Chapter 3

Strain/counterstrain research

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CHAPTER CONTENTS

INTRODUCTION

Strain/counterstrain has been emerging as an evidence-based osteopathic manipulative therapy since the first effects were described based on the clinical experience of Lawrence Jones, over 60 years ago (Jones 1964). The development of strain/counterstrain has been strongly influenced by the empirical clinical observations of Dr Jones (Jones 1995).

Individual treatment successes with patients have led thoughtful clinicians to develop plausible theories to explain their observed clinical phenomenon. While some may accept clinical theories at face value, inquiring clinician–scientists pose and test hypotheses to confirm or deny foundational theories.

Clinical researchers seeking to determine the physiological effects of strain/counterstrain have used a variety of research methods to increase understanding of multiple aspects of strain/counterstrain. Ultimately, more research into the effects of strain/counterstrain on symptomatic patients measuring functional ability and participation restriction outcomes – as defined by the International Classification of Functioning, Disability and Health (WHO 2001) – must be conducted to provide sound rationales for its use in health care (Fig. 3.1).

The path of discovery from inception to evidence-based clinical practice for strain/counterstrain is the same as for any medical innovation. This chapter defines evidence-based practice, describes the different levels of evidence available and reviews the available scientific literature that inform clinical decision-making related to strain/counterstrain in the context of the individual patient.

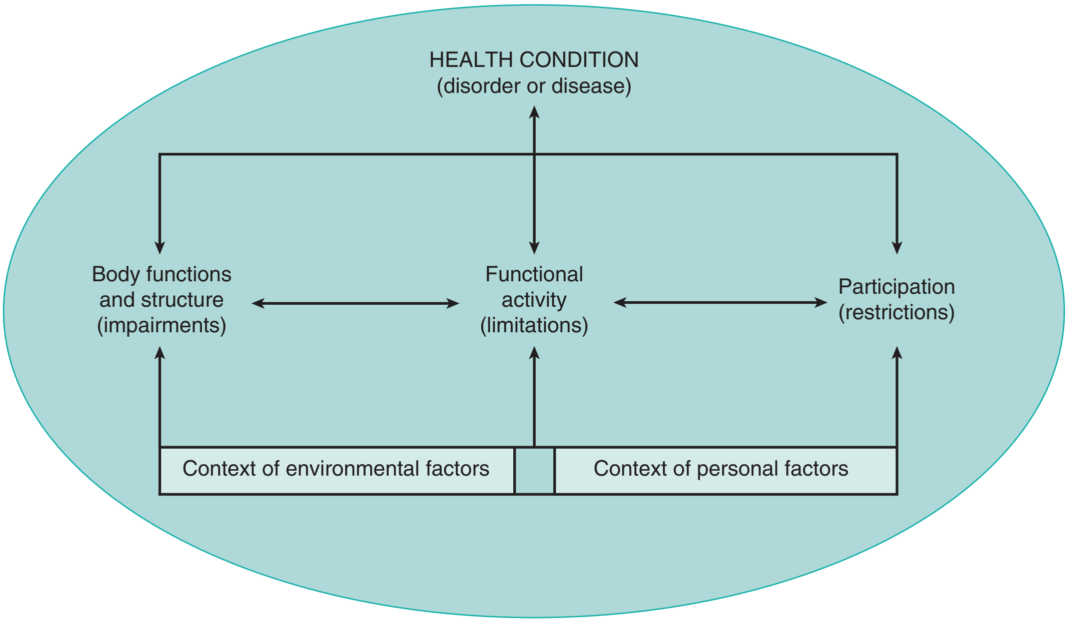

Figure 3.1 International Classification of Functioning, Disability and Health. *(Adapted from the World Health Organization.)*

EVIDENCE-BASED PRACTICE

Evidence-based medicine has been described as the 'conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients' (Sackett et al. 1996). Evidence-based medicine requires the integration of each practitioner's clinical expertise with the best available research evidence in the context of the individual patient's needs and preferences. Inherent is the need for the practitioner to make a professional analysis of the facts related to each case in making judgements as to the best clinical decisions for each individual patient (Fig. 3.2).

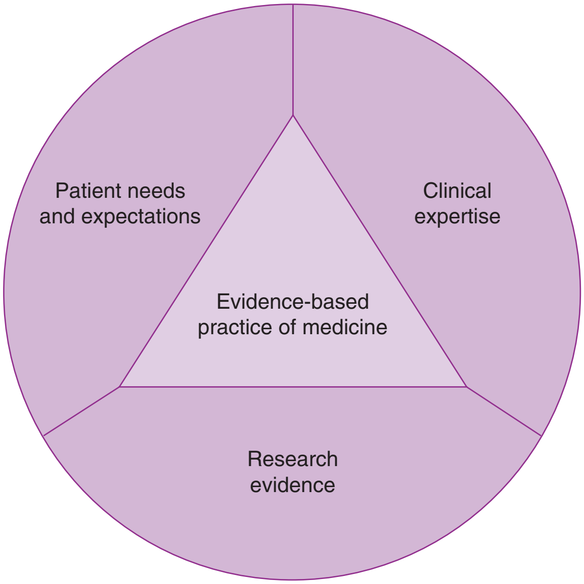

Figure 3.2 Model of evidence-based practice. *(Adapted from the Oxford Centre of Evidence-Based Medicine.)*

The clinical interaction

Each clinical interaction begins with the individual patient seeking care. Their visit is typically prompted by a health problem. However, each health problem is often not as simple as the identified pathological entity. Major medical problems can lead to other system involvement beyond the primary diagnosis that becomes apparent once the medical crisis is averted. For instance:

- Myocardial infarct may lead to inactivity that affects the pulmonary and digestive system.
- Pathology of various body systems can lead to residual musculoskeletal system dysfunctions.
  - Open-heart surgery for a coronary artery bypass graft may later affect shoulder function.
  - A stroke can lead to joint contractures that persist even after neurological function returns.
  - Autoimmune disorders can lead to delayed connective tissue and joint healing.

- Similarly, musculoskeletal problems can impact the function of other physiological systems.
  - For instance, the common problem of chronic nonspecific low back pain can lead to decreased activity, poor cardiac health and depression (Waddell 1998).

Patient needs and expectations

Beyond the precipitating health problem, the patient brings their own health and healthcare expectations related to their individual and cultural characteristics to every healthcare interaction. Patients may respond to treatment differently depending on their backgrounds, preferences and the settings in which they receive care. Pain tolerance, personal preference and individual participation goals may influence the type of care received.

Clinical expertise

Each clinical practitioner brings different levels of knowledgeable expertise, skill sets and empathy for the patient's unique sociocultural background. The practitioner's academic background, clinical practice and life experience shape their professional ability. How each practitioner uses these assets to make a clinical decision varies.

Clinical decision-making

During teaching rounds, clinical decisions may be arrived at through a hypothetical deductive process that involves the collection of clinical data to analyse that can prove or disprove clinical hypotheses and ultimately results in logical clinical decisions (Rothstein 2003). In the busy treatment room, clinical decisions may be made in a less circumspect manner based on recognition of a familiar clinical pattern (Croskerry 2009), what a practitioner has seen done before by more experienced clinicians (Tichelaar 2010), heuristic trial and error problem-solving (Hicks & Kluemper 2011) or other intuitive processes.

Sometimes left unexplored are the many subtle biases that can affect our decision-making process. Clinician personality (Dunphy 2009), individual preferences and skills (Hicks & Kluemper 2011) and social biases (Greenberger et al. 2012; Poon & Tarrant 2009; Steed 2010) may all influence our clinical decisions without conscious consideration.

These biases may especially affect care when external professional input or collaboration is absent, as unexamined experiences can reinforce the existing viewpoints. As a result, making clinical decisions based solely on one's clinical expertise is inherently tainted by bias. Although individually we can all recount clinical successes, it is impossible to separate those successes from our biases and uncontrolled variables, such as the natural healing process, over time.

Even when a treatment was successful, do we truly know why it was successful? And from a larger perspective, even when one practitioner has success using a treatment, should the treatment be taught if it cannot be shown as effective for other practitioners?

Research evidence

While not specific to any case and separate from clinical experience, evidence derived from research provides a critical element to the clinical decision-making of expert practitioners (Tichelaar 2010). The best available research evidence can be considered a source of external professional input.

Research provides additional insight regarding many elements that go into clinical decision-making for different patient scenarios. Research findings on strain/counterstrain address issues from the theoretical assumptions underlying clinical judgements, the reliability and validity of clinical examinations and the effectiveness of a treatment for a given condition considered across subjects, settings and practitioners.

The use of research evidence in clinical decision-making may ameliorate some natural biases in the patient–clinician interaction, although research findings do not prescribe a course of action for any individual patient. Integrating each individual patient's needs and preferences with a thoughtful and experienced analysis of the clinical presentation and consideration of the available research evidence to determine the best possible clinical decisions is the basis of evidence-based medicine.

LEVELS OF RESEARCH EVIDENCE

The level of research evidence in Table 3.1 depicts different levels of evidence derived from different research study designs and denotes the type of conclusions that can be drawn from the evidence. Each level of evidence has value, particularly for a relatively new treatment method such as strain/counterstrain.

- **Laboratory research** testing physiological responses provides the rationale for the development of the fundamental theories upon which strain/counterstrain has been based.
- **Methodological studies** provide insight into the validity and reliability of the methods used to assess the outcomes.
- **Case studies and expert opinions**, with or without case examples, describe a range of possible applications for a treatment and the theories upon which it is based. Included in this level are incidental findings extrapolated from other study designs.

Table 3.1 Levels of research evidence

Level of evidence	Syntheses	Single studies	Non-studies	Recommendation grades	Possible conclusions
I	SRs and meta-analyses of RCTs	RCTs	–	A	It is shown that …
II	SRs of cohort studies	Cohort studies, low quality RCTs	–	B	It is likely that …
III	SRs of case–control studies	Case–control studies	–	B	It is possible that …
IV	Case series, small or low quality cohorts	Single cases	Extrapolated findings of Level II–II evidence	C	There are signs that …
V	Clinical practice guidelines	Methodological and laboratory research	Expert opinions	D	Experts think that …

SR, systematic reviews; RCT, randomized control trials.

- **Quasi-experimental designs** such as case–control and cohort studies are preliminary tests of the theories applied to groups of subjects. While quasi-experimental studies lack the controls required to draw firm conclusions regarding cause and effect, such studies show potential effects that can generate or refine theory and application for further study (Portney & Watkins 2009).
- **Experimental studies** shed light on the cause and effect of treatments through more stringent bias control – primarily randomization, comparison groups and blinding.
- **Systematic reviews** of multiple studies, particularly when outcomes are combined and analysed through meta-analysis, demonstrate the strength of compiled evidence for the cause and effect of treatments from multiple trials in various settings conducted with different subject populations by different researchers.

While not extensive, the available evidence for strain/counterstrain represents all levels of evidence.

Quality research methodology

Beyond the study design, other basic tenets of good research apply to strain/counterstrain research. Studies should specifically define the purpose and hypotheses to be tested. Incidental findings extrapolated from the primary study are not as credible, since the study was intended and designed for another purpose and factors potentially affecting the incidental findings may not have been controlled for. Study methods should be clearly described to allow duplication of the research, including the experimental treatment, outcome assessment and data analysis. The research method should isolate the experimental treatment to avoid confounding of the results by co-interventions.

In order to provide the strongest evidence for a causal relationship between a treatment and the observed effect, the effect of the isolated treatment should be compared with a comparison treatment, involving subject groups similar in composition (Portney & Watkins 2009).

While research into some treatments can be effectively compared with placebo treatment, such as detuned ultrasound, the most stringent studies of manual therapy techniques, including strain/counterstrain, use a sham manual treatment. Sham manual treatment accounts for the potential positive effect of simple human touch on the measured outcomes. To be most clinically applicable, subjects should have characteristics and symptomatic conditions analogous to patients seen commonly by clinical practitioners.

Well-designed and thoroughly reported research can promote greater understanding of the theoretical foundations and clinical effects of strain/counterstrain. Knowledge of the quality and key findings of the available evidence, when combined with the practitioner's clinical experience and understanding of the patient's needs, contributes to sound clinical judgements.

The rest of this chapter summarizes the available strain/counterstrain research starting with the foundational level and continuing through clinical research to the top level of evidence, noting relevant research design and methods, with potential connections drawn to clinical application of strain/counterstrain techniques.

STRAIN/COUNTERSTRAIN RESEARCH

Theoretical foundations

Much of the theoretical foundation for strain/counterstrain was based on the work of Korr (1975) who described a potential mechanism of action to explain the effects of strain/counterstrain and other manual therapies. His analysis and explanation of the neurophysiological research led to the proposed theoretical link between the proprioceptors, particularly the muscle spindle and musculoskeletal dysfunction (Korr 1975).

Korr's foundational work formed the basis of the proprioceptive and nociceptive theories of strain/counterstrain (D'Ambrogio & Roth 1997). More recent research has attempted to test the theoretical underpinnings of strain/counterstrain by measuring physiological responses in laboratory research.

Neurophysiological reflexes

Research using human physiological testing has explored the effect of strain/counterstrain on neurophysiological reflexes. To explore the role of the muscle spindle and the hypothesis that sensitivity of the deep tendon monosynaptic stretch reflex contributes to range-of-motion restrictions, Howell et al. (2006) measured stretch and H-reflex latency and amplitude before and after strain/counterstrain treatment (Box 3.1).

1. Achilles tendonitis

Standardized treatment was directed specifically to the Achilles musculotendinous complex in people with Achilles tendonitis, and compared with a sham strain/counterstrain treatment of asymptomatic control subjects, using a case–control design study.

The control group experienced no changes. In the treatment group there was an 18–26% reduction in gastrocnemius and soleus stretch reflex amplitudes. This occurred without any apparent change to the H-reflex. The H-reflex is stimulated directly in the popliteal fossa, and measured at the Achilles tendon, bypassing stretch stimulation of the muscle spindle. The results suggest that strain/counterstrain treatment affected the sensitivity of the muscle spindle, thought to be heightened by the existence of tendonitis (Howell et al. 2006).

Questions about the role of the H-reflex in the stretch reflex loop, and comparison between non-equivalent groups in this case–control study precluded a firm conclusion. Asymptomatic control subjects may have had normal reflex amplitudes at the outset, which would make treatment effects unlikely.

2. Plantar fasciitis

A similar study from the same laboratory sought to confirm the finding that strain/counterstrain decreased stretch reflex amplitude. Subjects with plantar fasciitis received strain/counterstrain to the foot, ankle and lower leg but did not experience the same reflex effects on the Achilles tendon (Wynn et al. 2006).

While the results of these two studies appear to conflict, the study by Wynn et al. (2006) did not standardize or describe the specific treatment, and the Achilles musculotendinous unit may not have been consistently targeted by the strain/counterstrain treatment.

Without a standardized strain/counterstrain treatment, specifically directed to the tissue in question, a neurophysiological reflex effect of the target tissue – in this case the Achilles tendon – would be unlikely.

The findings by Howell et al. (2006) are the strongest evidence to date for a strain/counterstrain effect on the stretch reflex but require confirmation through additional well-controlled research.

> Box 3.1 **Stretch and H-reflex stimulation for measurement**
>
> Stretch reflex:
> - Elicited by rapid movement into 5 degrees of ankle dorsiflexion.
>
> H-reflex:
> - Elicited by tibial nerve stimulation in the popliteal fossa.

Muscle excitability and stretch reflex

Other laboratory research exploring the possibility that strain/counterstrain can affect stretch reflex amplitude, as a measure of muscle excitability, has demonstrated that a combination of non-thrust manual therapies, including strain/counterstrain, can reduce the amplitude and reduce side-to-side asymmetries (Goss et al. 2012).

The existence of co-interventions makes it impossible to draw conclusions from this research. Potential alteration of neuromuscular reflex activity or muscular excitability after strain/counterstrain, supports the notion that reducing spasm could interrupt the pain–spasm cycle. Evidence to support the notion of a circular pain–spasm cycle, however, is lacking, and the theory has been recently questioned. Laboratory research to stimulate noxious stimuli to muscle and subcutaneous tissues of conscious humans, generally decreased muscle spindle activity and did not increase muscle activity consistent with spasm (Birznieks et al. 2008). Pain is a complex entity influenced by more than local stimuli and this study did not examine whether pain, related to preexisting spasm, could be reduced by decreased muscle excitability.

Circulatory effects theory of strain/counterstrain

Another line of inquiry has explored the theoretical underpinning of the circulatory theory of strain/counterstrain (D'Ambrogio & Roth 1997).

The most often cited study observed that in a cadaveric shoulder, dye injected into the vasculature of the rotator cuff of the shoulder remained static when the shoulder was positioned in neutral, but circulated freely when positioned in flexion–abduction–external rotation – the position for strain/counterstrain release of the rotator cuff (Rathbun & Macnab 1970).

This finding, however, was an incidental finding, as the study was not intended to test the circulatory theory of strain/counterstrain but rather to explore the circulation of the rotator cuff and its potential impact on healing and injury.

A different study, potentially related to circulatory effects, found that temperature measured with thermography decreased at tender points after a mixed intervention of three osteopathic techniques, including strain/counterstrain (Walko & Janouschek 1994). This finding also cannot be attributed to strain/counterstrain due to the existence of co-interventions, and the impact of decreased tissue temperature on healing remains unclear.

Cellular inflammation and healing

A study related to the cellular effects of injury and healing was performed on fibroblasts in tissues that had been exposed to strain, compared with control tissue (Dodd et al. 2006). Strain conditions of >10% increased interleukin (IL6) concentrations and cell proliferation, indicating cell healing in response to injury, over the non-strain control condition. Once strain conditions increased by 30%, cell viability and metabolic response decreased precipitously (Dodd et al. 2006). Whether strain/counterstrain may provide benefit to tissues through a circulatory effect has been examined at the cellular level. Meltzer & Standley (2007) sought to assess the potential effect of strain/counterstrain on inflammatory interleukins that could influence tissue healing. This laboratory study attempted to mimic a condition of chronic repetitive strain in tissue samples and to explore the effect of tissue shortening, similar to a strain/counterstrain treatment, applied to that tissue.

Cells exposed to repetitive strain demonstrated an inflammatory response measured by increased secretion of pro-inflammatory interleukins and decreased cell proliferation. When the strained cells were then treated with tissue shortening designed to approximate the clinical effect of strain/counterstrain, the cells secreted less pro-inflammatory interleukins including IL6 and had increased cell proliferation compared with the conditions that had only repetitive strain and recovery conditions (Meltzer & Standley 2007).

The findings suggest that tissue shortening, characteristic of strain/counterstrain treatment, can reduce some inflammatory mediators when inflammation is excessive and reverse the decreased cell proliferation that occurs after repetitive strain. While the results support the hypothesis that strain/counterstrain can promote a healing environment for strained tissues, confirmation through additional research is needed. This kind of laboratory research is critical to test and potentially confirm the theoretical underpinnings of strain/counterstrain and provide insight into the biophysiological processes that result.

The tender point phenomenon

The treatment of strain/counterstrain depends heavily on the local identification and assessment of the palpation tenderness of defined tender points. An underlying assumption is that the tender points are quantifiably different from other tissues. If such tender points exist, treatment of them is also based on the assumption that tender points can be validly and reliably assessed.

The uniqueness of tender points compared with healthy tissue has been explored. Lewis et al. (2010b) examined electrical, temperature and vibratory detection thresholds, as well as electrical, temperature and pressure pain thresholds. A single examiner assessed a preselected set of tender points in the lumbo-pelvic region of 15 subjects with low back pain and 15 asymptomatic controls.

Significantly lower electrical detection and pain thresholds were found for the symptomatic tender points of subjects with low back pain compared with corresponding asymptomatic contralateral tender points. Significantly lower tender point thermal pain thresholds were found for subjects with low back pain compared with asymptomatic control subjects and asymptomatic contralateral tender points, although not consistently at all tender points (Lewis et al. 2010b). Based on the results of this single study, tender points appear different from surrounding tissues, corresponding points on asymptomatic subjects or non-tender contralateral points.

Methodological research

Assuming that tender points exist as identifiable entities, the reliability and validity of tender point palpation must also be established. Methodological studies play an important role because valid and reliable measurement methods are necessary to test the theories upon which strain/counterstrain has been based. Perhaps the most central assumption is the validity of the palpation method generally used in strain/counterstrain treatment. Most SCS practitioners and texts (D'Ambrogio & Roth 1997; Jones 1995) describe a tender point palpation pain assessment derived from Travell's work with trigger points in which the tenderness of the point is assessed based on the response of the patient.

A 'jump sign' or withdrawal reaction denotes significant tenderness (Simons et al. 1999). Patient response, however, can vary with individual characteristics and culture (Green 2006). When manual tender point palpation tenderness commonly identified by strain/counterstrain practitioners was compared with a subject-reported visual analogue scale of pain, the commonly used tender point palpation technique was not as reliable as the visual analogue scale for determining tender point palpation tenderness (Wong & Schauer 2004).

It was noted, however, that in clinical practice, a visual analogue scale, which would have to be repeated for each tender point treated, may be too unwieldy to be practical.

Testing tender point identification

The ability to reliably identify tender points has been tested in a study of experienced clinicians examining both symptomatic and asymptomatic subjects (McPartland & Goodridge 1997). The two testers showed moderate agreement with a Cohen's kappa value $\kappa = 0.45$ for symptomatic subjects. Agreement was low for asymptomatic subjects $\kappa = 0.19$.

While the percentage agreements for asymptomatic and symptomatic subjects were 59% and 73%, respectively, adjusting for chance agreements using the kappa statistic makes the kappa value a more realistic picture of the reliability of the tender point palpation. Substantial agreement would be indicated by kappa values >0.6 and excellent agreement indicated by values >0.8 (Portney & Watkins 2009).

While agreement was only moderate, identification of strain/counterstrain tender points was more reliable than identification of somatic dysfunction using the traditional osteopathic TART examination system (Tissue texture, Asymmetry, joint Restriction and Tenderness, see Chapter 2), which demonstrated only fair agreement (McPartland & Goodridge 1997).

Tender points in osteopathic education

The teaching of practitioners to identify different tender points should also be established. A recent multi-institutional study of five osteopathic schools identified strain/counterstrain points that were tender, a majority of the time, among osteopathic medicine students. These high yield strain/counterstrain points, as well as others deemed clinically useful, based on expert opinion, were compiled in a recommendation of strain/counterstrain points to teach in Doctor of Osteopathy schools (Snider et al. 2013).

An interesting finding of the study was the number of tender points found to be positive in the sample of asymptomatic students. A total of 40 of the 78 tender point groups studied had at least one positive tender point in over 50% of the students. The effectiveness of strain/counterstrain teaching has not been studied.

Case reports and expert opinions

Published case reports and expert opinions and recommendations provide examples of potential applications for strain/counterstrain. In a sense, reading expert opinions and case reports is like sharing the experiences of other clinicians in a larger forum.

Clinical experiences have great face validity, as they are real life experiences and capture the complexities of clinical practice in a way that a randomized control study cannot. The outcomes are individual and not average group outcomes, as reported in single or multiple group studies. Case studies, however, carry implicit bias. Authors tend to only report successful outcomes, and journals tend not to publish reports of unsuccessful cases. In addition, the conduct of most cases would not be stringently controlled.

Regardless of the outcome, without controlled comparison among multiple subjects of the isolated use of strain/counterstrain, no conclusion can be drawn with respect to cause and effect. In this regard, studies that use strain/counterstrain as one undifferentiated aspect of an experimental osteopathic manipulative treatment (OMT) provide the same information as case studies (Box 3.2).

This section summarizes the available published peer-reviewed case reports, thus eschewing editorials and clinical recommendations, texts, continuing education manuals and other non-peer-reviewed work. Selected studies, in which strain/counterstrain was applied as one aspect of a more OMT, have also been included. The combined reports provide insight into the potential applications of strain/counterstrain in various healthcare settings, for different diagnoses and presentation severities, involving multiple body segments and using a range of durations and frequencies.

Acutely ill, hospitalized patients

While most strain/counterstrain treatment is applied in outpatient settings, use of strain/counterstrain has been reported in studies with mixed interventions. Strain/counterstrain has been used in combination with other treatments in cases of visceral problems, such as pancreatitis (Radjieski et al. 1998).

In total, 15 patients with pancreatitis were randomly assigned to receive standard medical care or standard care and daily OMT including strain/counterstrain. The attending physician was blinded to group allocation. The strain/

Box 3.2 Osteopathic manipulative treatment

Osteopathic manipulative treatment (OMT) typically refers to the many manual techniques performed by osteopathic physicians to alleviate dysfunction within the body's structural framework, including skeletal, arthrodial, myofascial and associated vascular, lymphatic and neural structures. The most common techniques included in OMT are soft tissue, high-velocity low-amplitude thrust, muscle energy, counterstrain, myofascial release; but the range of techniques also include cranial sacral (Johnson & Kurtz 2003).

Clinicians in other professions including physical therapists and chiropractors use similar techniques. Varying nomenclature and intended effects among the professions can make comparisons between disciplines or systematic syntheses of study findings difficult (Licciardone et al. 2005).

Regardless of the profession, combining multiple techniques in a single treatment causes confounding among the co-interventions and precludes conclusions regarding the effect of any specific technique. Similarly, varying the technique or combination of techniques from subject to subject causes confounding among the subjects. Although understandable in a clinical setting to address each person's individual characteristics, varying treatment among research subjects confounds the results and prevents confirmation of the findings through independent reproduction of the study methods.

Osteopaths diagnose the specific function based on the four TART criteria: tissue texture abnormality, asymmetry, restriction of motion or tenderness (Licciardone & Kearns 2012) – as described in Chapter 2.

counterstrain group was discharged in 3.5 fewer days on average than the control group (Radjieski et al. 1998). The suggestion that strain/counterstrain can be utilized with acutely ill patients was described earlier in an opinion by Schwartz (1986) and has been explored clinically by other strain/counterstrain practitioners.

With comparatively few cases of in-patient hospital-based care reported, strain/counterstrain appears most often utilized in the outpatient setting. Patient cases with musculoskeletal diagnoses of various severities affecting both lower and upper quarters have been reported.

Complex regional pain syndrome of the foot and ankle

Strain/counterstrain has been applied in an outpatient setting to an adolescent in a case of complex regional pain syndrome of the foot and ankle (Collins 2007). Complex regional pain syndrome presents musculoskeletal deficits but has neurologic origins. In this case, the subject was treated once or twice per week over 6 months with benefits observed in pain, range of motion, balance and gait functions. Descriptions of the foot and ankle techniques used in Collins (2007) were first published by Jones (1973).

Iliotibial band friction syndrome

Pedowitz (2005) described a case of an athletic man with lateral knee pain attributed to iliotibial band friction syndrome treated with strain/counterstrain within a comprehensive treatment plan that also included modalities, exercise, orthotics and medication, five times over a 2-week period with success.

Low back pain

Lewis & Flynn (2001) reported four cases seen in an outpatient rehabilitation department that received strain/counterstrain three times over 1 week to treat low back pain with success. While no other treatment occurred during the strain/counterstrain treatment period, total care also included joint manipulation and soft tissue mobilization, exercise and ergonomic training. The sacral points treated were the topic of earlier expert opinion by (Cislo et al. 1991) in collaboration with (Ramirez et al. 1989).

Neck and jaw pain

In the upper quarter, strain/counterstrain to the cervical region has been used for three sessions for four cases of musculoskeletal torticollis in which pain was decreased, ROM and function increased after strain/counterstrain (Baker 2013). Strain/counterstrain has also been combined with massage to the neck and upper anterior chest to reduce jaw pain and increase jaw opening (Eisensmith 2007).

Tension-type headache

Another single case report of an individual with tension-type headaches also derived benefit from passive positioning treatment similar to strain/counterstrain applied over three sessions to address common neck trigger points: upper trapezius, spinalis, SCM and suboccipital muscles (Mohamadi et al. 2012). The emphasis in this study on the use of passive positioning to treat trigger points, which reside primarily in muscle tissue, may not capture the scope of strain/counterstrain tender points that are often located on osteopathic structures but still provides examples of strain/counterstrain application.

Fibromyalgia

Management of more generalized pain was addressed in a case of myofascial pain syndrome that progressed to fibromyalgia severe enough to include an earlier hospitalization (Dardzinski et al. 2000).

In another study of people with fibromyalgia seen weekly over 23 weeks, four randomly assigned groups including mixed OMT, OMT and teaching, moist heat placebo or current medication only. The OMT treatment consisted of counterstrain and any combination of soft tissue mobilization, myofascial release, cranial-sacral therapy or muscle energy techniques. Pain and daily function outcomes favoured the strain/counterstrain groups (Gamber et al. 2002). Though the individual hands-on attention provided to the two strain/counterstrain groups are likely to have a strong biasing effect on the results, this study shows that patients with widespread musculoskeletal pain can be treated with strain/counterstrain.

Balance impairment

Beyond musculoskeletal dysfunctions, strain/counterstrain has been used for neurological dysfunction in an outpatient setting. Balance impairment in 40 elderly community dwellers with vestibular dysfunction was treated with a combination of osteopathic treatments in a non-random control trial. After four half-hour treatments including myofascial release, counterstrain and cranial-sacral techniques for subjects in the experimental group, a significant reduction in AP sway was observed (Lopez et al. 2011).

Overall, strain/counterstrain has been applied in cases of acutely ill individuals in hospital settings as well as those less medically vulnerable in outpatient settings. Patient presentation ranged from a youth to older adults with pain of likely orthopaedic origin to complex cases with possible neurological involvement, and localized to wide spread musculoskeletal complaints. And treatment in these successful cases has ranged from as little as one session to multiple over a 6-month period.

Quasi-experimental designs: case–control or cohort studies

The process of clinical research into new treatment approaches often starts with successful cases in the clinical practice of individual practitioners shared through published case reports. While theoretical principles for strain/counterstrain were presented first in this chapter, research into the foundational theories has often been spurred by such clinical observations from case reports. After a successful case report has been documented, the next step is to determine whether the observation was unique or can be repeated.

The repeatability of the findings is important to establish because the results of a case report could be unique to the individual patient, practitioner or clinical scenario. Results may be exceptional or the analysis biased.

Quasi-experimental designs, such as cohort studies can preliminarily test the theory and strengthen the findings of a single case through the reporting of repeated cases. A cohort study can provide findings for multiple cases treated in the same manner. Cohort studies can be retrospective observations or prospective measures of a cohort of subjects.

A common form is a single group assessed before and after treatment, a simple pre-treatment and post-treatment design. Some cohort studies will report multiple measures from before and/or after treatment, such as follow-up measures. Other than the foundational research into Achilles tendon reflex changes (Howell et al. 2006), the case–control design, which uses a non-randomized non-equivalent comparison group compared with the experimental cohort, has been unusual in strain/counterstrain research.

Myofascial pain and fibromyalgia

In a retrospective cohort of people with myofascial pain syndrome, including 14 of 20 that had fibromyalgia, three sessions of strain/counterstrain were effective in improving symptoms by at least 50% in 19 of the 20 subjects and 15 of the 20 after 6 months at follow-up (Dardzinski et al. 2000).

Epicondylalgia

A prospective cohort of 10 people with lateral epicondylalgia, using strain/counterstrain in a comprehensive physical therapy plan of care was also found to be effective in significantly reducing pain and increasing wrist range of motion and strength (Benjamin et al. 1999).

While providing stronger evidence than single case studies, since the number of subjects is large enough to run statistics and generate mean results, neither of these studies yield strong causative information about the effect of strain/counterstrain. This is due to the mixed subject group in the first study, the lack of control applied to the treatment in the latter study, and the lack of comparison group in both studies.

In summary, these studies highlight possible outcome effects to measure in future studies, such as pain, range of motion, strength and function.

Experimental designs: control trials

Elements of experimental design research

Control trials provide a controlled environment that allows cause and effect of strain/counterstrain to be interpreted with more confidence.

One primary element of a control trial is the use of a control group to compare with the experimental group that receives the treatment of interest. Another primary element is the random assignment of a homogenous set of subjects to the control and experimental groups.

Comparisons among the randomly assigned experimental and control groups – the classic randomized control trial – allow the effects of the different conditions to be compared with confidence and thus causation to be determined. Multiple elements of study design affect the strength of any eventual findings derived from a randomized control trial. The treatment provided to the comparison group is a critical element.

- **No-treatment** control conditions are common and demonstrates the difference between no treatment and the experimental treatment. Receiving no treatment, however, can bias subject experience positively towards the experimental treatment because the control subjects may easily perceive that they received no treatment.
- **Placebo treatment** can be used to ameliorate this effect. An inert pill, a detuned ultrasound head, or an educational video are all examples of placebo treatments designed to suggest to the subject that a treatment has been received. Placebo treatments, however, are vulnerable to bias when the experimental treatment is a hands-on manual therapy treatment, such as strain/counterstrain. The simple human act of touching may confer warmth, caring or other beneficial effects regardless of specific treatment effect.
- **Sham treatment** can be used to address this source of bias in manual therapy studies by including human touch instead or in addition to a control or placebo condition. In this way, the effect of the manual therapy treatment can be differentiated from the effect of simple human touch.

Strain/counterstrain as a sham treatment comparison

Regardless of the comparison condition, determining whether the group allocations remained blind throughout the trial by surveying the subjects, for instance, is a very stringent methodology that helps validate the study findings. Blinded sham comparison treatments are research design elements to attend to when reviewing randomized control trials.

One study specifically examined whether a simulated strain/counterstrain treatment including palpation, positioning and a 90-second holding time could be used as a sham without the subject or assessor detecting the group allocation (Brose et al. 2013). This randomized control trial stratified subjects by pain level and randomly assigned them to sham or strain/counterstrain treatment groups. The 26 subjects were not able to detect which group they had been assigned to even though pain reduction was associated with receiving real strain/counterstrain treatment. In addition, the blinded assessor was not able to detect the group allocation based on interactions with the subjects (Brose et al. 2013). These results suggest that strain/counterstrain can be effectively simulated and used as a sham treatment in manual therapy research.

Table 3.2 Methodological study quality tool

Methodological study criteria	Yes–Unclear–No
Groups were randomly assigned	
Treatment group allocation was concealed	
Subject was blinded to treatment allocation	
Care provider was blinded to treatment allocation	
Outcome assessor blinded to treatment allocation	
The recruitment and drop-out rates were reported	
Data from all subjects that began the study were analysed	
Groups were similar at baseline	
Treatments clearly described avoiding co-interventions/ confounders	
Compliance with the treatment conditions acceptable in all groups	
The outcome assessment timing similar in all groups	
All planned outcomes were reported	
Number of criteria met (yes)	

Methodological study quality criteria

Other aspects of research design weigh heavily on the quality of the study design and the eventual interpretation of the results as well. Study methodological quality can be assessed in a critical appraisal of the research using standard criteria (Table 3.2) often addressed in the publication process of many journals. Related to random group assignment is whether allocation to the experimental or control group remains concealed to the subjects and assessors. While possible in a study using placebo pills, it seems impossible to keep the care provider blinded from a manual therapy treatment study.

1. Complete subject data

Completeness of the data is also important in not biasing study findings: keeping track of the recruitment rate for subjects to enter a study and the number of subjects that do not complete the study is important. Subjects may not complete a study when they perceive little improvement, thus analysis without this group that was intended to receive treatment may bias the results. The subjects that are recruited to the different groups should be similar in characteristics in order to be compared.

2. Complete description of independent treatments

All treatment conditions whether sham or strain/counterstrain must be reported with enough specificity to be reproduced. To understand clearly what the effect of one treatment was, the study treatment should be independent from other co-interventions. This separation of one treatment from another is not common in clinical practice and occurs in the research treatment protocols within the literature as well. However, any finding that results from such a mixed intervention cannot be applied to any specific treatment. The treatment protocol should be consistently adhered to and the outcome consistently assessed.

3. Complete description of all outcomes

Missed treatment sessions, lack of information about home exercise adherence and variability of the follow-up time, are all research design elements that can bedevil the clinical researcher because subject behaviour falls outside the control of the researcher. Reporting all planned outcomes, however, is the researcher's responsibility and the selective reporting of some results while not reporting others denies the consumer of research full understanding of the findings.

A summary of methodological study criteria can be documented with various standardized rating tools like that used by the Cochrane Back Review Group (Furlan et al. 2009) to consistently record important elements of research methods (Table 3.2).

Overall, randomized control trials test specific hypotheses related to the effect of an experimental treatment on defined measureable subject outcomes, while controlling as many other aspects as possible. The controlled study environment allows conclusions to be drawn about the causative factors leading to the measured effects.

Because average outcomes for homogenous subject groups are typically reported for randomized control trial designs, however, the findings may not apply to an individual clinical case with unique characteristics. Outcomes resulting from experimental studies investigating strain/counterstrain include pain, tissue texture, range of motion, strength and function measures.

Pain

Musculoskeletal pain is one of the most frequent complaints of patients seeking care by their physicians (Jordan et al. 2010). The effect of strain/counterstrain on painful musculoskeletal conditions has been relatively rarely reported.

1. Neck pain and upper trapezius trigger points

One example is a randomized control trial of people with nonspecific neck pain and upper trapezius trigger points with blinded assessors (Nagrale et al. 2010). Subjects were randomly assigned to a control group that received a muscle energy technique described as contract–relax stretching or integrated neuromuscular inhibition technique treatment. The integrated neuromuscular inhibition technique included the same muscle energy technique applied after strain/counterstrain was applied for 20–30 seconds with three to five repetitions to reduce the discomfort resulting from ischaemic compression. The 60 subjects received 12 treatments over 4 weeks. Pain and neck disability index scores were all significantly improved with large effect sizes compared with the muscle energy technique treatment alone (Nagrale et al. 2010).

2. Upper trapezius pain and spasm

The finding of reduced neck pain after integrated neuromuscular inhibition technique stands in contrast to the findings of another randomized control trial. Perreault et al. (2009) studied 20 subjects with self-reported upper trapezius pain and spasm that were allocated to receive a single strain/counterstrain or sham touch treatment.

The subjects receiving strain/counterstrain had significant reduction in resting pain with large effect size immediately post-treatment. However, this change was not different from the sham procedure, which also had a large effect size pain reduction 24 hours after treatment (Perreault et al. 2009). Although the sham procedure was certainly different from the strain/counterstrain position for the upper trapezius, positioning the neck in slight rotation could affect other cervical tender points that can affect pain in the neck region.

Both studies included people with neck pain, but inclusion standards for the Nagrale et al. study (2010) were more stringent. Baseline pain in the Nagrale et al. study (2010) was rated on a visual analogue scale of more than 8 out of 10, while the baseline pain in Perreault et al. (2009) was 1 out of 10. The low pain rating on the visual analogue scale suggests that an essentially asymptomatic population may have little room for improvement (Perreault et al. 2009).

3. Neck pain

In extrapolated findings from a pilot randomized control trial study with 26 subjects investigating the feasibility of simulated strain/counterstrain position as a sham for use in future research, cervical pain was reduced after strain/counterstrain treatment compared with the sham condition. The incidental nature of the findings and the incomplete description of the numeric pain rating assessment used made firm conclusion impossible in this study (Brose et al. 2013).

Low back pain

One other study included people with low back pain rated from between 3 and 4 out of 10 on a visual analogue scale for both experimental and control groups. Treatment four times over 2 weeks was provided with the control group performing exercise that included abdominal bracing, knee to chest and trunk roll stretching, and the experimental group receiving strain/counterstrain combined with the exercises. Strain/counterstrain did not have a significant impact on pain level compared with exercise alone at four time points from 0 to 28 weeks (Lewis et al. 2010a).

Overall, there is limited evidence documenting reduction in general or regional pain for subjects with painful conditions after isolated strain/counterstrain treatment. The improvement in global rating of change reported by Collins (2014) in a randomized control trial of people with chronic ankle instability could be construed as a reduction in pain but was not defined as such. Reduction in tender point palpation pain has been reported more frequently and will be discussed in the systematic review section, as there were sufficient studies to perform a meta-analysis (Wong et al. 2014).

Tissue texture

Tender points in strain/counterstrain treatment are identified by palpation with the recognition that the tender point has a different tissue texture than surrounding tissue. Tissue texture can be quantified with a durometer that can measure the hysteresis, which takes into account the force applied, the responding tissue resistance and the tissue response time.

A randomized control trial with blinded subjects and assessor, by Baker et al. (2013), compared the effects of a sham and four osteopathic manipulative therapies. Strain/counterstrain appeared to significantly increase hysteresis, more than other treatments, based on a comparison of median values. Unclear recruitment inclusion criteria, inconsistent randomization methods, unspecified conditions for each treatment group and incomplete statistical analyses weaken the results of this study (Baker et al. 2013).

Range of motion

Range of motion has been less frequently measured as an outcome of strain/counterstrain than pain and tenderness.

1. Hamstring flexibility

The first study to examine the effect of strain/counterstrain on range of motion was a randomized control trial using a crossover design to study the effect on hamstring muscle flexibility measured in active knee extension from the supine 90-degree hip position. No significant difference was found between the experimental group and the control group, which received a sham manual positioning treatment (Birmingham et al. 2004).

While the result of this study was that strain/counterstrain had no effect on hamstring flexibility, this study of 33 asymptomatic individuals had research design flaws that could have affected the outcome.

- First, the asymptomatic individuals were included if they lacked at least 10 degrees of motion; a small limitation that may not have provided the potential for larger improvements in individuals who present with musculoskeletal dysfunction.
- Second, the crossover design, used by some researchers to increase the analysed sample size, exposes subjects of both groups to the same treatments. When study treatments can be reasonably expected to produce a lasting change, the results of crossover study designs can be confounded by co-intervention of the other treatment conditions. Even though this study employed a week long wash-out period between the two treatments, evidence from case reports and cohorts discussed previously suggest that beneficial effects of strain/counterstrain could last for 6 months (Dardzinski et al. 2000).
- Third, the strain/counterstrain treatment selected addressed only the lateral hamstring muscles, thus subjects with impaired motion related to the untreated medial hamstrings could be less affected.

2. Hip flexor flexibility

The effect of strain/counterstrain on lower extremity muscle flexibility was also examined in an unpublished dissertation that used a randomized control trial design with symptomatic individuals with low back pain and/or lower extremity dysfunction. The control group in this study received a manual hip flexor muscle stretch, while the experimental group received strain/counterstrain.

The strain/counterstrain group gained significantly more hip flexor flexibility than the control group, with an average difference >10 degrees (Dempsey 2001). The use of subjects with heterogeneous presentations combined with the fact that this research was never published, relegates the findings to the level of expert opinion, despite the more stringent research design.

3. Neck mobility in non-neurological neck pain

Klein et al. (2013) reported the results of a study of 61 subjects with non-neurological neck pain and a cervical joint block restricting normal joint movement of at least one cervical level. Subjects were randomly assigned to a single individual strain/counterstrain treatment, that was not described, or sham treatment before other osteopathic treatment was performed.

Cervical range of motion measured with a cervical rotation goniometer found the strain/counterstrain group increased rotation range of motion by 2%, while the manual sham group increased by an insignificant 0.6%. After the individualized osteopathic treatment, both groups had gained around 5% range of motion and there was no significant difference for the experimental group (Klein et al. 2013).

In this study, subjects were included when identified as having reduced cervical range of motion due to joint restriction. Without clear description of the treatment in Klein et al. (2013), it remains unknown whether the strain/counterstrain treatment was directed towards a joint restriction or muscle tightness. The study described earlier in the Pain section by Nagrale et al. (2010) directed treatment to muscle and produced a large effect size increase in upper trapezius flexibility assessed with lateral cervical flexion range of motion.

Because strain/counterstrain treatment can be theoretically directed to muscle, such as the upper trapezius or joint restrictions at specific cervical levels using posterior cervical release positions, without clear description of the treatment used in Klein et al. (2013) it is difficult to analyse the meaning of the results and impossible to independently reproduce the treatment or study methods.

4. Masseter trigger points and active mouth opening

Two strain/counterstrain studies produced by research collaborations with multiple shared authors have investigated range of motion changes, as measured by active mouth opening in people with masseter muscle trigger points.

The first of these studies used 90 subjects randomly divided into three treatment groups that received strain/counterstrain, repeated contract–relax masseter muscle stretching or no treatment (Blanco et al. 2006). No significant effect of strain/counterstrain on active mouth opening was found compared with no treatment. Repeated contract–relax stretching produced a significant and large effect size change in mouth opening compared with the other groups when measured immediately after the single treatment (Blanco et al. 2006).

The second study used 71 subjects using a soft-tissue mobilization technique consisting of masseter muscle longitudinal stroking instead of the contract–relax stretching. The results showed strain/counterstrain and the stroking soft-tissue mobilization technique both produced significant and large effect size changes in active mouth opening compared with control (Ibáñez-García et al. 2009).

The second study utilized three sessions scheduled once per week with outcome assessed 1 week after the last session. The repeated strain/counterstrain treatments in this second study produced a 4 mm increase in active mouth opening range of motion, which when compared to the single session result of the first study (2 mm), may be considered more effective. This observation extrapolated from the findings of two studies is not a direct comparison. No experimental research into strain/counterstrain treatment dosing has been reported.

Differentiation of joint and muscle mobility effects in strain/counterstrain research

Range of motion outcome measures do not typically differentiate between joint mobility and muscle flexibility, although these are not identical entities. The Birmingham et al. (2004) study did ascertain that full knee joint extension was available before assessing hamstring flexibility with knee extension from a hip position of flexion. The two-joint hamstring muscle was clearly accommodated for and separate from hip joint range of motion.

Ascertaining the available joint motion in the absence of muscle tightness was not possible in the studies of active jaw opening. Although Blanco et al. (2006) and Ibáñez-García et al. (2009) directed treatment to muscle tissue, as specified by the inclusion criteria of masseter muscle trigger point, the strain/counterstrain positioning for the masseter involves lateral glide of the mandible at the temporomandibular joint.

It is possible that strain/counterstrain in this instance may have produced increased range of motion through joint alignment and mobility, since joint mobilization with lateral glides has also been reported to increase range of motion (Mulligan 2010).

Strength

As has range of motion, strength has been infrequently reported as an outcome measure after strain/counterstrain treatment.

1. Hip strength

The first study employing an experimental design with strain/counterstrain to measure strength effects – assessed as the maximal voluntary isometric contraction generated against a handheld dynamometer – included 49 subjects randomly assigned to an exercise-only control group, a strain/counterstrain group and a strain/counterstrain plus exercise group.

Subjects received strain/counterstrain for painful hip adductor and abductor tender points with all subject outcomes measured 2–4 weeks after treatment (Wong & Schauer-Alvarez 2004).

While the exercise-only group gained strength by the second session, the groups receiving strain/counterstrain with or without exercise had significant within group strength increases after the first session. The strength increases in the strain/counterstrain groups were significantly greater than the exercise group throughout the study. Total strength gains at follow-up ranged from 22% to 40% for the exercise group and 50 to 73% in the groups receiving strain/counterstrain (Wong & Schauer-Alvarez 2004).

Lack of a sham manual treatment and imprecisely standardized muscle testing and lack of assessor blinding limited the strength of the findings.

2. Arm muscle strength

A smaller study of 12 people with forearms that were tender to palpation at the supinator and pronator points, had more modest findings. This randomized control trial by the same author compared strain/counterstrain with a sham manual treatment condition in a subject and assessor blinded environment with a standard strength testing protocol that had been shown to be both reliable and valid in previous work (Wong & Moskowitz 2010).

After three sessions of strain/counterstrain for the pronator and supinator muscles over 3 weeks, increased within-group strength was apparent with significant between group pronator strength increase after strain/counterstrain (Wong et al. 2011).

Inconsistent results for supinator muscle strength, allocation of individual forearms to different groups, and analysis with one-tailed *t*-tests weakened the results of this study. Furthermore, neither of these studies examined the effects of strain/counterstrain on symptomatic individuals who may respond differently than those with symptomatic conditions.

3. Ankle strength

Another study to assess strength after strain/counterstrain treatment was a randomized control trial of a strain/counterstrain approach to treatment for people with chronic ankle instability and a history of ankle sprain (Collins 2014). The 27 study subjects were randomly assigned to strain/counterstrain or sham treatment groups for four treatment sessions over 4 weeks. Specific strain/counterstrain treatments were not detailed.

No significant strength gains were noted, despite significant improvement on functional balance testing (Collins 2014). Because treatment varied depending on individual presentation, it is unknown whether specific strain/counterstrain treatment was consistently directed to the ankle invertor and evertor muscles that were strength tested.

4. Wrist strength

A study that applied strain/counterstrain to the forearm wrist muscles found wrist extension strength increased significantly by 40% in patients with epicondylalgia (Benjamin et al. 1999). The effects of strain/counterstrain in this study, however, were confounded by other treatments including modalities, exercise and massage. Thus, strain/counterstrain may well have an effect on strength when treatment is directed specifically to the muscle to be assessed but independent confirmation with carefully designed studies is lacking.

Assessing strength effects in strain/counterstrain research

The conclusion as to whether strain/counterstrain could affect inversion and eversion muscle function after the generalized strain/counterstrain treatment reported by Collins (2014) was not possible because treatment may not have been directed to the particular muscles tested.

This was also the case in Wynn et al. (2006), which noted no change in Achilles tendon reflex amplitude after general and undefined strain/counterstrain treatment around the foot and ankle.

Specific effects on muscle contractions due to strain/counterstrain would appear to require isolated treatment directed to specific muscles. In research, the treatment and assessment of the treated muscles must be described in sufficient detail to be reproduced in order to draw conclusions about the observed effect.

Functional outcomes

If pain is the most frequent patient complaint, functional outcomes have the greatest impact on functional disability and participation limitations (WHO 2001).

1. Balance and ankle instability

Collins (2014) revealed an increase in functional balance performance in subjects with ankle instability after strain/counterstrain, although improvement in physical performance ability was not matched by subjective ability level measured by the self-reported Foot Ankle Ability Measure.

Functional balance performance was measured with the Star Excursion Balance Test, which involves balance on the affected leg, while reaching the other foot as far as possible in eight directions around a circle. Significant gains were made in seven of eight directions after strain/counterstrain compared with the sham treatment. Although subjects judged their global rate of change to be greater after strain/counterstrain, no change was noted in either the Activity of Daily Living or Sport subsections of the Foot Ankle Ability Measure (Collins 2014).

2. Global ratings

A similar result was found in a randomized control trial of 89 people with low back pain. Subjects received exercise alone or strain/counterstrain plus exercise. A significant difference in the global rating of change – patient-rated judgements about the overall improvement or worsening of their condition – favoured the strain/counterstrain group. However, no functional benefit was reported on the Oswestry Disability Index (Lewis et al. 2010a).

The apparent conflict between global ratings of change and self-reports of functional limitations or abilities may be explained by potential subject bias. Since neither study (Collins 2014; Lewis et al. 2010a) reported subject or assessor blinding, the possibility exists that subjects were biased in favour of the strain/counterstrain treatment on the global ratings of change. Global ratings of change have been shown to inadequately correlate with measures of functional change (Schmitt & Abbott 2015).

3. Neck disability scores

One study of patients with nonspecific neck pain and upper trapezius trigger points responding to integrated neuromuscular inhibition technique, demonstrated significantly improved neck disability index scores indicating less discomfort in daily activities commonly associated with neck pain (Nagrale et al. 2010).

In summary, investigations assessing functional activity and participation restriction outcomes (WHO 2001) of symptomatic patients have been infrequently reported. Treatment primarily using strain/counterstrain has more often been found to improve specific impairments in the available research.

Controlled studies investigating specific strain/counterstrain treatments for conceptually related impairment level outcomes are still needed to gain greater understanding of how strain/counterstrain affects body structures and functions. Clinical improvements in general functioning and participation gains for patients may require a more comprehensive approach than isolated strain/counterstrain treatment.

Systematic reviews and meta-analyses

Systematic reviews are a compilation of studies. Analysing studies together reduces the effect of the unique or exceptional finding of a single study by combining the results of multiple studies, not unlike collecting data from a subject cohort instead of a single case. When multiple study results present similar data with sufficient detail, the findings can be compiled and data aggregated in a meta-analysis.

The quality of the conclusions drawn from a systematic review depends on the quality of the studies reviewed. Thus, a review of cohort studies never rises to the highest level of evidence (Table 3.1).

One systematic review with meta-analysis examined the narrow question of whether strain/counterstrain affected tender point palpation tenderness (Wong et al. 2014). This review covering the 10 years from 2002 to 2012 included only experimental research examining the effect of isolated strain/counterstrain treatment on tender point palpation pain measured with a visual analogue scale.

The five studies that met the criteria demonstrated a significant pooled tender point palpation pain reduction with small (0.14) to large (1.15) effect sizes (Ibáñez-García et al. 2009; Lewis et al. 2010a; Meseguer et al. 2006; Perreault et al. 2009; Wong & Schauer 2004).

The meta-analysis for the 283 combined subjects included in the five studies demonstrated a pooled effect of an approximately 1/2 cm pain reduction on a 10 cm visual analogue scale.

The meta-analysis included asymptomatic (Ibáñez-García et al. 2009; Perreault et al. 2009; Wong & Schauer 2004) and symptomatic subjects (Lewis et al. 2010a; Meseguer et al. 2006) with tender points at the jaw (Ibáñez-García et al. 2009), upper trapezius (Meseguer et al. 2006; Perreault et al. 2009), lower back (Lewis et al. 2010a) and hips (Wong & Schauer 2004).

Heterogeneity among the studies related to the body regions examined, the mixture of asymptomatic and symptomatic subjects, and the small number of overall subjects led to a downgrading of the combined randomized control trial evidence to low quality, following the recommendations of the Cochrane Collaboration for ratings for systematic reviews of randomized control trials (Higgins & Green 2011).

The small pooled findings for tender point palpation tenderness reduction with strain/counterstrain compared to control conditions (Wong et al. 2014) when considered with the limitations of only moderate reliability for palpating tender points in the first place (McPartland & Goodridge 1997), may lead researchers to employ more objective outcome measures than palpation pain in future strain/counterstrain research.

STRENGTH OF RESEARCH RECOMMENDATIONS FOR STRAIN/COUNTERSTRAIN

Strain/counterstrain research is in a nascent stage. While support is not definitive for strain/counterstrain as the cause of the observed effects for any of the applications for which it has been recommended, this is not unusual for manual therapy in general. The evidence suggests that strain/counterstrain may well be the cause of changes in measureable outcomes, including pain, range of motion, strength and functional outcomes.

The small number of subjects included in research involving symptomatic conditions, flaws in research methodology, and conflicting results make firm conclusions impossible. The onus remains on manual therapy clinician researchers to design and conduct high quality research that will enhance our understanding of strain/counterstrain and outline evidence-based applications in health care.

Recommendation grades for research evidence

The Oxford Centre for Evidence-Based Medicine (OCEBM 2009) suggests recommendation grades for the available evidence supporting healthcare treatments.

- An A grade is given when the evidence is drawn consistently from Level I randomized control trial studies.
- A B grade is warranted when the evidence is consistently drawn from Level II–III studies, which include lower quality randomized control trials, as well as cohort and case–control studies.
- A C grade is given to Level IV evidence, such as case studies and extrapolated findings from Level II–III studies.
- A D grade is given to expert opinion, foundational laboratory research, theories developed from bench research, and other Level V evidence; or when the available studies are inconsistent, inconclusive, or have troublesome design flaws.

Any recommendation can be downgraded (–) due to limited available evidence or weaknesses within the combined evidence.

Design flaws include basic tenets of good experimental research such as employing independent interventions by eliminating co-interventions and clearly defining and describing the interventions so that other clinicians and researchers can reproduce the intervention.

A number of strain/counterstrain studies have not described the treatment protocols with enough specificity to reproduce the study or even the treatment for individual clinical cases. Such undifferentiated treatment descriptions limit all study findings. Limitations extend to the analytical interpretations of what occurred during treatment, such as whether related points may have been treated during purportedly inert sham treatments.

Many studies have included strain/counterstrain with other co-interventions making the effect of strain/counterstrain unclear. While such an approach may support the particular protocol used for the clinical research scenario, a clinician attempting to use these findings for practical purposes would not be able to differentiate which treatments were beneficial or necessary.

Overall quality of strain/counterstrain research

The overall quality of research into strain/counterstrain is low with few randomized control trials included. While the number of randomized control trials has steadily increased since 2004 when the first were published, a number of methodological quality criteria have not been consistently met.

For example, the concealment of group allocation and the effectiveness of participant and evaluator blinding were not routinely reported (Table 3.2). Another common source of potential bias has been the lack of stringently defined inclusion criteria for self-referred or recruited subjects with tender points and the lack of recruitment rate reporting.

Careful reporting of the inclusion of symptomatic participants with diagnosed pathology would mitigate these problems. It has been very encouraging, however, that sham treatments were commonly used in strain/counterstrain research. Without sham treatment conditions in manual therapy the effect of manual therapy compared to the power of simple touch cannot be differentiated.

The paucity of experimental studies and the limited number of outcomes that have been assessed, as well as limiting study design elements, limit the possible conclusions that can be drawn.

- A B recommendation can be supported by the available evidence only for use of strain/counterstrain for the relief of tender point palpation tenderness.
- While there is evidence to suggest that strain/counterstrain can increase range of motion or strength in specific target muscles and improve some functional measures, the available evidence only warrants a grade of C–.
- The many alternative applications for strain/counterstrain reported in the available case studies and suggested in continuing education courses can only receive a D grade recommendation.

The grade recommendations derived from the limited available evidence for strain/counterstrain serve as a cautionary word for clinical practitioners but also an opportunity for researchers. Since the first experimental study into the effects of strain/counterstrain only appeared in the literature 10 years ago, significant progress has been made with respect to both the clinical findings and the quality of the research methods used. It can be expected that more progress and significant discoveries related to strain/counterstrain will be made in future decades.

PRIORITIES FOR FUTURE STUDY

Evidence-based medicine is based on using clinical experience, knowledge of the available evidence and individual judgement of the patient's individual needs, to make the best clinical decisions in the care of our patients.

Strain/counterstrain is the fourth most often used osteopathic manipulative technique, though it is only used very often by 15% of osteopaths (Johnson & Kurtz 2003). Use of strain/counterstrain may be hampered by lack of supporting evidence. Recent evidence using a durometer to objectively assess tissue texture response has found that strain/counterstrain affected tissue hysteresis more than other common osteopathic techniques while providing a new research assessment method (Barnes 2013). Future research into strain/counterstrain should continue to explore the theoretical foundations of the fundamental mechanisms of strain/counterstrain. In addition to the mechanisms discussed in this chapter, future exploration of the effect of strain/counterstrain on the ligamentomuscular reflex that coordinates the synergistic functions of joint ligaments and related muscle contractions may yield relevant knowledge (Chaitow 2009).

Future strain/counterstrain research focussed on people with symptomatic pathological conditions should use objective outcome measures that can include pain and impairment level outcomes but also functional ability and participation restriction level outcomes (WHO 2001).

THIS CHAPTER

This chapter has provided an evaluation of the current understanding of the mechanisms involved in positional release approaches, particularly strain/counterstrain (SCS).

NEXT CHAPTER

The next chapter goes more deeply into the methodology of SCS/counterstrain – together with numerous exercises and clinical examples of its application in treatment of soft-tissue and joint dysfunction.

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Chapter 4

Counterstrain models of positional release

CHAPTER CONTENTS

The best known and most widely used positional release variation is the method developed from the clinical research of Laurence Jones – Strain Counterstrain (SCS). This pioneering work of developing SCS evolved into a method of treatment of joint and soft-tissue dysfunction of supreme gentleness (Jones 1981).

Modifications by the author and others, particularly the late George Goodheart DC, of Jones's original counterstrain methods are described in detail in this chapter, as well as a further variant, known as *positional release therapy* (D'Ambrogio & Roth 1997) (see Scanning and mapping, later in this chapter).

Evidence of efficacy of the use of SCS has been comprehensively detailed and discussed in the previous chapter and will not be amplified further in this chapter. Chapter 9, Visceral positional release: the counterstrain model, outlines counterstrain in a non-musculoskeletal setting.

HOW DOES SCS WORK?

It is important to state at the outset that the various theories as to how positional release in general, and counterstrain (SCS) in particular, achieves its effects, remain largely hypothetical. What supporting evidence there is for the theoretical models is outlined in this chapter.

Much basic scientific research remains to be conducted to validate the hypotheses discussed below, and the reader is advised to adopt a robustly critical frame of mind, while attempting to evaluate the mechanisms described, that *might* be operating.

Some of the hypotheses made are based on animal models (see Chapter 12). Some also emerge from a combination of assumption and deduction, based on clinical evidence, and an understanding of basic physiology and experience.

Very little concrete certainty exists, apart from the reality that positional release methods are safe and effective (see Chapter 3). How they achieve their benefits remains for future research.

THEORETICAL MODELS

Jones's (1981) concept as to how SCS works is based on the predictable physiological responses of muscles in particular situations, most notably in relation to acute or chronic strains. He describes how, in a balanced state, the proprioceptive functions of the various muscles supporting a joint will be feeding a flow of information, derived from the neural receptors in those muscles and their tendons, to the higher centres.

For example, the Golgi tendon organs will be reporting on tone, while the various receptors in the spindles will be firing a constant stream of information (slowly or rapidly depending upon the demands being placed on the tissues) regarding their resting length and any changes that might be occurring in that length.

In a dysfunctional state (see Neurological concepts, below) inappropriately excessive degrees of tone may be sustained, leading to chronic imbalances between agonists, antagonists and associated muscles. In some instances, excessive tone might relate to some degree of segmental or local (e.g. trigger point) facilitation.

D'Ambrogio & Roth (1997) state that:

> ***Positional release therapy appears to have a damping influence on the general level of excitability within the facilitated segment. Weiselfish (1993) has found that this characteristic of PRT is unique in its effectiveness, and has utilized this feature to successfully treat severe neurologic patients, even though the source of the primary dysfunction arose from the supraspinal level.***

It is the dampening, calming, influence on the neurological features (including pain receptors) of hyperreactive and stressed tissues that seems to characterize many of the results observed following appropriate use of PRT.

Circulatory and fascial influences are also considered possible mechanisms for PRT's benefits, as outlined below.

NEUROLOGICAL CONCEPTS

The proprioceptive hypothesis

(Korr 1947, 1975; Mathews 1981)

Jones first observed the phenomenon of spontaneous release when he 'accidentally' placed a patient who was in considerable pain, and some degree of compensatory distortion, into a position of comfort ('ease') on a treatment table (Jones 1964).

Despite no other treatment being given, after just 20 minutes resting in a position of relative ease, the patient was able to stand upright and was free of pain. The pain-free position of ease into which Jones had helped the patient was one which exaggerated the degree of distortion in which his body was being held.

Jones had taken the patient into the direction of 'ease' (as opposed to 'bind'), since any attempt to correct or straighten the body would have been met by both resistance and pain. In contrast, moving the body further into distortion was acceptable and easy, and seemed to allow the physiological processes involved in resolution of spasm, etc. to operate. This position of ease is the key element in what later came to be known as strain/counterstrain.

Example

The events that take place at the moment of strain may provide the key to understanding the mechanisms of neurologically induced positional release.

Take, for example, an all too common instance of someone bending forwards from the waist. At that moment, the flexor muscles would be short of their resting length, and the neural reporting structures (muscle spindles) in the flexor muscles would be firing slowly, indicating little or no activity and no change of length taking place.

At the same time, the antagonist group of muscles – the spinal erector group in this example – would be stretched or stretching, and firing rapidly.

Any stretch affecting a muscle (and therefore its spindles) will increase the rate of reporting, which will reflexively induce further contraction (myotatic stretch reflex), as well as an increase in tone in that muscle, along with an instant inhibition (reciprocal) of the functional antagonists, so further reducing the already limited degree of reporting from the antagonists' spindle cells.

This feedback link with the central nervous system is the primary muscle spindle afferent response, and it is thought to be modulated by an additional muscle spindle function that involves the gamma-efferent system, which is controlled from higher (brain) centres. In simple terms, the gamma-efferent system influences the primary afferent system: for example, when a muscle is in a quiescent state, when it is relaxed and short with little information coming from the primary receptors, the gamma-efferent system might fine-tune and increase ('turn up') the sensitivity of the primary afferents to ensure a continued information flow (Mathews 1981).

It is important to acknowledge that these neurological concepts are largely based on animal studies, and that definitive basic science studies to validate them have not yet been performed in humans.

Crisis

Now imagine a sudden 'alarm' situation arising (a person loses his footing while stooping, or the load being lifted shifts), which creates immediate demands for stabilization on both sets of muscles (the short, relatively 'quiet' flexors and the stretched, relatively actively firing extensors), even though they are in quite different states of preparedness for action.

- The flexors would be 'unloaded', relaxed and providing minimal feedback to the control centres, while the spinal extensors would be at stretch, providing a rapid outflow of spindle-derived information, some of which ensures that the relaxed flexor muscles remain relaxed, due to inhibitory activity.
- The central nervous system would at this time be receiving minimal information as to the status of the relaxed flexors and, at the moment when the demand for stabilization occurs, these shortened/relaxed flexors would be obliged to stretch quickly to a length that will balance the already stretched extensors.
- Meanwhile these stretched extensors will most probably be contracting rapidly, also to achieve stabilization.
- As this happens, the annulospiral receptors in the short (flexor) muscles will respond to the sudden stretch demand by contracting even more – the stretch reflex (Fig. 4.1).
- The neural reporting stations in these shortened muscles would be firing impulses as if the muscles were being stretched, even though the muscle remains well short of its normal resting length.
- Simultaneously the extensor muscles, which had been at stretch and which, in the alarm situation, were obliged to rapidly shorten, would remain longer than their normal resting length as they attempt to stabilize the situation (Korr 1976).

Korr has described what he believes happens in the abdominal muscles (flexors) in such a situation. He says

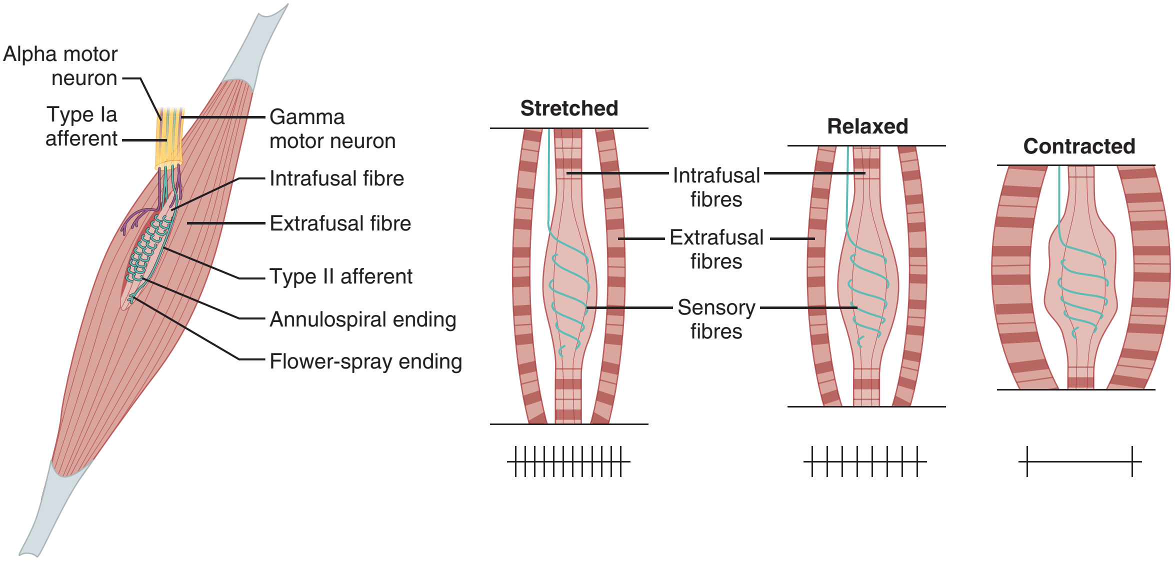


Figure 4.1 Annulospiral receptors. The sensitivity of the stretch receptors is adjusted by the innervating gamma motor neurons, and the intrafusal fibres detect stretch. When the muscle contracts gamma motor neurons fire, increasing tension on the intrafusal fibres so that muscle spindles maintain sensitivity to changes in the muscle length.

that because of their relaxed status, short of their resting length, there occurs in these muscles a silencing of the spindles; however, due to the demand for information from the higher centres, *gamma gain is increased reflexively* and, as the muscle contracts rapidly to stabilize the alarm demands, the central nervous system will receive information that the muscle, which is actually short of its neutral resting length, is being stretched.

In effect, the muscles would have adopted a restricted position as a result of inappropriate proprioceptive reporting. As DiGiovanna explains (Jones 1964):

> ***With trauma or muscle effort against a sudden change in resistance, or with muscle strain incurred by resisting the effects of gravity for a period of time, one muscle at a joint is strained and its antagonist is hyper-shortened. When the shortened muscle is suddenly stretched the annulospiral receptors in that muscle are stimulated causing a reflex contraction of the already shortened muscle. The proprioceptors in the short muscle now fire impulses as if the shortened muscle were being stretched. Since this inappropriate proprioceptor response can be maintained indefinitely a somatic dysfunction has been created.***

In effect, the two opposing sets of muscles will have adopted a stabilizing posture to protect the threatened structures, and in doing so would have become locked into positions of imbalance in relation to their normal function. One would be shorter and one longer than its normal resting length (Fig. 4.2).

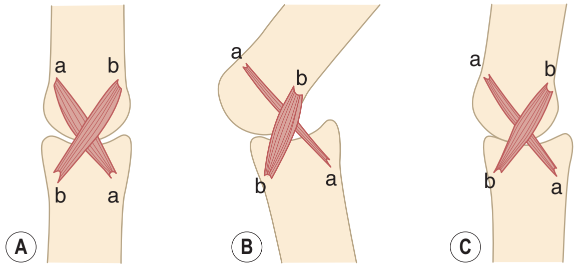


Figure 4.2 (A) Normal unstrained joint in normal position with muscles 'a' and 'b' in a non-stressed state. (B) Normal joint in an extreme position in which stress occurs which will result in strain, as illustrated in (C). (C) Joint in a strained state in which muscle 'a', which had been excessively stretched, is splinted/contracted and resists movement, and muscle 'b', short at the time of the stress, is slightly stretched and is neither splinted nor contracted. Any attempt at returning to the situation as illustrated in (A) would meet with resistance, while a return to the position of stress, (B), would be easily and painlessly achieved and could allow for a spontaneous positional release of the hypertonicity and splinting in muscle 'a'.

At this time, any attempt to extend the area/joint(s) would be strongly resisted by the tonically shortened flexor group. The individual would be locked into a forward-bending distortion (in this example).

The joint(s) involved would not have been taken beyond their normal physiological range, and yet the normal range would be unavailable, due to the shortened status of the flexor group (in this particular example). Going further into flexion, however, would present no problems or pain.

Walther (1988) summarizes the situation as follows:

> ***When proprioceptors send conflicting information there may be simultaneous contraction of the antagonists … without antagonist muscle inhibition, joint and other strain results [and in this manner] a reflex pattern develops which causes muscle or other tissue to maintain this continuing strain. It [strain dysfunction] often relates to the inappropriate signaling from muscle proprioceptors that have been strained from rapid change that does not allow proper adaptation.***

This situation would be unlikely to resolve itself spontaneously and is the 'strain' position in Jones's SCS method.

We can recognize it in an acute setting in torticollis, as well as in acute lumbago. It is also recognizable as a feature of many types of chronic somatic dysfunction in which joints remain restricted due to muscular imbalances of this type, occurring as part of an adaptive process (as discussed in Chapter 2).

This is a time of intense neurological and proprioceptive confusion, and is the moment of 'strain'. SCS offers a means of quieting the neurological confusion and the excessive, or unbalanced, tone.

The nociceptive hypothesis

(Bailey & Dick 1992; Van Buskirk 1990)

In order to appreciate a second possible neurological influence involved in strain, we need a different example.

Let us consider someone involved in a simple whiplash-like neck stress as a car came to an unexpected halt:

- The neck would be thrown backwards into hyperextension, provoking all of the factors described above involving the flexor group of muscles in the forward-bending strain.
- The extensor group would be rapidly shortened and the various proprioceptive changes leading to strain and reflexive shortening would operate.
- At the time of the sudden braking of the car, there would occur hyperextension of the flexors of the neck, scalenes, etc. which would be violently stretched, inducing actual tissue damage.
- Nociceptive responses would occur (which are more powerful than proprioceptive influences) and these multisegmental reflexes would produce a flexor withdrawal, dramatically increasing tone in the flexor group.
- The neck would now display hypertonicity of both the extensors and the flexors; pain, guarding and stiffness would be apparent and the role of the clinician would be to remove these restricting influences layer by layer.
- Where pain is a factor in strain, this needs to be considered as producing an overriding influence over whatever other more 'normal' reflexes are operating.

In the simple example of neck strain described above, it is obvious that, in real life, matters are likely to be even more complicated, since a true whiplash would introduce both rapid hyperextension and hyperflexion as well as a multitude of layers of dysfunction.

More complex than described

The proprioceptive and nociceptive reflexes that might be involved in the production of strain are also likely to involve other factors, including chemically mediated changes.

D'Ambrogio & Roth (1997) elucidate:

> ***Free nerve endings are distributed throughout all of the connective tissues of the body with the exception of the stroma of the brain. These receptors are stimulated by neuropeptides produced by noxious influences, including trauma … Impulses generated in these neurons spread centrally and also peripherally along the numerous branches of each neuron. At the terminus of the axons, peptide neurotransmitters such as substance P are released. The response of the musculoskeletal system to these painful stimuli may thus play a central role in the development (and maintenance) of somatic dysfunction.***

As Bailey & Dick (1992) explain:

> ***Probably few dysfunctional states result from a purely proprioceptive or nociceptive response. Additional factors such as autonomic responses, other reflexive activities, joint receptor responses, [biochemical features] or emotional states must also be accounted for.***

It is at the level of our basic neurological awareness that understanding of the complexity of these problems commences.

PRT as a safe solution

(DiGiovanna 1991; Jones 1964, 1966)

Fortunately, the methodology of positional release does not demand a complete understanding of what is going on neurologically, since that which Jones and his followers, and those clinicians who have evolved the art of SCS to newer levels of simplicity have shown, is that by means of a slow, *painless* return to the position of strain, aberrant neurological activity currently locked into place in the strained tissues can frequently resolve itself, irrespective of the mechanisms involved.

The reaction of the body to this confusing and stressed situation apparently varies with the time available to it.

Should a deliberate and controlled response be possible, allowing the stretched muscles to slowly return to normal, then resolution of the potential problem might take place with no dysfunction arising. This can happen only if a controlled and not a panicky return towards the neutral position is achieved.

All too often, however, the situation is one of an almost-panic response, as the body makes a rapid attempt to restore stability to the region and finds the neural reporting information incoherent (one moment the abdominal muscles are saying, 'all is well, we are relaxed and short', and the next they are firing rapidly and lengthening, while there is a sudden change imposed on already stretched spinal extensors, which are trying to shorten at the same time in order to produce balance).

Restriction

The result is likely to involve the shortened muscles being 'fixed' in a position short of their normal resting length, from which they cannot easily be lengthened without pain (Fig. 4.3C).

The person bending, as described in our earlier example, would be locked in flexion, with an acute low back pain. The resulting spasm in tissues 'fixed' by this or other similar neurologically induced 'strains' causes the fixation of associated joint(s), and prevents any attempt to return to neutral. Any attempt to force the distorted spine (in this example) towards its anatomically correct position, would be strongly resisted by the shortened fibres.

It would, however, not be difficult, or indeed painful, to take the tissues/joint(s) further towards the position in which the strain occurred, effectively shortening the spasmed fibres even further, so reducing tension on affected tissues, and calming excessive proprioceptive reporting.

It is suggested that when held at 'ease', that enhanced vascular and interstitial circulatory function in previously tense and probably ischaemic tissues would moderate the activity of inflammation-enhancing chemical mediators. This model has been validated – for example in treatment of low back pain by Lewis & Flynn (2001).

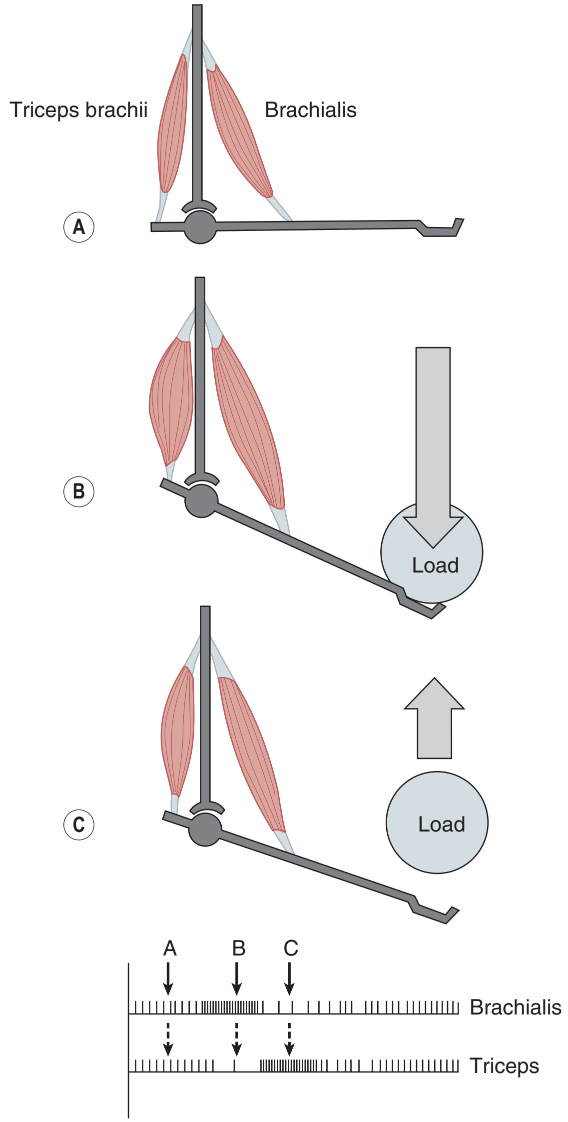


Figure 4.3 Hypothetical model. (A) The arm flexor (brachialis) and extensor (triceps brachii) muscles in an easy, normal position, as shown by the rate of firing indicated on the scale for each muscle. (B) A sudden force is applied which results in the flexors being stretched while the extensors protect the joint by rapidly shortening. The firing rate relating to hyperextension and hypershortening is indicated on the scale. (C) Flexor stretch receptors have been excited by this sudden demand and these continue to fire as though stretch were continuing even though a relatively normal position has been achieved. The rate of firing of both flexors and extensors continues to be maintained at an inappropriately high rate. This is the situation in a strained joint. DiGiovanna (1991) explains: 'The joint is restricted within its physiological range of motion (and is prevented) from achieving its full range of motion. It is therefore an active process rather than a static injury usually associated with a strain'.

Moving towards 'ease'

Jones found that by taking the joint/area close to the position in which the original strain took place an interesting phenomenon was observed, in which the proprioceptive functions were given an opportunity to reset themselves, to become coherent again, during which time pain in the area lessened.

This is the 'counterstrain' element of the system.

If the position of ease were held for a period (Jones suggests 90 seconds; see discussion of 'Timing' in Box 4.4), the spasm in hypertonic, shortened tissues commonly resolves, following which it is usually possible to return the joint/area to a more normal resting position, as long as this action is performed extremely slowly.

The muscles that had been overstretched might remain sensitive for some days, but for all practical considerations, the joint would be normal again.

Jones had found that by carefully positioning the joint, whether this be a small extremity joint or a spinal segment, into a position of neutral or 'ease' (which is frequently an exaggeration of the distorted position in which the body is holding the area, or is a close replica of the position in which the original strain took place), a resolution of spasm/hypertonia takes place.

Since the position of ease achieved during Jones's therapeutic methods is the same as that of the original strain, the shortened muscles are repositioned in such a manner as to allow the dysfunctioning proprioceptors to modulate their activity.

Korr's explanation for the physiological normalization of tissues brought about through positional release (Korr 1976) is that:

> ***The shortened spindle nevertheless continues to fire, despite the slackening of the main muscle, and the CNS is gradually able to turn down the gamma discharge and, in turn enables the muscles to return to 'easy neutral', at its resting length. In effect, the [practitioner] has led the patient through a repetition of the dysfunctioning process with, however, two essential differences. First it is done in slow motion, with gentle muscular forces, and second there have been no surprises for the CNS; the spindle has continued to report throughout.***

Travell & Simons (1992) noted that in stressed soft tissues, there are likely to be localized areas of relative ischaemia – lack of oxygenated blood – and that this can be a key factor in production of pain and altered tissue status contributing to the evolution of myofascial trigger points.

Studies on cadavers have shown that when a radiopaque dye is injected into muscles, this is more likely to spread into the vessels of the muscle when a 'counterstrain' position of ease is adopted than when the muscle is in a neutral position (Rathbun & Macnab 1970). This was demonstrated by injecting a suspension into the arm of a fresh cadaver while the arm was maintained at the side. No filling of blood vessels occurred. When the other arm, following injection of a radiopaque suspension, was placed in a position of flexion, abduction and external rotation (position of 'ease' for the supraspinatus muscle), there was almost complete filling of the blood vessels by the dye, as a result.

Jacobson et al. (1989) suggested that, 'unopposed arterial filling may be the same mechanism that occurs in living tissue during the 90-second counterstrain treatment'.

More recently, studies at the University of Ulm, Germany, by Schleip and Klingler have expanded awareness of the effects of aspects of soft tissue treatment on the fluid content of tissues. For example, when tissues are compressed or crowded, as occurs in counterstrain, as well as during application of facilitated positional release (FPR) methods, water is extruded from fascial structures in a sponge-like manner. This makes the tissues more pliable for a period of up to 30 minutes (Klingler et al. 2004). As water levels drop, temporary relaxation and an increased range of movement is possible – until water is absorbed back into the tissue, after 20–30 minutes, at which time it stiffens again (Schleip et al. 2012). The 20–30 minutes of greater mobility allows tissues to move more freely and for proprioceptive functions to normalize, offering the individual an experience of reduced discomfort and greater motor control.

Wong et al. (2014) explained yet another fluid related effect of counterstrain. They noted that Standley & Meltzer (2007) demonstrated that counterstrain methods lead to a decrease in interleukin (IL-6) levels, and that these are important for mediating inflammatory healing after acute injury. This effect may explain why Achilles tendonitis patients report reduced swelling after SCS (Howell et al. 2006).

CIRCULATORY AND FLUID CONCEPTS AND PRT

There exist other mechanisms that suggest ways in which positional release methods might usefully modify distressed tissues – involving circulatory changes.

CONNECTIVE TISSUE AND COUNTERSTRAIN CONCEPTS

In summary (see also Chapter 7 for a fuller exploration of the proposed connections between positional release approaches and connective tissues), a number of fascial features and functions appear to be associated with mechanisms involved in different PRT effects.

1. *Mechanotransduction* involves a variety of cellular effects in response to mechanical load applications. Of particular interest are the effects of altered degrees and types of strain and load on fibroblasts – cells that are plentifully present in fascial structures (Dodd et al. 2006; Standley & Meltzer 2008; Meltzer et al. 2010).
2. *Ligamentous reflexes* may be a feature of the effects – albeit temporary – of facilitated positional release (FPR, see Chapter 5) and aspects of counterstrain according to Solomonow (2009) – Wong et al. (2014) has summarized current thinking regarding ligamentomuscular reflexes and SCS:

> ***Ligamentous strain inhibits muscle contractions that increase strain, or stimulates muscles that reduce strain, to protect the ligament (Krogsgaard et al. 2002). For instance, anterior cruciate ligament strain inhibits quadriceps and stimulates hamstring contractions to reduce anterior tibial distraction (Dyhre-Poulsen & Krogsgaard 2000). Ligamentous reflex activation also elicits regional muscle responses that indirectly influence joints (Solomonow & Lewis 2002). Research is needed to explore whether SCS may alter the protective ligamentomuscular reflex and thus reduce dysfunction by shortening joint ligaments or synergistic muscles (Chaitow 2009).***

CONVENTIONAL SCS AND THE MODIFIED APPROACH

The counterstrain model advocated in this book is not the same as that originally taught by Jones (1981), but is a variation largely based on refinements suggested by Goodheart. This chapter therefore focusses on modifications of Jones's original SCS model and how to use it. In order to do so, the phenomenon of the 'tender point' needs to be thoroughly grasped.

The elements that need to be kept in mind as SCS methods are summarized in Boxes 4.1 and 4.2.

The usual method for studying Jones's SCS methodology involves learning the described locations, and practising the location, of tender points, followed by practising the positioning of the body/associated area in a prescribed manner, in order to reduce discomfort in the palpated tender point.

Locating tender points depends upon palpation skills which can be learned, and which practice can refine into a practical ability that allows for the very rapid location of areas of localized soft-tissue dysfunction.

Some researchers in positional release and SCS who discuss tender point characteristics speak of *sudomotor changes* as a primary feature, usually associated with

Box 4.1 **Ideal settings for application of SCS/PRT**

See also Box 4.7 for contraindications and Box 4.8 for indications

- For reduction of stiffness (hypertonia) in pre- and postoperative patients
- In cases involving muscle spasm – where more direct methods would not be tolerated
- Where contraction is a feature – reducing tone before stretching tissues after use of muscle energy or other techniques
- In cases of acute and multiple strain – whiplash, for example
- As part of any treatment of chronic soft-tissue dysfunction
- As part of a sequence (INIT) of treating trigger points – after NMT and before MET
- In treatment of sensitive, frail, delicate individuals or sites
- In treatment of joint dysfunction where hypertonia is the prime restricting factor.

Box 4.2 **SCS application guidelines**

The four keys which allow anyone to apply counterstrain efficiently are:

1. An ability to localize by palpation soft-tissue changes related to particular strain dysfunctions, acute or chronic.
2. An ability to sense tissue change as it moves into a state of ease, comfort, relaxation and reduced resistance.
3. The ability to guide the patient as a whole, or the affected body part, towards a state of ease with minimal force.
4. The ability to apply minimal palpation force as the changes in the tissues are evaluated.

Application guidelines:

1. Locate and palpate an appropriate tender point
2. Use minimal force
3. Use minimal monitoring pressure
4. Achieve maximum ease/comfort
5. Produce no additional pain anywhere else.

increased or decreased temperature as compared with surrounding tissues (Lewit 1999). Phenomena, such as blanching, erythema and sweating of the skin overlying tense, tender and often oedematous tender points, are all used as a means of their identification (Chaitow 2003; Jones 1964, 1981; Schwartz 1986).

- The simplest method of palpation ('drag palpation') involves the light passage across the skin involving one digit, which seeks a sense of 'drag' in which the elevated sympathetic, sudomotor activity becomes apparent, as the finger or thumb feels a momentarily retarded passage over the skin, due to increased hydrosis (as described in Chapter 2 under the heading 'A TARTT shortcut: drag palpation').
- Pressure applied into the tissues below such localized skin changes (described as 'hyperalgesic skin zones' by Lewit 1999), usually evinces an increased degree of sensitivity or pain.
- Whether this or some other form of soft-tissue palpation is used, the tender points, which Jones has catalogued, need to be identified. They frequently differ from active myofascial trigger points inasmuch as Jones's tender points may refer pain elsewhere when compressed, whereas active trigger points always refer pain elsewhere.
- They commonly lie in those tissues that were shortened at the time of strain, or have been shortened in response to chronic strain, and are seldom in areas where the patient was previously aware of pain.

SCS guidelines

The general guidelines that Jones gives for relief of the dysfunction with which such tender points are related (pain, restriction, etc.) involves directing the movement of these tissues towards ease, which commonly involves using the protocols listed in Box 4.3.

Once in a 'position of ease', the optimal amount of time this position should be maintained has been subject to different opinions. The key suggestions are listed in Box 4.4. Using these guidelines, it is possible to begin to practice the use of SCS on a model, fellow student, a willing volunteer or even oneself.

Further clinical guidelines

A consensus has emerged, out of the clinical experience of thousands of practitioners, over the past 40 years, of a number of simple yet effective ways of selecting which of many areas of discomfort and 'tenderness' should receive primary attention (McPartland & Klofat 1995). The advice is summarized in Box 4.5.

Box 4.3 **Counterstrain positioning guidelines**

- For tender points on the anterior surface of the body, flexion, side-bending and rotation is most commonly towards the side of the palpated point, followed by fine-tuning to reduce sensitivity by at least 70%.
- For tender points on the posterior surface of the body, extension, side-bending and rotation is most commonly away from the side of the palpated point, followed by fine-tuning to reduce sensitivity by at least 70%.
- The closer the tender point is to the midline, the less side-bending and rotation is usually required, and the further from the midline, the more side-bending and rotation may be required, in order to effect ease and comfort in the tender point (without any additional pain or discomfort being produced anywhere else).
- The direction towards which side-bending is introduced when attempting to find ease, is most frequently away from the side of the palpated pain point, especially in relation to tender points found on the posterior aspect of the body.
- Despite the previous comment, there are instances in which ease will be noted when side-bending towards the direction of the painful point. These guidelines therefore offer a 'suggestion' as to the likeliest directions of ease and are not 'rules'. Individual tissue characteristics will ultimately determine the ideal directions that will achieve comfort/ease for the point being monitored.

Where to look for tender points

- Use of Jones's 'maps' (or D'Ambrogio & Roth 1997) offer one way of deciding where to palpate for a tender point. This model is formulaic, and does not take account of the unique characteristics of individuals or their dysfunctional patterns – which is why the Goodheart model is advocated (see below).
- As briefly explained in Chapter 1, Goodheart (1985) suggested a patient-specific formula for identifying the location of areas of tenderness that can be used in the counterstrain procedure.
  - If the patient displays obvious distortion, or a marked imbalance in terms of 'loose–tight' tissues, the tender points that are most likely to be useful as monitors during counterstrain application will be found in the tight (i.e. shortened) tissues, and the ease position is likely to be an exaggeration of the presenting distortion (see Chapter 1 for an elaboration of this concept). The tissues that are short are shortened and crowded (painlessly) even more, during the positioning and 'fine-tuning' process, while the tender point is monitored for a decrease in sensitivity.

Box 4.4 **Timing and SCS**

- Jones (1981) suggests a 90-second hold of the position of ease.
- Goodheart (in Walther 1988) suggests that if a facilitating crowding or neuromuscular manipulation of the spindle is utilized (see Fig. 1.9), a 20–30-second holding of the position of ease is usually adequate.
- Morrison (induration technique, described later in this chapter) suggests a 20-second hold in the position of ease.
- Weiselfish (1993) recommends not less than 3 minutes for neurological conditions to benefit.
- Schiowitz (1990) reduces the holding time to just 5 seconds when employing facilitated positional release (see Chapter 5).
- D'Ambrogio & Roth (1997) suggest that between 1 and 20 minutes may be needed to achieve fascial release.
- Others (e.g. Chaitow 1996) suggest that the times recommended above are approximate at best, since tissues respond idiosyncratically, depending on multiple factors which differ from individual to individual.
- As the tissues release, palpation should reveal these changes, at which time, a slow return to neutral is called for. However, the basic idea of a 90-second hold as a minimum for using Jones's methodology is endorsed, when first learning these methods.

Additional notes on timing, and ways of modifying this, will be found later in this chapter.

Box 4.5 **Which points to treat first?**

- Choose the most painful, the most medial and the most proximal tender points for primary attention, within the area of the body that demonstrates the greatest aggregation of tender points.
- If a chain, or line, of tender points is identified, treat the most central of these.
- No more than five tender points should receive attention at any one treatment session, even if a relatively robust individual is involved.
- The more dysfunctional, ill, adaptively exhausted (see Zink & Lawson's evaluation in Chapter 2), pain-ridden and/or fatigued the patient, the fewer the number of tender points that should be treated at any one session (between one and three in such cases).

- If the patient demonstrates a movement that is painful, or that is restricted, then Goodheart's guidelines suggest the tender points most useful for monitoring will be located in the muscles that would perform the opposite movement to that which is painful or restricted, i.e. the practitioner should seek tender points in the antagonists to muscles active when pain or restriction is reported or observed.
  - As an example, if turning the head to the right is either painful or restricted, the muscles that produce that action would be those on the right of the neck, as well as the left sternocleidomastoid muscle.
  - Restriction in rotation to the right might therefore be expected to relate to shortening (or dysfunction) involving the muscles *on the left side of the neck*, and/or right sternomastoid.
  - According to Goodheart's guidelines ('seek tender points in antagonist muscle to those active when pain or restriction is noted'), it is in these shortened structures that a tender point can be found, and used as a monitor during SCS positioning.
  - Palpation for suitable tender points should be carried out in the muscles that would turn the head to the left, i.e. those on the left side of the neck, as well as in right side sternomastoid (as this helps to turn the head to the left).
  - It is very important to avoid confusion that can occur and to *NOT seek a tender point in tissues opposite the site of pain*.
  - The appropriate tender point will be located in the antagonists to the muscles *active in producing the painful or restricted movement – irrespective of where the pain is reported*.
  - Once located, the point would be used as a monitor – as in all SCS procedures.
- Any area of local tenderness identified during palpation most probably represents a response to some degree of imbalance, chronic strain or adaptive change. Using such a point as a monitor while local or general positioning is introduced to remove the sensitivity from the point, will almost certainly help to modify whatever stress pattern is causing or maintaining it, even if this has not been identified.

TENDER POINTS AND THE POSITION OF EASE

Jones's discovery that somatic dysfunction involves associated areas of palpable tenderness, that are frequently only tender when palpated or probed, led to the realization that when the joint or area is suitably positioned to ease tenderness in these points, associated hypertonia or spasm usually diminishes.

He called these points 'tender points' (see Chapter 1, Box 1.1).

Describing his methods, Jones (1981) states:

> ***Finding the myofascial tender point, and the correct position of release, will probably take a few minutes at first. Watching a skilled physician find a tender point, in a few seconds, and a position of release in a few seconds more, may give a false impression of simplicity to the beginner.***

It may take longer than a few minutes to locate tender points initially; however, accurate palpation methods, such as the 'drag' method, can usually be rapidly learned if practised regularly.

What happens next?

- Once located, the tense tender point should be palpated, with just less than sufficient pressure to cause pain in normal tissue.
- The pain/sensitivity should be apparent to both the physician and the patient.
- By careful guiding of the joint (or other tissue) while constantly palpating the tender point (or by intermittently probing it), a monitoring of progress towards the ideal neutral (reduced or no pain in the palpated point) position is eventually achieved.
- The practitioner senses and evaluates reducing (desirable) or increasing (undesirable) levels of tension/tone in the palpated tissues, as well as the patient's report of either increasing or diminishing levels of sensitivity/pain in the point.
- These indicators are used to guide ('fine-tuning') the practitioner/therapist to the position where eventually there is a feeling of relative ease in the soft tissues, together with markedly reduced pain in the tender point (by 70% at least, ideally).
- An absence of 'bind' and also, most importantly, the patient's report that pain has significantly lowered are the desired indicators.

Jones (1981) states:

> ***The point of maximum relaxation accompanied by an abrupt increase in joint mobility, within a very small arc, is the mobile point.***

After holding this position for 90 seconds (see Box 4.4), the practitioner/therapist slowly returns the area to its neutral position.

What are the tender points?

Jones equates tender points with trigger points (Simons et al. 1999; Travell & Simons 1992) and with Chapman's neurolymphatic reflexes (Owens 1982). However, this comparison cannot be strictly accurate, despite an inevitable degree of overlap in all reflexively active points on the body surface.

There are differences in the nature, if not in the feel, of these different point systems (Kuchera & McPartland 1997). For example, myofascial trigger points will refer sensitivity, pain or other symptoms to a target area when pressed, which is not usually the case with Chapman's (neurolymphatic) reflex points, which are found in pairs and not singly, as are Jones's tender points and most trigger points.

Schwartz (1986) – developer of facilitated positional release (FPR, see Chapter 5) noted that:

> ***Generally, but not always, pressure on the tender point will cause pain at a site distant to the point itself.***

That description could define such a point as a trigger point, as well as a tender point. Schwartz highlights the difference between SCS and other methods which use such points in treatment by saying:

> ***Other methods invade the point itself, for example by needle in acupuncture, injection of lidocaine into the point, or the use of pressure or ultrasound to destroy the tender point.***

Osteopathic physician, Eileen DiGiovanna (1991), summarizes the overlap:

> ***Today many physicians believe there is a relationship among trigger points, acupuncture points and Chapman's reflexes. Precisely what the relationship may be is unknown.***

She quotes from prestigious osteopathic pioneer, George Northrup (1941), who stated:

> ***One cannot escape the feeling that all of the seemingly diverse observations [regarding reflex patterns of surface 'points'] are but views of the same iceberg, the tip of which we are beginning to see, without understanding either its magnitude or its depth of importance.***

Felix Mann, one of the pioneers of acupuncture in the West, has entered the controversy as to the existence, or otherwise, of acupuncture meridians (and indeed acupuncture points). In an effort to alter the emphasis which traditional acupuncture places on the specific charted positions of points, he stated (Mann 1983):

> ***McBurney's point, in appendicitis, has a defined position. In reality it may be 10 cm higher/lower, to the left or right. It may be 1 cm in diameter, or occupy the whole of the abdomen, or not occur at all. Acupuncture points are often the same, and hence it is pointless to speak of acupuncture points in the classical traditional way. Carefully performed electrical resistance measurements do not show alterations in the skin resistance to electricity corresponding with classical acupuncture points. There are so many acupuncture points mentioned in some modern books, that there is no skin left which is not an acupuncture point. In cardiac disease, pain and tenderness may occur in the arm; however, this does not occur more frequently along the course of the heart meridian than anywhere else in the arm.***

Hence, Mann appears to conclude, meridians do not exist, or – more confusingly perhaps – that the whole body is an acupuncture point! Leaving aside the validity of Mann's comment, it is true to say that if all the multitude of points described in acupuncture, traditional and modern, together with those points described by Travell and colleagues, Chapman and Jones, were to be placed together on one map of the body surface, we would all soon come to the conclusion that the entire body surface is a potential acupuncture point.

The discussion in Chapter 2 on the evolution of soft-tissue dysfunction in general (along with the tight–loose concept), and trigger points in particular, offers a representation in which some areas are seen to become short, tight and bunched, while others become lax, stretched or distended.

If the broad guideline of 'exaggerating the distortion' (see Chapter 1) is brought into consideration in such situations, this suggests that whatever is short, tight and bunched is likely to benefit by having these characteristics amplified, reinforced and held/supported, as part of a treatment approach that attempts to offer these tissues an opportunity to change, to release.

Using a tender point (whether or not it is also a trigger point or plays some other role in relation to reflex activity) to guide the tissues towards the precisely balanced degree of crowding, folding and compression describes SCS methodology simplistically but accurately.

Are *ah-shi* points and tender points the same?

It is worth remembering that, in acupuncture, there exists a phenomenon known as the 'spontaneously sensitive point'. These 'points' arise in response to trauma, or joint dysfunction, and are regarded, for the duration of their existence, as 'honorary' acupuncture points (Academy of Traditional Chinese Medicine 1975).

Most acupuncture points that receive treatment by means of needling, heat, pressure, lasers, etc. are clearly defined and mapped. The only exception to this rule relates to these spontaneously arising (ah-shi) points, associated with joint problems, which become available for treatment for the duration of their sensitivity.

In an earlier text (Chaitow 1991), I make the following comment:

> ***Local tender points in an area of discomfort may be considered as spontaneous acupuncture points. The Chinese term these ah-shi points, and use them in the same way as classical points, when treating painful conditions.***

It is worth recalling that in Chinese medicine, as well as use of acupuncture, manual acupressure of ah-shi points is also considered an appropriate form of treatment.

It would seem that Jones's points are in many ways the same, if not identical, to ah-shi points.

Is the muscle weak or strong?

Goodheart suggested a simple test to identify a tender point's usefulness as a monitor of the counterstrain procedure.

- If the muscle containing the tender point tests is weak following a maximal 3-second isometric contraction, it will probably benefit from counterstrain (Walther 1988).
- When a counterstrain is successful, this same protocol suggests that the muscle will no longer weaken after a short, strong, isometric contraction.

Different focus

Whereas Jones's use of counterstrain is largely focussed towards treatment of painful conditions, Goodheart has focussed on improving the neuromuscular function of muscles, even if no pain is present.

Goodheart's associate, David Walther, notes that:

> ***Neuromuscular dysfunction that responds to strain/counterstrain technique may be from recent trauma, or be buried in the patient's history.***

Goodheart and Walther agree with the interpretation of the role of neurological imbalance, which Jones and Korr (Korr 1975) have described as a key factor leading to many forms of soft-tissue and joint dysfunction, in which antagonistic muscles fail to return to neurological equilibrium following acute or chronic strain.

When this happens, an abnormal neuromuscular pattern is established that benefits from being held in 'ease' during a positional release treatment. The muscles that have shortened in the process of strain, and *not* those that were stretched (where pain is commonly noted), are the tissues to be used in the process of rebalancing.

> ***Understanding that the cause of the continued pain … is usually not at the location of pain, but in an antagonistic muscle, is the most important step in solving the problem.***
>
> (Walther 1988)

The tender point might lie in muscle, tendon or ligament but the perpetuating factor is the imbalance in the spindle cell mechanisms. Since the patient can usually easily describe which movements increase the pain (or which are restricted), the search sites for tender areas are easily decided.

Positioning to find ease

As we have seen, Jones discovered a further use for tender points, apart from pressing or puncturing them.

Maintaining a sufficient degree of pressure on such a point allows the patient to be able to report on the level of pain being produced as the joint is (re)positioned, becoming a monitor and guide for the practitioner. The disappearance, or at least marked reduction of pain noted on pressure, after holding the joint in the position of ease for the prescribed period, is instant evidence as to the success of the procedure.

The holding, or periodic probing, of the point during the 90-second period recommended by Jones, leads to a further question; one which Jones acknowledges as being asked of him quite frequently. This queries whether the pressure on the tender point is not in itself therapeutic? Jones answered:

> ***The question is asked whether the repeated probing of the tender point is therapeutic, as in acupressure, or Rolfing techniques (or ischemic compression as used in neuromuscular technique). It is not intentionally therapeutic, but is used solely for diagnosis and evidence of accuracy of treatment.***

This answer could be thought of as being equivocal for it does not address the possibility of a therapeutic end-result from the use of pressure on the tender point, but states only the intention of such pressure.

It may be assumed that some therapeutic effect does indeed derive from sustained inhibitory (also known as 'ischaemic') pressure on such a spontaneously arising tender point, for the reasons described in Box 4.6.

Box 4.6 **Some of the effects of sustained compression**

- Ischaemia is reversed when pressure is released (Simons et al. 1999).
- Neurological 'inhibition' results from sustained efferent barrage (Ward 1997).
- Mechanical stretching occurs as 'creep' of connective tissue commences (Cantu & Grodin 1992).
- Piezoelectric effects modify hardened 'gel-like' tissues, towards a softer more 'sol-like' state (Barnes 1997).
- Mechanoreceptor impulses resulting from applied pressure interfere with pain messages ('gate theory') (Melzack & Wall 1988).
- Analgesic endorphin and enkephalins are released in local tissues and the brain (Baldry 1993).
- 'Taut bands' associated with trigger points release due to local biochemical modifications (Simons et al. 1999).
- Traditional Chinese medicine concepts associate digital pressure with altered energy flow.
- In the use of acupuncture there is clear evidence of a pain-reducing effect when pressure methods are applied to acupuncture points.

Applied pressure and positioning

Since acupuncture authorities both in China and the West include spontaneously tender (ah-shi) points (which seem to be in every way the same as Jones's points) as being suitable for needling or pressure techniques, the avoidance of a clear answer on this point by Jones may be taken to indicate that he has not really addressed himself to the possibility that the applied pressure aspect of SCS contributes to the results.

That his method has other mechanisms which achieve release of pain and spasm in injured joints seems highly probable. The total effect of SCS would seem to derive from a combination of the positioning of the joint in a neutral position, and the pressure on the tender point.

The process of positioning used in SCS is similar, but not identical, to that described in functional technique by Harold Hoover (see Chapter 5). Hoover's methods involved the positioning of a joint or tissues which display a limited range of motion in what he called a 'dynamic neutral' position. He sought a position in which there was a balance of tensions, fairly near the anatomical neutral position of the joint.

Jones also aims at a position of ease, but he relates more to the identical position in which the original strain occurred, or by exaggeration of existing distortions.

By combining the position of ease, in which the shortened muscle(s) are able to release themselves, while simultaneously applying pressure (which, despite Jones's doubts, appears to involve a therapeutic effect), improvements in severe and painful conditions are possible.

Jones's conclusions regarding joints

Jones came to a number of conclusions as a result of his work, which may be summarized as follows:

- The pain in joint dysfunction is related very much to the position in which the joint is placed – varying from acute pain in some positions, to a pain-free position, which would be almost directly opposite the position of maximum pain.
- The dysfunction in a joint that has been strained is the result of something which occurs in response to the strain – a reaction to it. The palpable evidence of this is found by searching not in the tissues that were placed under strain, but by searching for tenderness in the (usually shortened) antagonists of these overstretched tissues.
- These painful structures in joint problems are usually not those which were stretched at the time of the injury, but which were in fact shortened, and which have remained so.
- It is in these shortened tissues that the tender points will be found.

Jones's technique

Jones described the use of 'tender points' as follows:

> ***A physician skilled in palpation techniques will perceive tenseness and/or edema as well as tenderness. The tenderness, often a few times greater than that for normal tissue, is for the beginner the most valuable sign.***

Jones suggested maintaining the palpating finger over the tender point, to monitor expected changes in tenderness, while with the other hand, he positioned the patient into a posture of comfort and relaxation.

Jones reported that he might proceed successfully just by questioning the patient as to comfort, reduction in pain, etc., as he probed intermittently, while moving towards the position of ease. If the correct position is arrived at, the patient would report diminished tenderness in the palpated area.

By intermittent deep palpation, as he fine-tuned the positioning, he monitored the tender point, seeking the ideal position at which there was at least a 70% reduction in tenderness. This degree of pressure stimulus is similar to that applied in the treatment of similar tender points by acupressure or Japanese 'tsubo' techniques.

The key to successful normalization by means of these methods seems to be the achievement of the position of maximum ease of the joint, in which the tender point becomes markedly less sensitive to palpation pressure.

Most importantly, the subsequent return to the neutral resting position, after the maintenance of the joint in this position of ease for not less than 90 seconds, is achieved very slowly. Without this slow repositioning, the likelihood exists of a sudden return to a shortened state of the previously disturbed structures.

THE GEOGRAPHY OF SCS

Tender points, relating to acute and chronic strain, can be found in almost all soft-tissue locations which have come under adaptation stress.

Although Simons et al. (1999) indicate that trigger points close to attachments are the ones most likely to benefit from positional release methods, D'Ambrogio & Roth (1997) observe:

> ***Tender points are found throughout the body, anteriorly, posteriorly, medially, and laterally on muscle origins or insertions, within the muscle belly, over ligaments, tendons, fascia and bone.***

Jones has identified a large number of conditions that are related to predictable tender points and from his vast clinical experience, and a lengthy process of trial and error, he has concluded that when tender points are found on the anterior surface of the body they are (with a few exceptions) indicative of the associated joint requiring a degree of forward-bending during its treatment (see Box 4.3). The location (in this case on the anterior aspect of the body) also indicates that the joint was probably initially injured in a forward-bending position.

Thus, information as to the original injury position (or observation of the direction in which adaptation is directing distortion) helps to direct the search for the tender points to the likeliest aspect of the body.

The exception to this rule is that the tender point related to the fourth cervical vertebra, when injured in flexion, is not necessarily treated with the neck in flexion, but may require side-bending and rotation, away from the side affected. Reduction in pain from the tender point during positioning and fine-tuning, will produce the guide to the most suitable position.

Tender points found on the posterior aspect of the body indicate joint dysfunction, which calls for some degree of backward-bending in the treatment (see Box 4.3). There are also exceptions to this rule, notably involving the piriformis muscle and the third and fifth cervical vertebrae. These exceptions may involve a degree of flexion on treatment.

Maps

Figure 4.4 will guide the reader to the most common tender point positions, as noted by Jones. Proprioceptive skills, and the use of careful palpation, will enable the required technique to be acquired. Reading of Jones's (1981) book, or that of D'Ambrogio & Roth (1997) is suggested for greater detail and understanding of his approach and for those who wish to work in this structured, somewhat formulaic, manner.

The examples that follow are adapted from Jones's text (Jones 1981) and are not recommendations but are for general information only.

Settings in which SCS/positional release might ideally be applied are given in Box 4.2.

The suggested positions of ease relate to the findings of Jones and his followers over many years, and while they are largely accurate, the author is critical of formulae that prescribe a set protocol for any given joint or muscular strain, and encourages the use of 'Goodheart's guidelines', described earlier in this chapter, as well as the development of palpation skills that allow for sensing of ease in the tissues, rather than reliance on verbal feedback from the patient as to the current level of discomfort as tissues are being positioned and repositioned.

Reminder about positioning

(see Box 4.3)

Remember that when positioning/fine-tuning the body as a whole or just the part in question (elbow, knee, etc.), it is normally found that tender points on the anterior aspect of the body require flexion, and those on the posterior aspect require extension as a first part of the process of easing pain or excessive tone.

The more lateral the point is from the midline the greater the degree of additional side-bending and/or rotation required to achieve ease.

Notes on prioritizing points for treatment

(see Box 4.5)

When selecting a tender point for use as a monitor in SCS treatment, there are often a confusing number of possibilities. The consensus among clinicians (McPartland & Klofat 1995) experienced in the use of SCS is that choice should be based on the following priorities:

- First, the most sensitive point found in the area with the largest accretion of tender points should be treated.
- If there are a number of similarly tender points, the most proximal and/or medial of these should be chosen.
- If there exists an apparent 'line' of points, one close to the centre of the chain should be chosen to 'represent' the others.
- Clinical experience suggests that no more than five points should be treated at any one session to avoid adaptive overload, and that one treatment weekly is usually adequate.

These 'guidelines' are based on experience rather than research.

An example might be where tender points of similar intensity are noted in the low back as well as the hip region. A point in the low back would receive primary attention (i.e. the most proximal point treated first). However, if tender points were found in the low back and hip, but the hip point was more sensitive, this would receive primary attention (i.e. most sensitive point treated first). If a row of points was noted between the low back and the hip and these were equally sensitive, the most central point in the row would receive primary attention (i.e. treat middle of a line of points first).

Notes on patient feedback

In order to have instant feedback as to the degree of pain/sensitivity/discomfort being felt as the tender point is palpated, it is useful to ask the patient to 'grade' the pain out of 10 (0 = no pain) and to give frequent reports as to the 'value' of the pain being noted during the process of fine-tuning.

A reduction to a score of 2 or 3 (approximately 70% reduction in pain) is regarded as adequate to achieve the release required.

In the USA, a method commonly suggested is to say to the patient, '*The amount of pain you feel when I press this point is a dollar's worth. I want you to tell me when there is only 30 cents worth of pain*'.

Whichever approach is chosen, it is important to instruct the patient that a conversation is not what is needed, but simple indications as to the benefits or otherwise, in terms of pain felt in the point being palpated and monitored, of the various changes in position that are being made.

Continued on p. 75

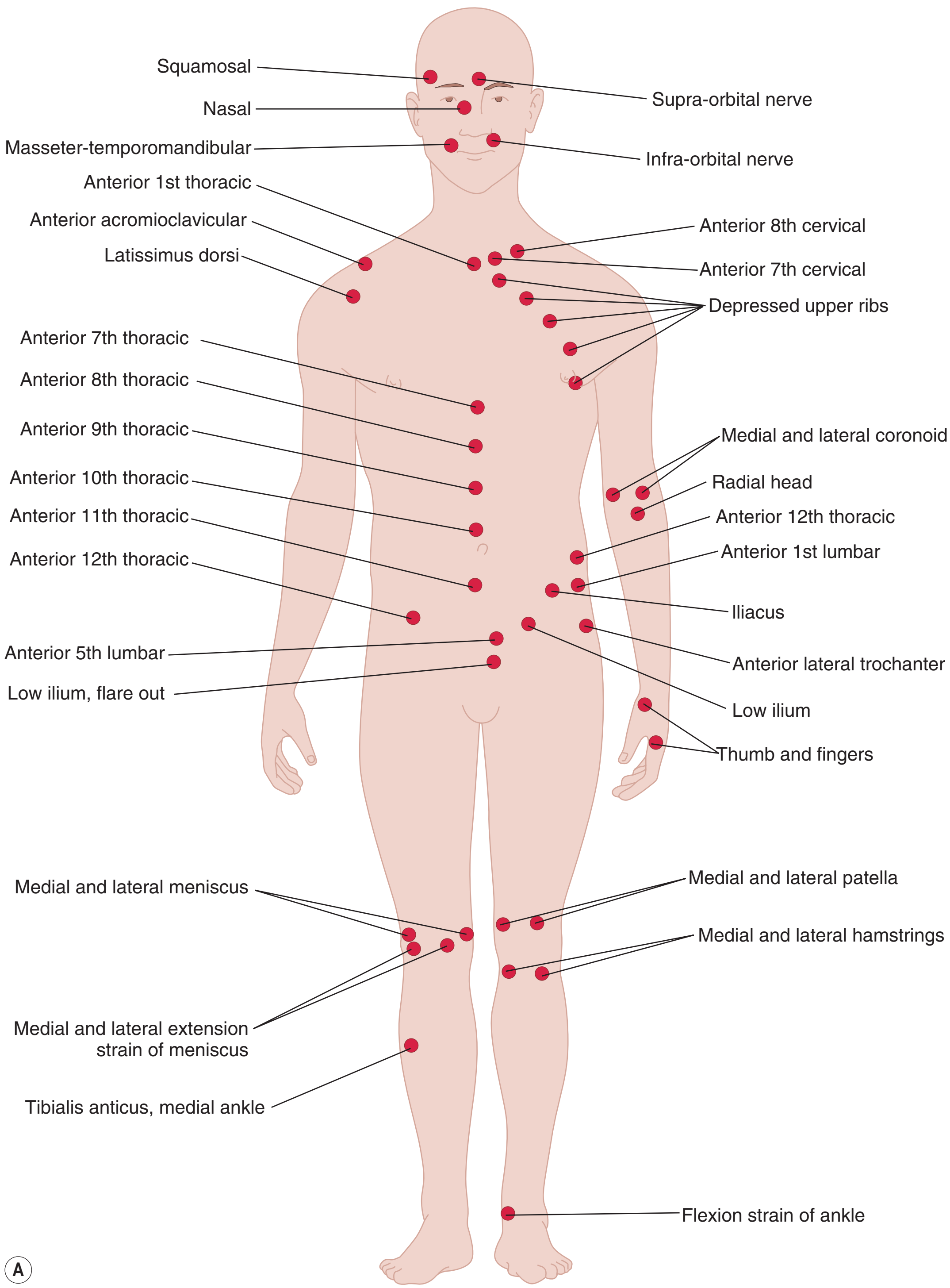


Figure 4.4 Note that although the most likely location of tender points may be bilateral they are shown on only one side of the body in these illustrations. The point locations are approximate, and vary within the indicated area, depending upon the specific mechanics and tissues associated with the particular trauma or strain, according to Jones.
(A) Common locations of Jones's tender points on the anterior body surface, commonly relating to flexion strains.

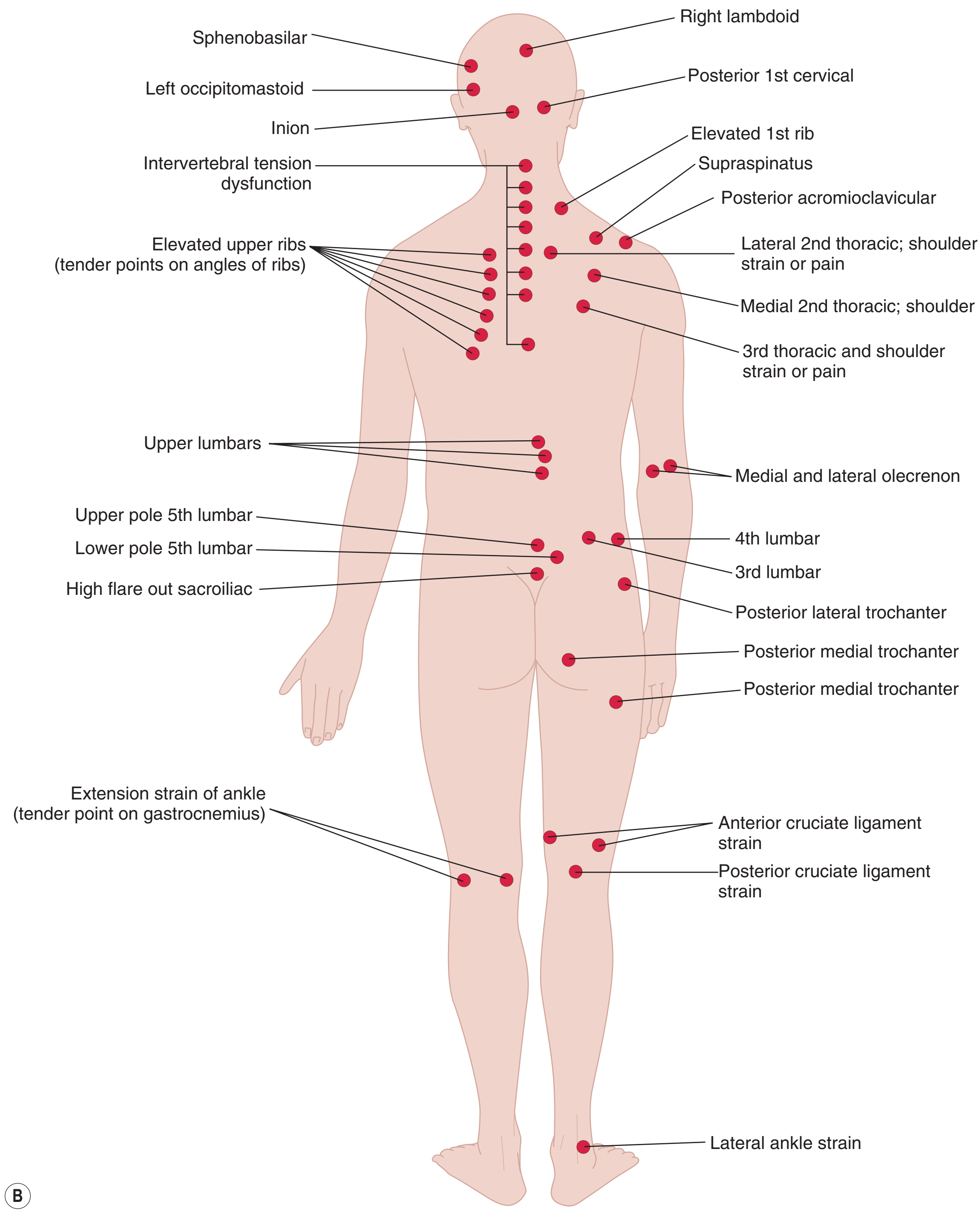


Figure 4.4, continued
(B) Common locations of Jones's tender points on the posterior body surface, commonly relating to extension strains.

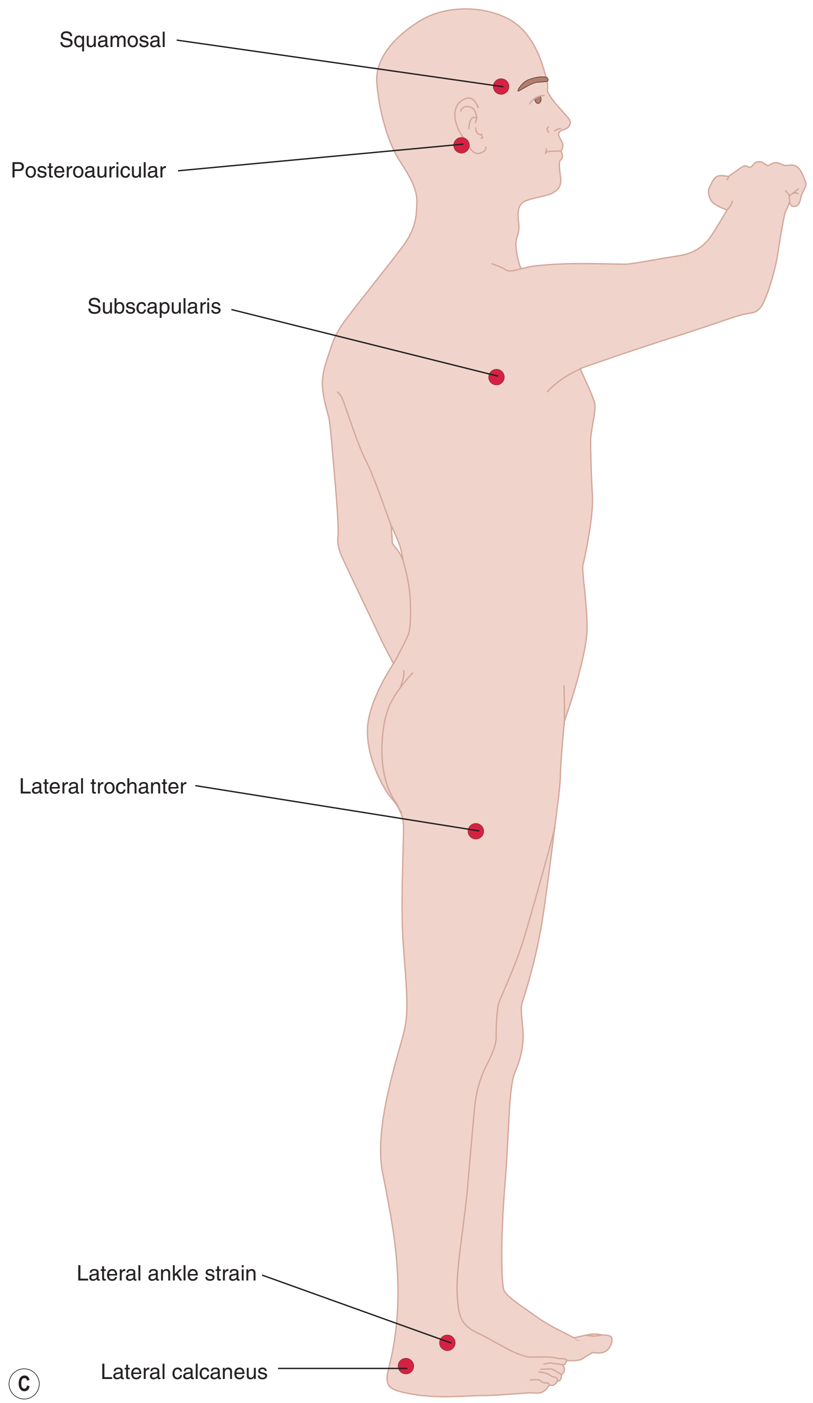


Figure 4.4, continued
(C) Common locations of Jones's tender points on the lateral body surface, commonly relating to strains involving side-flexion or rotation.

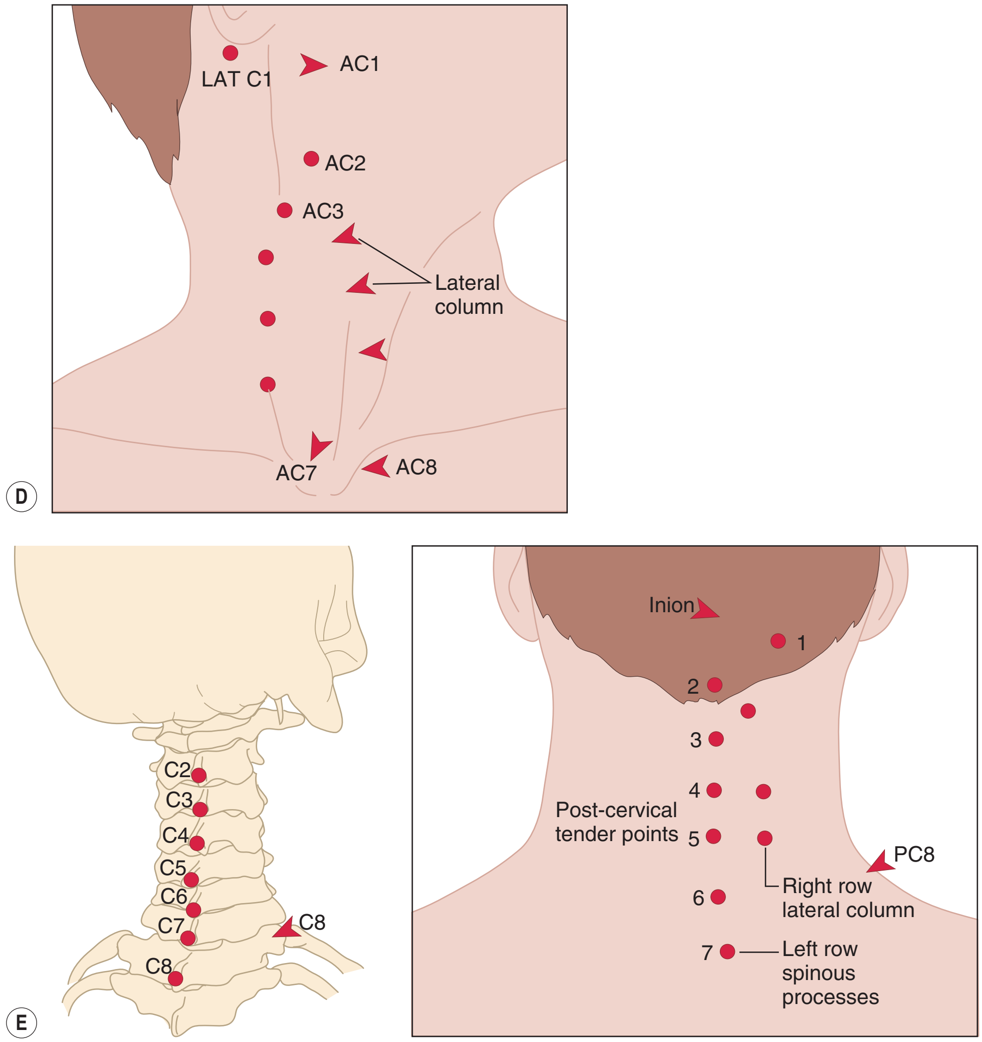


Figure 4.4, continued
(D) Common locations of anterior cervical tender point sites.
(E) Common locations of posterior cervical tender point sites.

Notes on fine-tuning the ease position

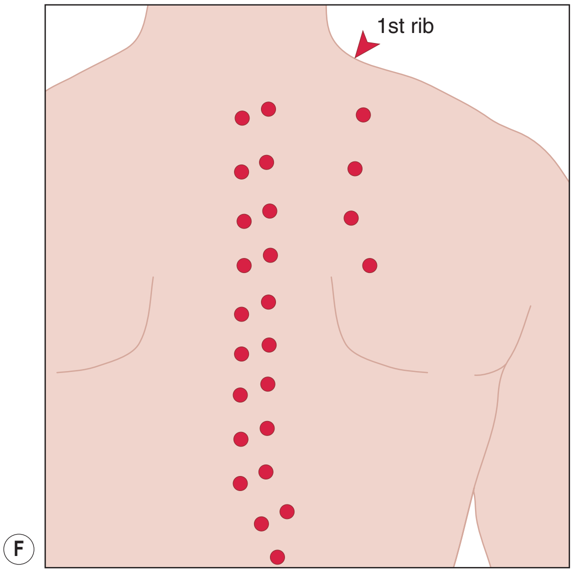
A crowding of the tissues to induce slackness in the affected tissues is a usual final aspect of the 'fine-tuning' once initial pain reduction has been achieved.

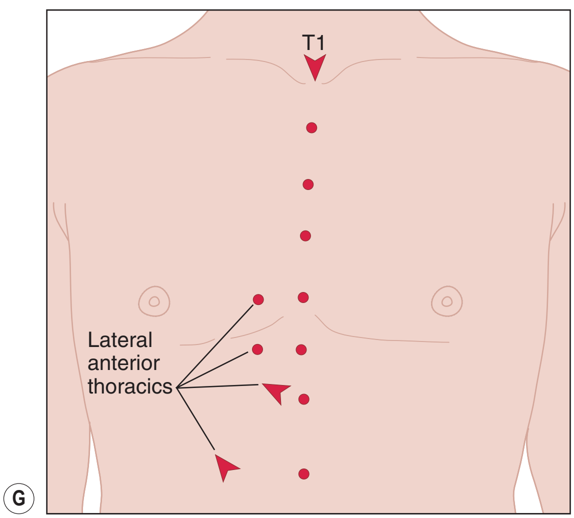
Additional ease can often be achieved by asking the patient to fully inhale or exhale to evaluate which phase of the breathing cycle reduces pain (or which reduces increased tone) the most.

Eye movements (visual synkinesis) can also be used in this way, always allowing the patient's report of pain levels and/or your palpation of a sense of ease in the tissues to guide you towards the 'comfort zone' (Lewit 1999).

Tips and comments about positioning into ease

1. There should be NO increase in pain elsewhere in the body during the treatment process.
2. It is not necessary to maintain possibly painful pressure on the tender point.





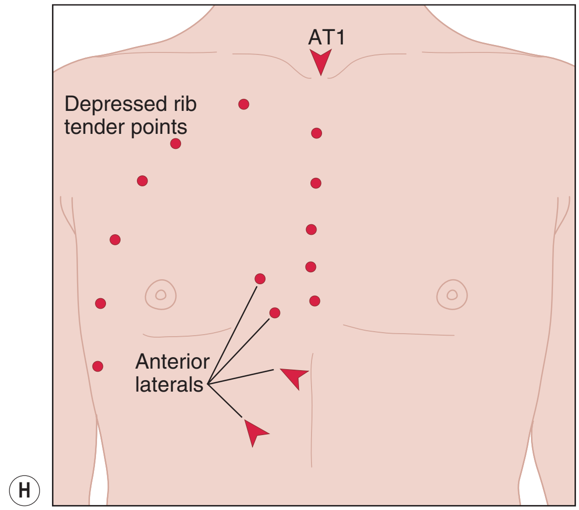


Figure 4.4, continued
(F) Common locations of posterior thoracic spine extension strain tender point sites.
(G) Common locations of anterior thoracic spine flexion strain tender point sites.
(H) Common locations of tender points relating to depressed upper ribs (2–7).

3. Intermittent pressure applied periodically, to evaluate the effects of a change in position in order to ascertain the degree of sensitivity still present, is the preferred Jones method.
4. The amount of time the position of ease should be maintained is discussed in Box 4.4.

After the 90-second hold

- It is necessary for a slow return to be made to the neutral start position, in order to avoid ballistic proprioceptors firing, and restoring the dysfunctional pattern that has just released.
- The patient should be advised to avoid strenuous activity over the following days.
- If the treatment has been helpful, reassessment of the tender point should indicate that a reduction in previous sensitivity of at least 70% has taken place.
- Post-treatment soreness is a common phenomenon and the patient should be warned that this may occur and that it should pass over the next 48 hours or so without further attention.

Advice and choices

The listings that follow in this chapter describe the main sites of tender points relative to particular strain patterns, as identified by Jones (1981), and also give the most usual directions of ease as presented in his writings and teachings. It is suggested that these should not be taken as absolute, for the reasons explained above, and should be used as a starting point in guiding you towards identifying the desired position of ease.

If ease (as judged by pain reduction in the palpated tender point) is not achieved in the position suggested by Jones, then that which emerges by careful fine-tuning is the 'correct' position. The body and its tissues, in other words, are being 'consulted' during the positioning phase, and the answer comes in the form of a reduction in pain in the palpated point.

As will become clear in Chapter 5, which describes functional technique and facilitated positional release, the use of pain in a point as a guide to the state of 'ease' is not the only way of arriving at the point of tissue balance – palpated reduction in 'bind' can be used as an equally clear message from the tissues to indicate that 'ease' is being approached.

Pressure – constant or intermittent?

It is suggested that at times, it may be useful to maintain pressure on the tender point throughout the repositioning process, rather than using the intermittent probing urged by Jones. The reasoning for this is explained in Box 4.6.

Patient's assistance

A final variation worth restating, involves, where convenient, asking the patient to apply pressure to the tender point sufficient to register pain.

In many instances, especially in intercostal areas, this has proved very useful, allowing freedom of movement for the practitioner/therapist as the positioning process is carried out and, in some instances more significantly, allowing pressure to be applied to areas of extreme sensitivity by the patient, when he or she was unable to tolerate practitioner/therapist application of pressure.

Contraindications and indications

There are very few contraindications to the use of SCS, but those that are suggested are listed in Box 4.7.

Box 4.8 lists major indications for the use of SCS (in combination with other modalities or on its own).

What does SCS treatment do?

- Where should treatment start?
- What should be treated first?
- Is there a way of prioritizing areas of dysfunction and choosing 'key' locations for primary attention?

Box 4.7 **SCS: contraindications and cautions**

- Particular care should be taken in application of SCS in cases of malignancy, aneurysm and acute inflammatory conditions.
- Skin conditions may make application of pressure to the tender point undesirable.
- Protective spasm should not be treated unless the underlying conditions are well considered (osteoporosis, bone secondaries, disc herniation, fractures).
- Recent major trauma or surgery precludes anything other than gentle superficial positional release methods (see later in this chapter for details concerning SCS in hospital settings).
- Infectious conditions call for caution and care.
- Any increase in pain during the process of positioning shows that an undesirable direction, movement or position is being employed.
- Sensations, such as numbness or aching may arise during the holding of the position of ease, and as long as this is moderate and not severe, the patient should be encouraged to relax and view the sensation as transient and part of the desirable changes taking place.
- Caution should be exercised when placing the neck into extension. It is important to maintain verbal communication with the patient at all times and to ask them to keep the eyes open, so that any signs of nystagmus are observable.

The notes on selecting and prioritizing points for treatment given earlier in this chapter (see Box 4.5), as well as the discussion on soft-tissue dysfunction in Chapter 2, should offer some general guidelines as to how and when dysfunctional tissues should be selected for treatment.

The author, to a large extent, works with a model of care that attempts to achieve one of two objectives (and sometimes both) when treating general or local (e.g. soft tissue) dysfunction.

It can be argued that all potentially beneficial therapeutic interventions depend on the manifestation of that benefit on the response of the body and tissues being treated. In other words, the treatment (involving any technique whatsoever) has a catalytic influence, but is of itself not capable of 'curing' anything.

The objectives relating to the two areas of influence, within which all therapeutic interventions operate, can be summarized as follows:

- Reduction of the adaptive load to which the organism as a whole, or the local tissues, are adapting (or failing to adapt), i.e. the objective is to

Box 4.8 **Indications for SCS (alone or in combination with other modalities)**

See also Box 4.1 for 'ideal settings' for SCS, and Box 4.7 for contraindications

Note: The fact that conditions are included in the partial listing below is not meant to suggest that SCS/PRT could do other than offer symptomatic relief for some of them. Alleviation of pain, enhanced mobility and, in some instances, resolution of the actual dysfunctional condition may be anticipated following appropriate use of SCS.

- Painful and restricted muscles and joints, irrespective of cause
- Degenerative spinal and joint conditions, including arthritis
- Post-surgical pain and dysfunction
- Osteoporosis
- Post-traumatic pain and dysfunction, such as sporting injuries, whiplash, ankle sprain, etc.
- Repetitive strain conditions
- Fibromyalgia pain (see Chapter 6)
- Headache
- Paediatric conditions, such as torticollis
- Respiratory conditions that might benefit from normalization of primary and accessory breathing muscles, ribs and thoracic spinal restrictions
- Neurological conditions, such as dysfunction following cerebrovascular accidents (stroke), spinal or brain injury or degenerative neural conditions, such as multiple sclerosis (Weiselfish 1993).

'lighten the load' and to 'down-regulate' a sensitized nervous system.

- Enhancement of the ability of the organism as a whole, or of the local tissues, to adapt to whatever stress load is being coped with, i.e. the objective is to 'enhance homeostatic self-regulating functions'.

As an additional emphasis: 'Don't make matters worse', by overloading adaptive functions even more.

The decision, therefore, as to which and how many points to treat at a given time using PRT methods, as well as whether to combine this with other methods of treatment, depends on individual characteristics, including age, vulnerability, the chronicity or acuteness of the condition, as well as the specific objectives in the individual case, with all these considerations being related to assessment findings and therapeutic objectives.

Scanning and mapping

Clinicians such as D'Ambrogio & Roth (1997), who have developed a counterstrain variant known as 'positional release therapy' (PRT), argue for a 'scanning evaluation' (SE) that records tender points, as well as their severity, in which the entire body is evaluated.

Just as a postural evaluation will provide a number of pointers that might relate to the patient's symptoms, or the palpation and eliciting of active trigger points might show patterns that explain the pain being experienced by the patient, or testing for shortness, weakness or malcoordination in muscles might correlate with somatic dysfunction, so might a grid or map of areas of tenderness ('tender points') – and their severity – be seen to contribute to the formulation of a plan of therapeutic action.

A major element in this mapping approach is the identification of what have been termed 'dominant tender points' (DTPs), the deactivation of which, it is claimed, can lead to a chain reaction in which less tender areas will normalize. This concept is not dissimilar to that of Simons et al. (1999) who maintain that chains of active trigger points can be 'switched off', if a primary trigger can be identified.

As D'Ambrogio & Roth (1997) explain:

> ***Several patients may have the same complaint (e.g. knee pain, shoulder pain, or low back pain) but the source of the condition, as revealed by the scanning evaluation (and the 'dominant tender points'), may be different for each. By identifying the location of key dysfunctions and treating restrictive muscular and fascial barriers, the pain may begin to subside.***

For details of the complex mapping and charting exercise, as recommended by D'Ambrogio & Roth (1997), the reader is referred to their book.

The mapping and charting exercise is a useful procedure, albeit time-consuming; for busy therapists the guidelines offered earlier in this chapter (see Box 4.5) may suffice, and should provide good clinical results.

A number of exercises are described below that offer the reader a chance to experiment with SCS methodology, and to become familiar in a 'hands-on' way with the mechanics of its use. These exercises are followed by a series of descriptions of SCS in clinical use, covering a variety of the muscles and joints of the body.

SCS EXERCISES

1. The SCS 'box' exercise

(Woolbright 1991)

Colonel Jimmie Woolbright (1991), Chief of Aeromedical Services at Maxwell Airforce Base, Alabama, devised a

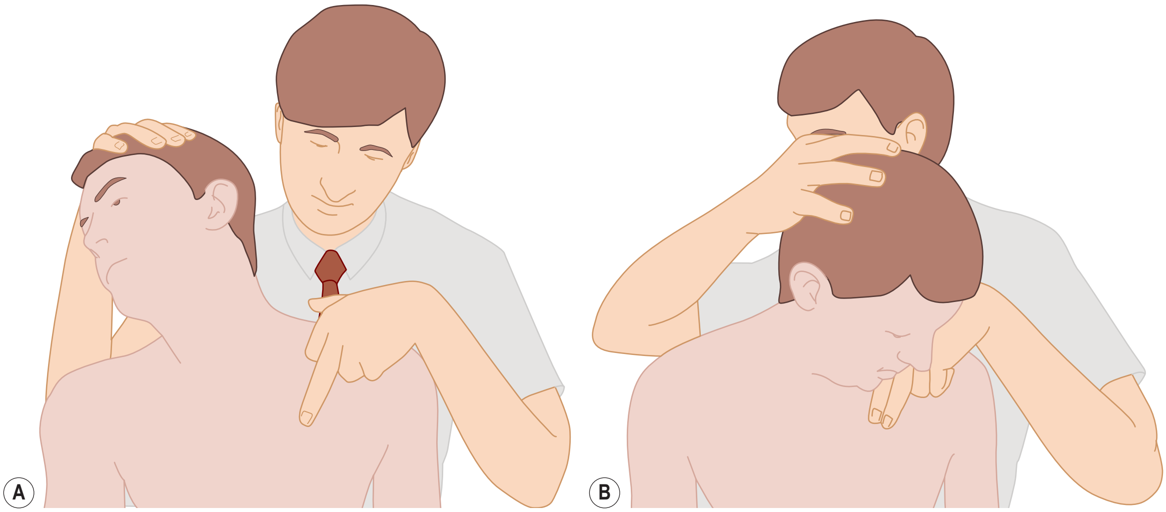


Figure 4.5 (A) The second head/neck position of the 'box' exercise as pain and tissue tension is palpated and monitored (in this instance in the left upper pectoral area). (B) The fourth and final head/neck position of the 'box' exercise as pain and tissue tension is palpated and monitored.

teaching tool that enables SCS skills to be acquired and polished. This is not designed as a treatment protocol but is an excellent means of acquiring a sense of the mechanisms involved.

'Box' exercise guidelines

Note: As the head and neck are positioned during this exercise (Figs 4.5, 4.6), no force at all should be used.

- Each position adopted is not the furthest the tissues can be taken in any given direction but rather it is where the first sign of resistance is noted.
- Thus, an instruction to take the patient/model's head and neck into side-bending and rotation to the right would involve the very lightest of guidance towards that position, with no force and no effort, and no strain or pain being noted by the patient/model.
- As each position described below in this 'box' exercise is achieved, three key elements require consideration:
  1. Is the patient/model comfortable and unstressed by this position? If not, too much effort is being used, or they are not relaxed.
  2. In this position, are the palpated tissues (in this exercise those on the upper left thoracic area) less sensitive to compression pressure in this particular head/neck position?
  3. In this position, are the palpated tissues reducing in palpated tone, feeling more at 'ease', with less evidence of 'bind'?

The information derived by the palpating hand (left hand in this example) should, at the end of the exercise, allow the practitioner/therapist to judge which of the various head/neck positions offered the most 'ease' to the palpated tissues (Fig. 4.5).

It will be found that while only one position of the head and neck (in this particular application of the exercise) offers the greatest reduction in palpated tension or reported pain, there are other secondary positions that also offer some reduction in these two key elements (pain and palpated hypertonicity), just as a number of the positions adopted during application of the 'box' exercise will demonstrably *increase* tension and/or pain.

Woolbright (1991) notes that there are what he terms 'mirror-image' points which are 'directly diagonally across from the anticipated position of release', and that these may at times offer a better position of ease than that designated as the likeliest by virtue of Jones's research.

Method

Note: As each position is reached you should pause to evaluate the tissue response to the position, as well as inquiring of the patient/model what the 'score' is for the pain/discomfort being produced by the palpating digit. Try to be constantly vigilant to changes in tone as the head and neck move through the sequence of positions around the 'box'.

- The patient/model is seated with the practitioner/therapist standing behind.

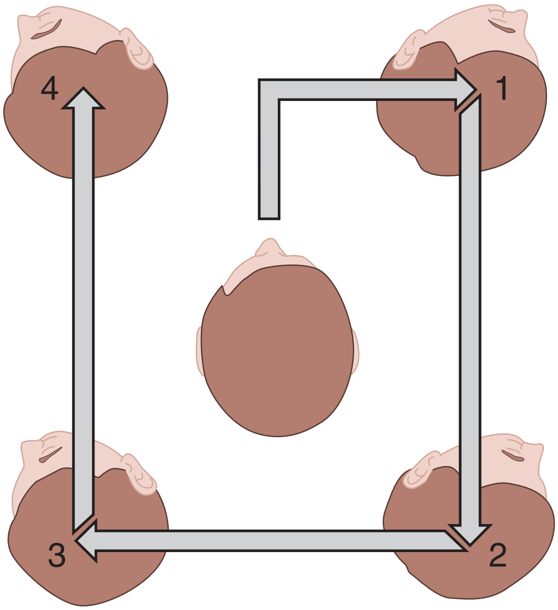


Figure 4.6 Box exercise. The head is taken into four positions: flexion with side-bending and rotation right (1); extension with side-bending and rotation right (2); extension with side-bending and rotation left (3); flexion with side-bending and rotation left (4). As these positions are gently adopted, tenderness and/or tissue tension is monitored.

- The practitioner/therapist's right hand rests **very lightly** on the crown of the patient/model's head (palm on head, fingertips touching forehead, or the hand can be transversely placed on the head so that the heel of the hand is on one side and the fingertips on the other), while the left hand/fingertips palpate an area of tenderness and tension a little below the left clavicle, in the pectoral muscles (Fig. 4.5).
- Sufficient pressure should be applied for a report to be made by the patient/model of discomfort or pain.
- This is given a value of '10' and it is explained that whenever a request is made for the level of pain to be reported, a number (up to '10', where '10' is the greatest pain) should be given.
- The discomfort/pain will change as the head and neck alter their positions, and it is the primary objective of the exercise that you should be able to sense – by virtue of changes in the palpated tension in the tissues – whether the 'score' is going to go up or down.
- As the patient/model exhales, the head should be guided, *with minimal effort*, into flexion and it is then gently side-flexed and rotated to the right to go to position 1 (Fig. 4.6).
- Pausing momentarily to assess changes in the palpated tissues and/or to obtain feedback as to reduction or otherwise in sensitivity, the practitioner/therapist then takes the head out of right rotation (while maintaining a slight right side-bend) and as the patient inhales, the practitioner/therapist introduces a slight pressure on the brow which allows the head to 'float' up out of flexion and into slight extension.
- When the easy limit of extension is reached, rotation to the right is again introduced taking it to position 2 (Fig. 4.5A, 4.6(2)).
- After a brief pause for evaluation of both tone and reported levels of pain/discomfort, the head is then moved gently to the left, back to a neutral position.
- Next, side-bending and finally some rotation to the left should be introduced, to an easy end-point, as the head comes to rest in position 3, still in slight extension (Fig. 4.6(3)).
- The head/neck is then, after a momentary pause, eased out of left rotation and into flexion (during an exhalation), while left side-bending is maintained.
- Rotation to the left is again introduced as the head/neck comes to rest in flexion, as in position 4 (Figs 4.5B, 4.6(4)).
- Taking the head back to the right and losing the side-bending/rotation at the midline returns it to the starting, neutral, position.
- Continuation to the right past the midline, again introducing flexion side-bending and subsequent rotation to the right, takes it back to position 1.
- The head and neck are moved around the box (as described above) a number of times, in order to assess for any additional relaxation (or increased bind) in the tissues under the palpating and monitoring hand.
- It is useful to try to note whether additional assistance to the process can be gained by having the patient/model, with eyes closed, 'look' up or down or sideways in the direction in which the head is moving, as it moves.
- Very often, experimenting with eye movements in this way allows for increased ease to be achieved, if the direction in which the eyes are looking is synchronized with the direction of movement.
- It is suggested that the practitioner/therapist can make the process of moving the model/patient around the box more fluid by duplicating the movements of the patient's eyes and breathing, as well as by leaning in the direction, and at

the speed, of the movement that the patient is being directed to follow, by the hand on the head.

- The whole exercise should be repeated a number of times (with different people) until the practitioner/therapist feels comfortable in using the 'box' approach to palpation of a specific tender point – noting the changes in tissue tone and reported discomfort under the listening/monitoring/palpating hand/finger.
- When palpating a posterior (extension) tender point, the 'box' should be entered from neutral by first going into extension (on inhalation) with the addition of side-bending and rotation towards the side of the tender point followed by progressing around the box.
- When palpating an anterior (flexion) tender point, the 'box' should be entered from neutral by flexing the head/neck (on exhalation) and then side-bending and rotating away from the side being palpated, before progressing around the box.

Note: Before continuing with this series of exercises and clinical treatment protocols, it is suggested that you review all the text boxes of information in this chapter, particularly Box 4.3 (Counterstrain positioning guidelines), which describes the general guidelines regarding positioning, derived from the clinical experience of Jones and many others, including the author.

2. SCS cervical flexion exercise

- The patient/model is supine and the practitioner/therapist sits or stands at the head of the table.
- An area of local dysfunction is sought using an appropriate form of palpation, such as a 'feather-light', single-finger, stroking touch on the skin areas overlying the tips of the transverse processes of the cervical spine.
- Using this method, a feeling of 'drag' is being sought for, which indicates increased sudomotor (sympathetic) activity and therefore a likely site of dysfunction, local or reflexively induced (Lewit 1999), as described in Chapter 2.
- When drag is noted, light compression is introduced to identify and establish a point of sensitivity, a tender point, which in this area represents (based on Jones's findings) an anterior (forward-bending) strain site.
- The patient is instructed in the method required for reporting a reduction in pain during the positioning sequence which follows.
- The author's approach is to say, 'I want you to score the pain caused by my pressure, before we start moving your head (in this example) as a "10" and to not speak apart from giving me the present score (out of 10) whenever I ask for it'.
- The aim is to achieve a reported score of 3 or less before ceasing the positioning process.
- In the example illustrated in Figure 4.7, an area of sensitivity/pain will have been located just anterior to the tip of a transverse process, on the right, and this is being palpated and monitored by the practitioner/therapist's right thumb.
- The head/neck is then taken lightly into flexion until some degree of ease is achieved based on the score reported by the patient. At this stage of the process this is being constantly compressed.
- When a reduction of the pain score of around 50% is achieved, fine-tuning is commenced, introducing a very small degree of additional positioning (side-flexion, rotation, etc.) in order to find the position of maximum ease, at which time the reported 'score' should be reduced by at least 70%.
- Remember that in Box 4.3, the guidelines for SCS suggest that anteriorly situated pain requires (as a rule, but not always) flexion, together with side-flexion and rotation toward the side of pain.
- Once relative 'ease' has been achieved, the patient may be asked to inhale fully and exhale fully, while observing for changes in the level of pain, in order to evaluate which phase of the cycle reduces it still more.
- The phase of the breathing cycle in which the individual senses the greatest reduction in sensitivity is maintained for a period that is tolerable (holding

Figure 4.7 Learning to use strain/counterstrain for the treatment of a cervical flexion strain.

the breath in or out or at some point between the two extremes), while the overall position of ease continues to be maintained, and the tender/tense area monitored.
- This position of ease is held for 90 seconds in Jones's methodology, although there exist mechanisms for reducing this, which will be explained later in this chapter.
- During the holding of the position of ease, the direct compression can be reduced to a mere touching of the point, along with a periodic probing to establish that the position of ease has been maintained.
- After 90 seconds, the neck/head is very slowly returned to the neutral starting position. This slow return to neutral is a vital component of SCS, since the neural receptors (muscle spindles) may be provoked into a return to their previously dysfunctional state if a rapid movement is made at the end of the procedure.
- The tender point/area may be retested for sensitivity at this time and should be found to be considerably less hypertonic.

3. SCS cervical extension exercise

- With the patient/model in the supine position and with the head clear of the end of the table, fully supported by the practitioner/therapist, areas of localized tenderness are sought by light palpation alongside or over the tips of the spinous processes of the cervical spine.
- When a point that is unusually tender is located, compression is applied to elicit a degree of sensitivity or pain.
- The model/patient is asked to ascribe a score of '10' to this tenderness.
- The head/neck is then very slowly taken into light extension, along with side-bending and rotation, as in (Fig. 4.8) (usually away from the side of the pain – see guidelines for positioning in Box 4.3), until a reduction of at least 50% is achieved in the reported sensitivity.
- The compression can be constant or intermittent, with the latter being preferable, if sensitivity is great.
- Once a reduction in sensitivity of at least 70% has been achieved, inhalation and exhalation are monitored by the patient/model to see which phase reduces sensitivity even more, and this is maintained for a comfortable period.
- If intermittent compression of the point is being used, this needs to be applied periodically during the 90-second holding period, in order to ensure that the position of ease has been maintained.
- After 90 seconds, a very slow and deliberate return to neutral is performed and the patient is rested for several minutes.

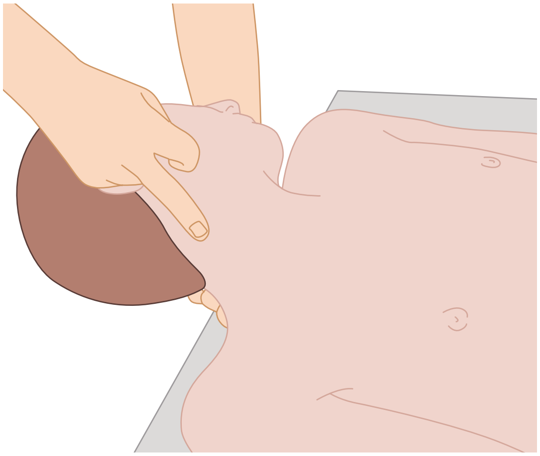


Figure 4.8 Learning to use strain/counterstrain for the treatment of a cervical extension strain.

- The tender point should be re-palpated for sensitivity, which may have reduced markedly, as should excessive hypertonicity in the surrounding tissues.

4. SCS 'tissue tension' exercise

(Chaitow 1990)

- SCS exercises 2 and 3 should be performed again; however, this time, instead of relying on feedback from the patient as to the degree of sensitivity being experienced in the tender point and using this feedback as the guide which takes the practitioner/therapist towards the ideal position of ease, the practitioner/therapist's own palpation of the tissues and their movement towards ease becomes the guide.
- A light contact should be maintained on the previously treated tender point, while positioning of the head and neck is carried out, to achieve maximum 'ease'.
- Ideally, a final position should be achieved which closely approximates the position in which reduction of the pain was achieved in the previous exercises.
- This is an exercise that begins a process of palpatory skill acquisition and enhancement, which will be carried further in exercises involving functional technique described in Chapter 5.

5. SCS exercise involving compression

- Exercises 1, 2 and 3 should be performed again, but this time when pain/sensitivity and/or hypertonicity

have reduced by 70% by means of positioning, and after the breathing element has been carried out to aid this process, a light degree of 'crowding' or compression is introduced by means of pressure onto the crown of the head through the long axis of the spine.
- No more than 1 lb (0.5 kg) of pressure – more often usually less than half of that – should be involved.
- This can be achieved by use of pressure from the practitioner/therapist's abdomen, or from the hands that are holding and supporting the neck and head.
- This additional element of crowding/slackening the tissues should not increase the sensitivity from the palpated point or cause pain anywhere else.
- If the addition of crowding does cause any additional pain/discomfort, it should be abandoned.
- The more usual response is for the patient to report an even greater degree of pain relief, and for the practitioner/therapist to sense greater 'ease' in the palpated tissues.
- This addition of crowding to the procedures reduces the time required during which the position of ease needs to be held, and mimics a major feature of facilitated positional release (FPR, see Chapter 5).
- The time-scale for SCS when crowding is a feature is commonly given as between 5 and 20 seconds.

These first five exercises – starting with the 'box' exercise – offer an initial opportunity to become familiar with SCS methodology.

The skills that should be enhanced by use of these exercises include:

1. A greater sense of the delicacy of the SCS process.
2. The ability to locate tender points and, depending on their location, to be able to position the area into flexion plus fine-tuning (anterior aspect) or extension plus fine-tuning (posterior aspect) until sensitivity reduces, or palpated tone reduces, by at least 70%.
3. A sense of the changes that occur in response to light 'crowding' of the tissues once they have been taken into their initial ease position.

Before moving on to a series of clinically useful examples of SCS, two more exercises will be described, and should be practised.

These involve:

- A low back exercise (exercise 6).
- A small joint (elbow) exercise (exercise 7).

In both of these, processes such as those used in the 'box' exercise (above) will be described.

Note that, although these are 'training exercises', meant to familiarize you with SCS assessment and treatment methodology, they are in fact perfectly usable in clinical settings to treat the areas being focussed upon.

These are authentic SCS protocols.

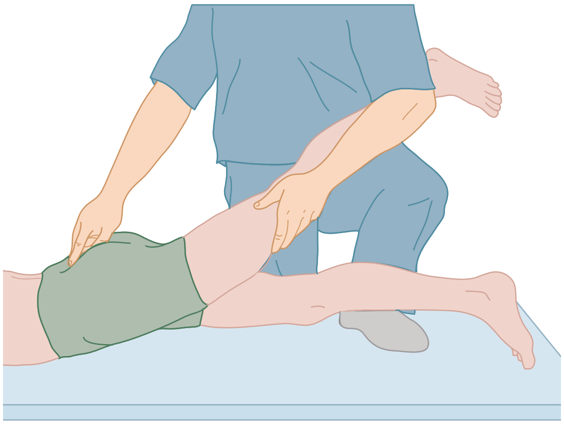


Figure 4.9 SCS low back/lower limb exercise.

6. SCS low back/lower limb exercise

- With the patient prone, one of the lower limbs can be used as a 'handle' with which to modify tone and tension and/or tenderness in the low back, as an area of this is palpated (Fig. 4.9).
- The practitioner palpates an area of the lumbar musculature as a systematic evaluation is carried out of the effects of moving the *ipsilateral* and then the *contralateral* limb into (slight) extension, adduction and internal rotation.
- Once the effects of these different positions have been assessed, take the limb to a neutral position and introduce abduction and external rotation, while still in extension.
- A further experiment to assess the effects on low back tenderness (palpating a tender point) and hypertonicity should involve taking the abducted limb into flexion (over the edge of the table) and then introducing external rotation.
- Following this, with the hip still in flexion, remove the rotation and take the limb into adduction and, at its easy end-of-range, introduce a little internal rotation.
- In this way, an approximation of a 'box' movement will have been created while a low back area is palpated for changes in perceived pain or modifications of tone.
- Assess which positions offer the greatest ease in low back areas as this sequence is repeated several times.

- Evaluate whether greater influence is noted in the tissues being palpated when the ipsilateral or contralateral leg is employed as a lever.
- Repeat these processes but this time, at the end of the fine-tuning, add long-axis compression, by easing the limb towards the pelvis using no more than 1 lb (0.5 kg) of pressure.
- Evaluate the effects of this on tenderness and tone.

Best position?

According to SCS theory and clinical experience, the likeliest positions of 'ease' will be found with the *contralateral leg in extension*.

Other variables will influence which parts of the low back eases most when the limb is adducted or abducted, and internally or externally rotated. Refer to Box 4.3, which provides the model that should produce optimal results.

As the limb is eased into extension (but only a very small amount – avoiding hyperextension of the spine), and is adducted and slightly rotated, a tender point on the *right low back area* would be placed into its greatest degree of ease when there is:

- extension of the contralateral (left) leg
- adduction of that limb (so rotating the lumbar spine slightly to the left, i.e. away from the side of palpated pain on the right side of the posterior aspect of the patient)
- some fine-turning involving rotation of the limb one way or the other to achieve 70% reduction in tenderness or tone
- long-axis compression.

7. SCS upper limb (elbow) exercise

- The concept and methodology of the 'box' exercise can be used to introduce a series of movements, while palpating tenderness and tension in the lateral epicondyle area.
- The patient lies supine while one hand palpates an area of tenderness on the lateral epicondyle.
- The other hand holds the wrist as the elbow is placed into extension with side-bending and rotation towards the side of the palpated tender point (i.e. externally rotated).
- Assess changes of palpated tone and reported pain with the arm in this position, and then introduce side-bending and rotation internally (still in extension).
- Now introduce flexion, and while in flexion assess the changes in palpated tone and reported discomfort and then introduce first internal and then external rotation with side-bending to assess changes in reported sensitivity, and changes in tissue tone.
- Identify the position in which the greatest reduction in tone and sensitivity is achieved.
- Then introduce long-axis compression, from the wrist towards the elbow, using no more than a few ounces (grams) of pressure (Fig. 4.10).

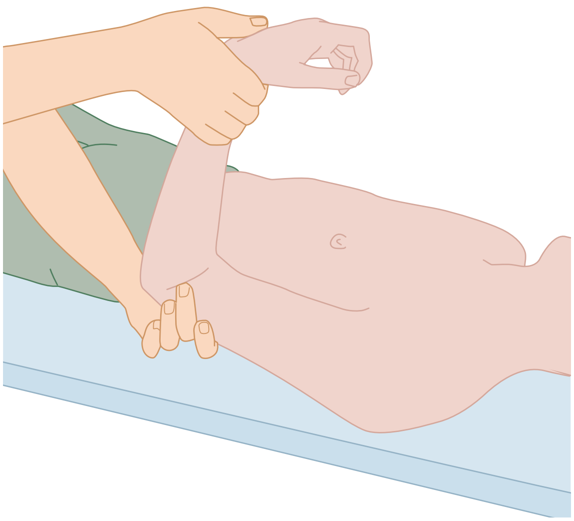


Figure 4.10 The lateral epicondyle is palpated as various positions of the lower arm (flexion, extension, rotation) are introduced to evaluate their influence on the palpated tissues.

The most probable position of ease for an anterior lateral epicondyle tender point is flexion with side-bending and external rotation. However, as in all tender points, the particular mechanisms involved in the dysfunctional strain pattern can make such predictions inaccurate. In the end, it is the position that achieves the maximum degree of ease which is likely to produce the most beneficial effects.

This and the previous exercises offer a useful starting point for anyone new to SCS.

SCS TECHNIQUES

Much of the remainder of this chapter comprises descriptions of recommended protocols for the treatment of many of the joints and muscles of the body.

Some descriptions are derived from the work of Jones (1981), while others are either modifications developed by the author or are modifications of protocols described by Deig (2001) or D'Ambrogio & Roth (1997).

The descriptions of these clinical applications of SCS will follow a descending pathway, starting at the neck and working inferiorly to the feet (with the exception of descriptions of cranial and temporomandibular joint (TMJ) methods that can be located in Chapter 5).

Cervical flexion strains

(see Fig. 4.4D)

Anterior strain of C1:

- The tender point for anterior strain in a C1 joint is found in a groove between the styloid process and angle of the jaw.
- Treatment usually involves rotation of the head of the supine patient away from the side of dysfunction, either maintaining pressure or repetitively probing Jones's point (Fig. 4.11).
- Fine-tuning is usually by side-flexing away from the painful side.

An alternative or second point for C1 flexion strain lies ½ inch (1 cm) anterior to the angle of the mandible. This is usually treated by introducing flexion and rotation, approximately 45° away from the side of pain.

Remaining *cervical anterior (flexion) strain tender points* are located on or about the tips of the transverse processes of the involved vertebrae (Fig. 4.12).

- These spinal segments are usually treated by positioning into forward-bending and rotation, to remove pain from the tender point.

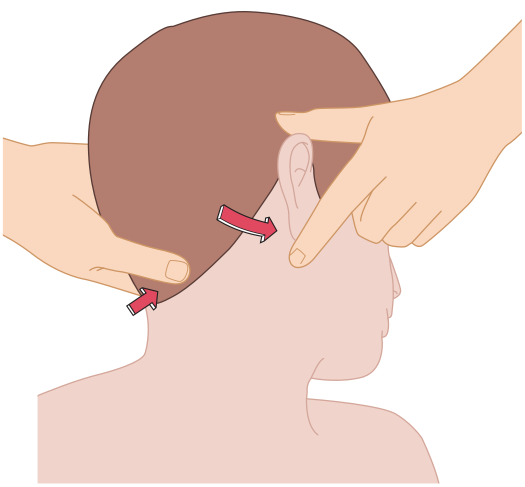


Figure 4.11 First cervical flexion strain tender point commonly lies between the styloid process and the angle of the jaw. A likely position of ease is as illustrated. However, alternative positions of ease can sometimes involve movement of the head and neck into different positions.

- In general, the more cephalad the palpated tender point the more rotation away from it is needed in fine-tuning (Fig. 4.12A).
- The more caudad the point the more flexion, and the less rotation, is usually required.

Note: Whenever the suggestion is given that rotation should be towards the tender point, this is the *likeliest* beneficial direction that will take the area towards ease; however, if this fails to achieve results, it is quite possible that rotation away from the side of pain would provide greater ease.

In the end, each strain pattern is unique, and while guidelines as to likely directions of positioning are usually accurate, this is not always so, and the feedback from palpated tissues and the patient is the true guideline.

Cervical side-flexion strains

Tender points relating to side-flexion strains of the cervical spine are located as follows:

- for C1 side-flexion restriction – tip of transverse process of C1
- for C2–C6 side-flexion restriction – on the lateral aspects of the articular processes, close to the spinous process (Fig. 4.13).

Treatment involves pressure being applied to the tender point and side-flexion *towards or away from* the side being treated, depending on the tissue response and patient's reports as to pain levels.

Fine-tuning might involve slight increase in flexion, extension or rotation.

Clinical tip: Do not forget to use drag palpation in order to *rapidly* identify localized areas of dysfunction (hyperalgesic skin zones) – as described in Chapter 2.

Suboccipital strains

(see Fig. 4.4B,E)

The tender points associated with upper cervical/suboccipital strains are located on the occiput, or in the muscles attaching to it, such as rectus capitis anterior, obliquus capitis superior and rectus capitis posterior major and minor.

Treatment involves either localizing cranial flexion or cranial extension to the C1 area, while applying precisely focussed flexion or extension procedures that markedly reduce the tenderness from the palpated tender point.

For example:

- If a tender point is located on rectus capitis anterior, just medial to the insertion of semispinalis capitis, inferior to the posterior occipital protuberance, it is said by Jones (1981) to relate to flexion strain of the region.

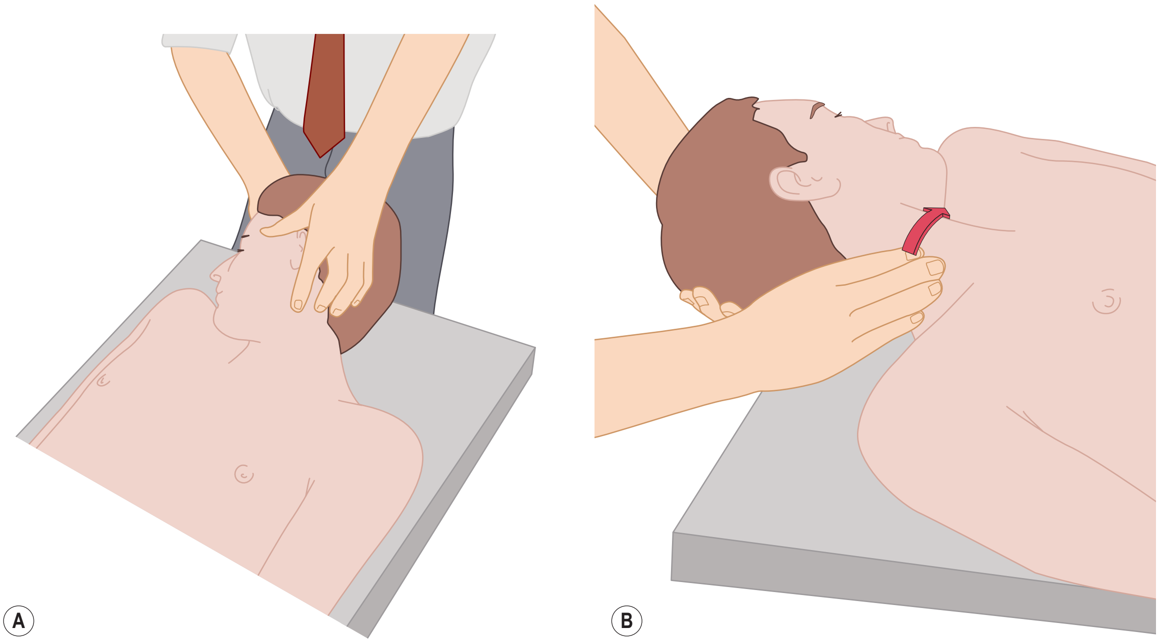


Figure 4.12 (A,B) A flexion strain of a mid to lower cervical vertebra, with the tender point close to the tip of a transverse process. The position of ease is often as illustrated – flexed and rotated away from the side of palpated pain – however, as noted in the text, alternative positioning may be called for.

Figure 4.13 Treatment for C2–C6 side-flexion strain.

- The ease position involves localized flexion of the suboccipital region.
- The patient is supine with the practitioner seated or standing at the head of the table.
- One hand palpates the tender point while simultaneously applying light distraction to the occiput, in a cephalad direction.
- The other hand rests on the frontal bone and applies *light* caudad pressure, inducing upper cervical flexion, bringing the chin close to the trachea (Fig. 4.14), until an appropriate tissue response is noted, accompanied by a reduction in perceived tenderness.
- Fine-tuning may also be required, possibly involving rotation towards and side-flexion away from the treated side.

Alternatively:

- If a tender point is located on obliquus capitis superior, approximately 1.5 cm medial to the mastoid process, it is said by Jones (1981) to relate to an extension strain of the region.
- The ease position involves localized extension of the tissues.
- The patient is supine and the practitioner is at the head of the table with one hand supporting the

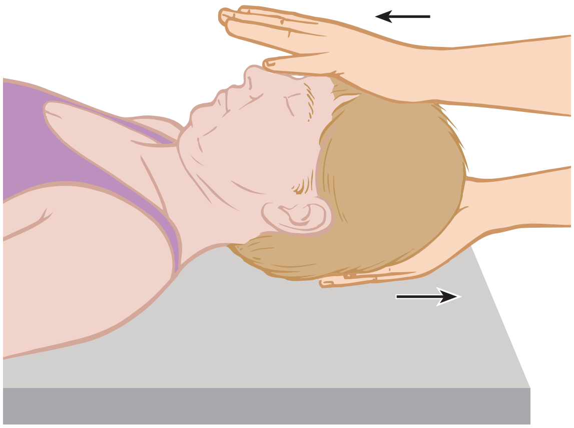


Figure 4.14 Treatment for first cervical flexion strain.

head, and with one finger of that hand localizing the tender point (Fig. 4.15).

- The other hand is on the crown of the head applying light pressure to induce upper cervical extension (as the occiput extends on C1).
- This position, together with fine-tuning involving side-flexion and/or rotation, should establish the position of ease.

Or:

- If a tender point is located on the occiput (when cephalad and medial pressure is applied), just lateral to the insertion of semispinalis capitis, or on the superior surface of the second cervical transverse process, the dysfunctional tissues may involve rectus capitis posterior major or minor (commonly traumatized through whiplash injuries or stressed through a forward-head posture).
- The ease positions for either point involve upper cervical extension.
- The treatment position is almost identical to that suggested in the previous description (Fig. 4.15).

Other cervical extension strains

These tender points are found on or about the spinous processes (see Fig. 4.4D).

Treatment should commence by introduction of increased extension.

- Extension strains in the lower cervical and upper thoracic areas are usually treated by taking the pain out of the palpated tender point, by means of extension of the head on the neck.

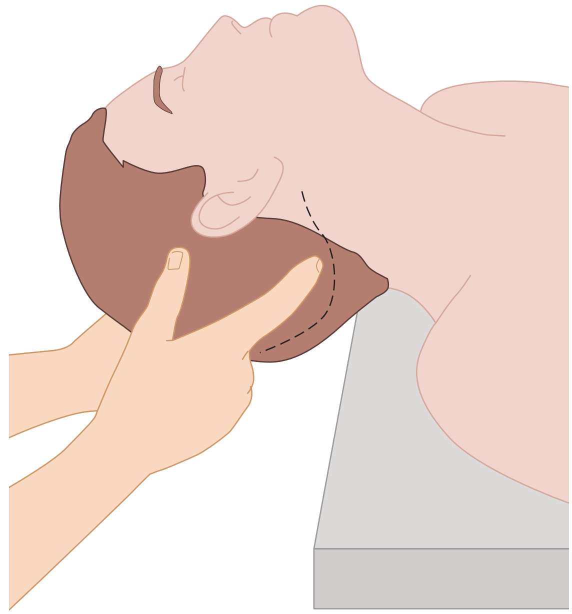


Figure 4.15 First cervical extension strain. The position of ease requires extension of the neck and (usually) rotation away from the side of pain.

- In a bed-bound patient, the patient lies on the side with the painful side uppermost, so that fine-tuning can be accomplished by means of slight side-bending and rotation towards the side of the dysfunction (Fig. 4.16A). (See Chapter 6 for Schwartz's (1986) suggestions regarding treating these points in a bed-bound patient.)
- Exceptions to the positioning suggestions given above include those applying to C3/4 extension strains, which can usually be treated in either flexion or extension.
- C8 extension strain may also need to be treated in slight extension, with marked side-bending and rotation away from, rather than towards, the side of strain (C8 point lies on the transverse process of C7).

Extension strains of the lower cervical and upper thoracic spine

(see Fig. 4.4B,E)

The patient should be prone. Jones states:

> *The head is supported by the doctor's left hand holding the chin. The practitioner/therapist's left forearm is held along the right side of the patient's*

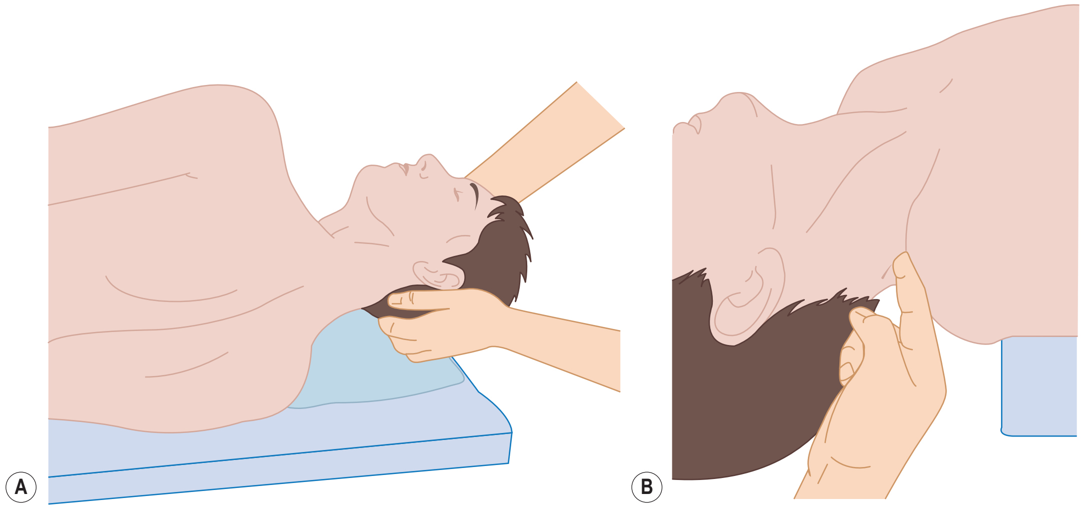


Figure 4.16 (A,B) Extension strains of the lower cervical and upper thoracic spine usually require extension and slight side-bending, and rotation away from the painful side.

head for better support. The right hand monitors tender points on the right side of the spinous processes. The forces applied are mostly extension, with slight side-bending and rotation left (Fig. 4.16B).

The tender points of the posterior thorax are located interspinally, paraspinally and at the rib angles, when there exist extension dysfunctions of intervertebral joints, side-bending dysfunction and ribs that are more comfortable when elevated.

The simplicity of Jones's methods is obvious.

- The shortened fibres relate to the areas where tender points are to be found, and the positioning is such as to increase the already existing shortening, while palpating the tender point(s).
- 90 seconds of holding the position of ease is suggested.
- The skill required lies in locating and localizing the tender point, and identifying and duplicating the nature of the original strain or injury.
- There are few exceptions to Jones's directions in this region, for extension strains.

Treating bed-bound patients

Recommendations for use of SCS methodology in hospital or home (bed-bound) situations, are given in Chapter 6, where additional functional approaches that may be useful for fragile patients, or in acute situations, are also outlined.

Clinical tip: Be aware that it is commonly necessary to use alternative positions to achieve ease, if the directions given in this text fail to produce ease and relief from pain in the tender point.

The Spencer shoulder sequence protocol

Note: The Spencer sequence is extremely useful clinically as either an assessment or a treatment approach.

It should be obvious that instead of positional release methods, as described below, muscle energy techniques (MET), or other modalities can also be used to good effect.

The Spencer sequence derives from osteopathic medicine in the early years of the 20th century (Spencer 1916), and is taught at all osteopathic colleges in the USA. Over the years it has been modified to include treatment elements other than the original intent to achieve articulation and mobilization.

Research evidence

(Knebl 2002)

A study involved 29 elderly patients with pre-existing shoulder problems. The patients were randomly assigned to a Spencer sequence osteopathic treatment or a control group.

The placebo group were placed in the same seven positions as those receiving the active treatment, but without MET ('corrective force') as part of the protocol.

Over 14 weeks, there were a total of eight 30-minute treatment sessions, during which time both groups demonstrated significantly increased ranges of motion and a decrease in perceived pain. However, following the end of the treatment period: 'Those subjects who had received OMT demonstrated continued improvement in ranges of motion, while that of the placebo group decreased'.

Choice

What has become clear in clinical practice is that the Spencer sequences, can not only be transformed from assessment and articulation into a muscle energy approach, but also into a positional release (SCS or functional) method, as the situation demands.

One key factor that would determine the choice of using articulation, and/or MET and/or SCS, would be the relative acuteness of the condition, and the relative sensitivity of the patient. The more acute, and the more fragile and sensitive the individual, the more the choice would tilt towards SCS or functional positional release methodology.

Spencer sequence method

A number of the Spencer positions are described below (shoulder flexion, extension, internal rotation, circumduction – with compression and with distraction, as well as adduction and abduction).

Note: There is no specific description of external rotation of the shoulder in these notes, although this movement is a part of the adduction sequence.

Method

(Patriquin 1992)

- When assessing and treating the shoulder, the scapula is fixed firmly to the thoracic wall to focus humeral movement to the glenoid fossa, as a variety of movements are introduced.
- In all Spencer assessment and treatment sequences, the patient is side-lying, with the side to be assessed uppermost, arm lying at the side with the elbow (usually) flexed.
- In all assessments, the practitioner stands facing the patient, at chest level or, if preferred, stands behind the side-lying patient.

Assessment and PRT treatment of shoulder extension restriction

- The practitioner's cephalad hand cups the shoulder, firmly compressing the scapula and clavicle to the thorax while the patient's flexed elbow is held by the practitioner's caudad hand, as the arm is taken into passive extension towards the optimal 90° (Fig. 4.17).

Figure 4.17 Spencer sequence treatment of shoulder extension restriction.

- Any restriction in range of motion is noted, ceasing movement *at the first indication of resistance* or if any pain is reported resulting from the movement.
- When restriction is noted during movement towards extension of the shoulder joint, the soft tissues implicated in maintaining this dysfunction could be the shoulder flexors – anterior deltoid, coracobrachialis and the clavicular head of pectoralis major.
- Palpation of these (using drag or other evaluation methods) should reveal areas of marked tenderness.
- The most painful tender point (painful to digital pressure) elicited by palpation is then used as a monitoring point.
- Digital pressure on the point, sufficient to allow the patient to give this a value of '10', is followed by the arm being moved into a position that reduces that pain by not less than 70% – without creating any additional pain elsewhere.
- This position of ease usually involves some degree of flexion and fine-tuning to slacken the muscle housing the tender point.
- This ease state should be held for 90 seconds (or less if compression is added), before a slow return to neutral and a subsequent re-evaluation of the range of motion.

Assessment and PRT treatment of shoulder flexion restriction

- The patient has the arm lying alongside the trunk, with the practitioner holding the wrist/forearm with one hand, while the other hand stabilizes the scapula and clavicle firmly to the chest wall.
- The practitioner slowly introduces passive shoulder flexion in the horizontal plane, as range of motion toward 180° is assessed, by which time the elbow is fully extended (Fig. 4.18).

Figure 4.18 Spencer sequence treatment of shoulder flexion restriction, showing the position towards the end of range of motion assessment.

- At the very first indication of restriction (or a report of pain as a result of the flexion movement) the movement should cease.
- When a restriction towards flexion of the shoulder joint is noted, the soft tissues implicated in maintaining this dysfunction would probably be the shoulder extensors – posterior deltoid, teres major, latissimus dorsi, and possibly infraspinatus, teres minor and/or long head of triceps.
- Palpation of these (drag palpation or any other appropriate method) should reveal areas of marked tenderness.
- The most painful tender point (painful to digital pressure) elicited by palpation should then be used as a monitoring point by application of digital pressure that the patient registers as having a 'value' of '10'.
- The arm is then moved into a position that reduces the tender point pain by not less than 70%.
- This position of ease will probably involve some degree of extension and fine-tuning to slacken the muscle housing the tender point.
- This ease state should be held for 90 seconds (or less if compression is added) before a slow return to neutral and a subsequent re-evaluation of range of motion.

Shoulder articulation and assessment of circumduction capability with compression or distraction

- The patient is side-lying with elbow flexed while the practitioner's cephalad hand cups the shoulder firmly, compressing the scapula and clavicle to the thorax (Fig. 4.19).
- The practitioner's caudad hand grasps the elbow and takes the shoulder through a slow clockwise (and subsequently an anticlockwise) circumduction, while adding compression through the long axis of the humerus.

Figure 4.19 Spencer sequence assessment of circumduction capability with compression.

- Subsequently, the same assessment is made with light distraction being applied.
- If restriction or pain is noted in either of the sequences involving circumduction of the shoulder joint (clockwise and anticlockwise, utilizing compression or distraction), evaluate which muscles would be active if precisely the opposite movement were undertaken.
- For example, if on compression and clockwise rotation, a particular part of the circumduction range involves either restriction or discomfort/pain, cease the movement and evaluate which muscles would be required to contract in order to produce an active reversal of that movement (Chaitow 1996; Jones 1981; Walther 1988).
- In these antagonist muscles, palpate for the most 'tender' point and use this as a monitoring point as the structures are taken to a position of ease which reduces the perceived pain, or increased tone, by at least 70%.
- This is held for 90 seconds (or less if compression is added) before a slow return to neutral, and retesting.

Assessment and PRT treatment of shoulder abduction restriction

- The patient is side-lying as the practitioner cups the shoulder and compresses the scapula and clavicle to the thorax with his cephalad hand, while cupping the flexed elbow with his caudad hand.

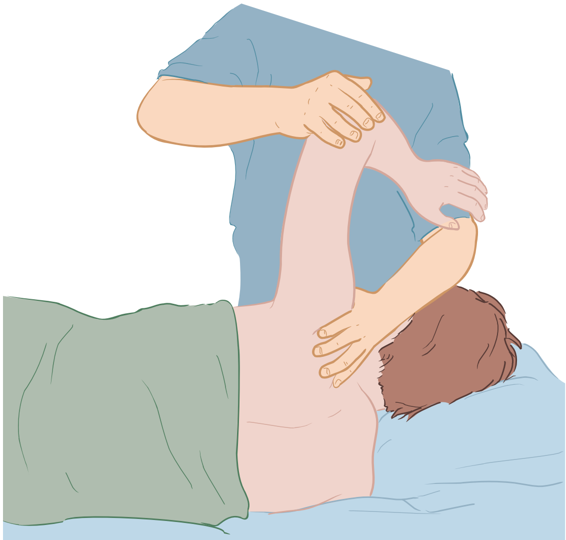


Figure 4.20 Spencer sequence assessment and treatment of shoulder abduction restriction.

- The patient's hand is supported on the practitioner's cephalad forearm/wrist to stabilize the arm (Fig. 4.20).
- The elbow is abducted towards the patient's head as range of motion (and/or discomfort relating to the movement) is assessed.
- Some degree of external rotation is also involved in this abduction.
- Pain-free easy abduction should be close to 180°.
- Note any restriction in range of motion, or report of pain/discomfort on movement.
- At the position of very first indication of resistance or pain, the movement is stopped.
- If there is a restriction towards abduction of the shoulder joint, the soft tissues implicated in maintaining this dysfunction would be the shoulder adductors – pectoralis major, teres major, latissimus dorsi, and possibly the long head of triceps, coracobrachialis, short head of biceps brachii.
- Palpation of these muscles (using drag palpation or another appropriate method) should reveal areas of marked tenderness.
- The most painful tender point (painful to digital pressure) elicited by this palpation should be used as a monitoring point by applied digital pressure, sufficient to allow the patient to ascribe a value of '10' to it.
- The arm is then moved and fine-tuned into a position that reduces the tender point pain by not less than 70%.
- This position of ease will probably involve some degree of adduction and internal or external rotation, to slacken the muscle housing the tender point.
- This ease state should be held for 90 seconds (or less if compression is added), before a slow return to neutral and a subsequent re-evaluation of range of motion.

Assessment and PRT treatment of shoulder adduction (and external rotation) restriction

- The patient is side-lying and the practitioner cups the shoulder and compresses the scapula and clavicle to the thorax with his cephalad hand, while cupping the elbow with his caudad hand.
- The patient's hand is supported on the practitioner's cephalad forearm/wrist to stabilize the arm.
- The elbow is taken in an arc, anterior to the chest, so that the elbow moves both cephalad and medially as the shoulder adducts and externally rotates.
- The action is performed slowly and any signs of resistance, or discomfort, are noted.
- If there is a restriction towards adduction of the shoulder joint, the soft tissues implicated in maintaining this dysfunction would be the shoulder abductors – deltoid, supraspinatus.
- Since external rotation is also involved, other muscles implicated in restriction or pain may include internal rotators, such as subscapularis, pectoralis major, latissimus dorsi and teres major.
- Palpation of these, using drag palpation or another suitable method, should reveal areas of marked tenderness.
- The most painful tender point (painful to digital pressure) elicited by palpation should be used as a monitoring point.
- Apply digital pressure sufficient to allow the patient to ascribe a value of '10' to the discomfort.
- Then slowly move the arm into a position which reduces the tender point pain by not less than 70%.
- This position of ease will probably involve some degree of abduction together with fine-tuning involving internal rotation, to slacken the muscle housing the tender point.
- This ease state should be held for 90 seconds (or less if compression is added) before a slow return to neutral and a subsequent re-evaluation of range of motion.

Assessment and PRT treatment of internal rotation restriction of the shoulder

- The patient is side-lying and the arm is flexed in order to evaluate whether the dorsum of the hand can be painlessly placed against the dorsal surface of the ipsilateral lumbar area (Fig. 4.21).
- This arm position is maintained throughout the procedure.

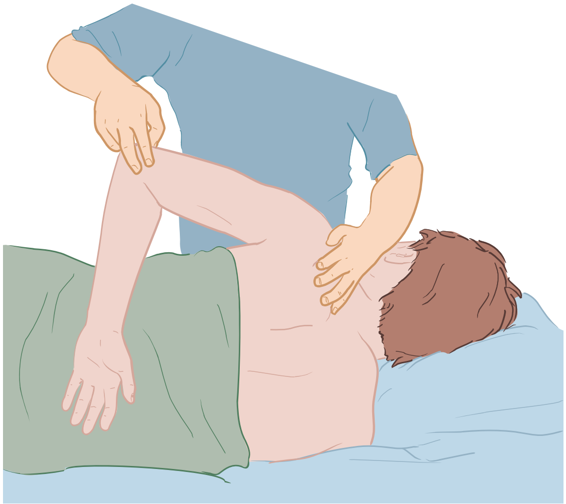


Figure 4.21 Spencer sequence assessment and treatment of internal rotation restriction.

- The practitioner cups the shoulder and compresses the scapula and clavicle to the thorax with his cephalad hand, while cupping the flexed elbow with the caudad hand.
- The practitioner slowly brings the elbow (ventrally) anteriorly, and notes any sign of restriction or reported pain resulting from the movement, as increasing internal rotation of the shoulder joint, proceeds.
- At the position of the very first indication of resistance, or reported pain, movement is stopped.
- If there is a restriction towards internal rotation, the soft tissues implicated in maintaining this dysfunction would be the shoulder external rotators – infraspinatus and teres minor – with posterior deltoid also possibly being involved.
- Palpation of these, using drag or other suitable assessment methods, should reveal areas of marked tenderness.
- The most painful tender point (painful to digital pressure) elicited by palpation should be used as a monitoring point.
- Digital pressure to the point should be sufficient to allow the patient to ascribe a value of '10' to the discomfort.
- The arm should then be moved into a position that reduces the tender point pain by not less than 70%.
- This position of ease will probably involve some degree of external rotation to slacken the muscle housing the tender point.
- This ease state should be held for 90 seconds (or less if compression is added) before a slow return to neutral and a subsequent re-evaluation of range of motion.

Note: All Spencer assessments should be performed passively in a controlled, slow, manner.

Specific muscle dysfunction – SCS applications

The description of SCS treatment methods for those muscles described below should be seen as representative, rather than comprehensive.

It is assumed that once the basic principles of SCS application have been understood, and the exercise methods already described in this chapter have been practised, the following selection of muscles should present few problems.

In all descriptions, it is assumed that a finger or thumb will be monitoring the tender point.

In some instances it is suggested that the practitioner should encourage the (intelligent and cooperative) patient to apply the monitoring pressure on the tender point, if two hands are needed by the practitioner to efficiently and safely position the patient into 'ease'.

The tender points may be used to treat the named muscles if these are hypertonic, painful or are in some way contributing to a joint dysfunction.

It is worth re-emphasizing that where chronic changes have evolved in muscles (e.g. fibrosis), positional release may be able to ease hypertonicity and reduce pain, but cannot of itself modify tissues which have altered structurally.

In all instances of treatment of muscle pain using SCS, the position of ease should be held for not less than 90 seconds, after which a very slow return is made to neutral.

No 'new' or additional pain should be caused by the positioning of the tender point tissues into ease.

Upper trapezius

The tender points are located approximately centrally in the posterior or anterior fibres (Fig. 4.22).

Method

- The supine patient's head is side-flexed towards the treated side while the practitioner uses the positioning of the ipsilateral arm to reduce reported tender point pain by at least 70%.
- The position of ease usually involves shoulder flexion, abduction and external rotation (Fig. 4.23).

Subclavius

The tender point lies inferior to the central portion of clavicle, on its undersurface (Fig. 4.24A).

See the fibre direction of the muscle, and the structural layout, in Figure 4.24 (Fig. 4.24B). This should offer

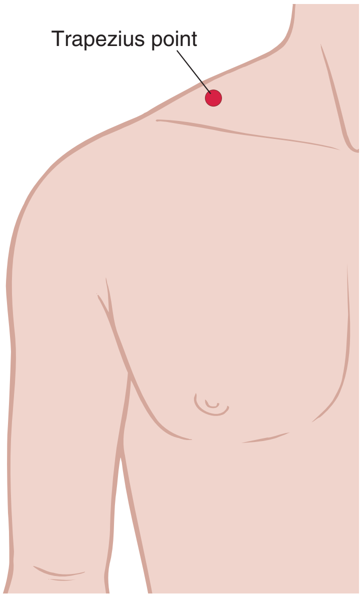


Figure 4.22 Common location of trapezius tender point.

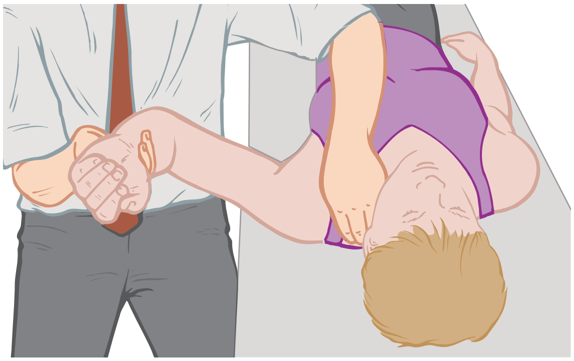


Figure 4.23 Treatment of trapezius tender point.

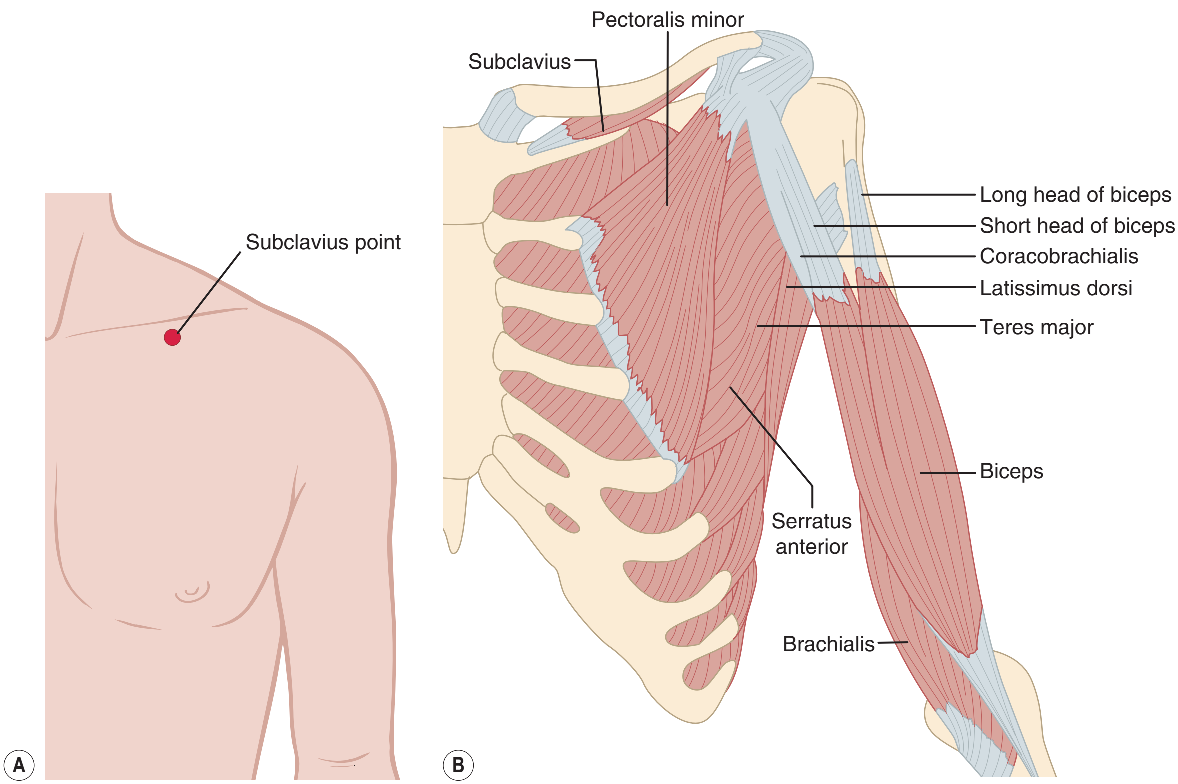


Figure 4.24 (A) Common location of subclavius tender point. (B) Deep muscles of the front of the chest and left arm. *(From Gray's Anatomy, 39th edn.)*

Figure 4.25 Treatment of subclavius tender point.

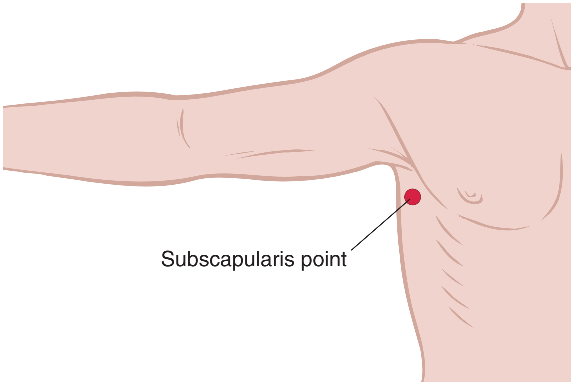


Figure 4.26 Common location of subscapularis tender point.

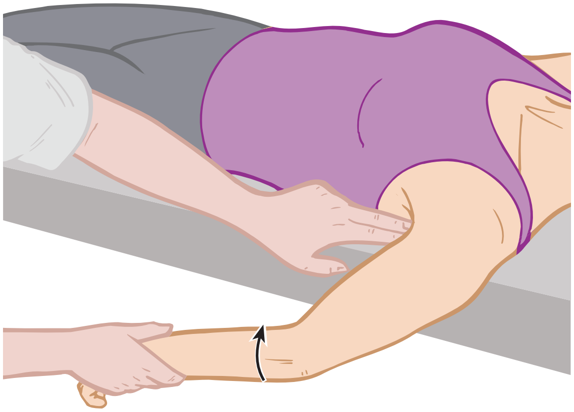


Figure 4.27 Treatment of subscapularis tender point.

an awareness of the way 'crowding' of the tissues, to ease tenderness in the palpated point, requires that the clavicle be taken inferiorly and medially. Consider also tensegrity factors, as described in Chapter 7, Box 7.1 (see also Fig. 4.49C).

Method

- The patient is side-lying, with ipsilateral shoulder in slight extension, forearm behind patient's back (or lying supine).
- The practitioner applies slight compression to the ipsilateral shoulder in an inferomedial direction, with fine-tuning possibly involving protraction until reported sensitivity in the palpated point drops by at least 70% (Fig. 4.25).

Subscapularis

The tender point lies close to the lateral border of the scapula, on its anterior surface (Fig. 4.26).

Method

- The patient lies close to the edge of the table with the arm held slightly (~30°) in abduction, extension and internal (sometimes external) rotation at the shoulder (Fig. 4.27).
- Slight traction on the arm may be used for fine-tuning, if this significantly reduces reported sensitivity.

Pectoralis major

The tender point lies on the muscle's lateral border close to the anterior axillary line (Fig. 4.28).

Method

- The patient lies supine as the ipsilateral arm is flexed and adducted at the shoulder, taking the arm across the chest (Fig. 4.29).
- Fine-tuning involves varying the degree of flexion and adduction, which can at times usefully be amplified by applied traction to the arm (but only if this reduces the reported sensitivity in the tender point).

Pectoralis minor

The tender point is just inferior and slightly medial to the coracoid process (and also on the anterior surfaces of ribs 2, 3 and 4 close to the mid-clavicular line) (Fig. 4.30).

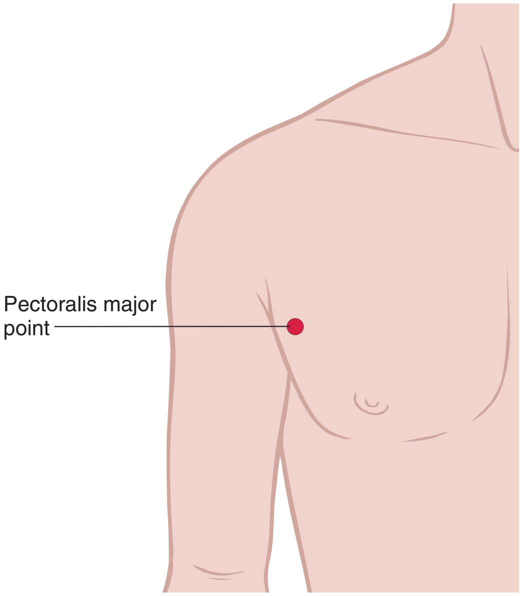


Figure 4.28 Common location of pectoralis major tender point.

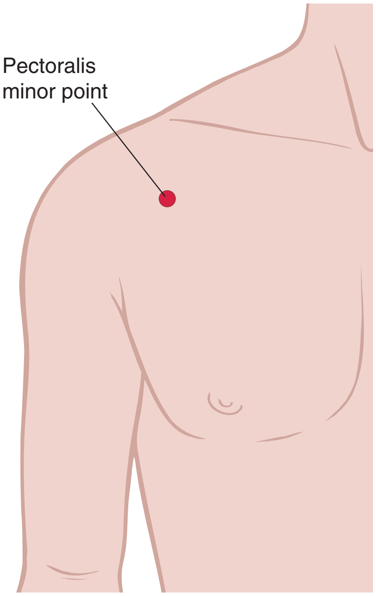


Figure 4.30 Common location of pectoralis minor tender point.

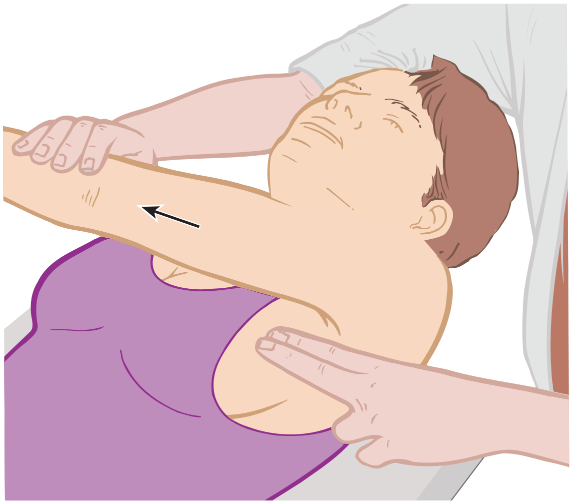


Figure 4.29 Treatment of pectoralis major tender point.

Figure 4.31 Treatment of pectoralis minor tender point.

Method

- The patient is seated and the practitioner stands behind. The patient's arm is taken into extension and internal rotation, bringing the flexed forearm behind the back (Fig. 4.31).
- The hand which is palpating the tender point is used to introduce protraction to the shoulder, while at the same time compressing it anteromedially to fine-tune the area and reduce reported sensitivity by at least 70%.

Rib dysfunction

Assessment of elevated first rib

Among the commonest rib dysfunctions is that of an elevated first rib (see Fig. 4.4B). Assessment of this is as follows:

- The patient is seated and the practitioner stands behind (Fig. 4.32A).

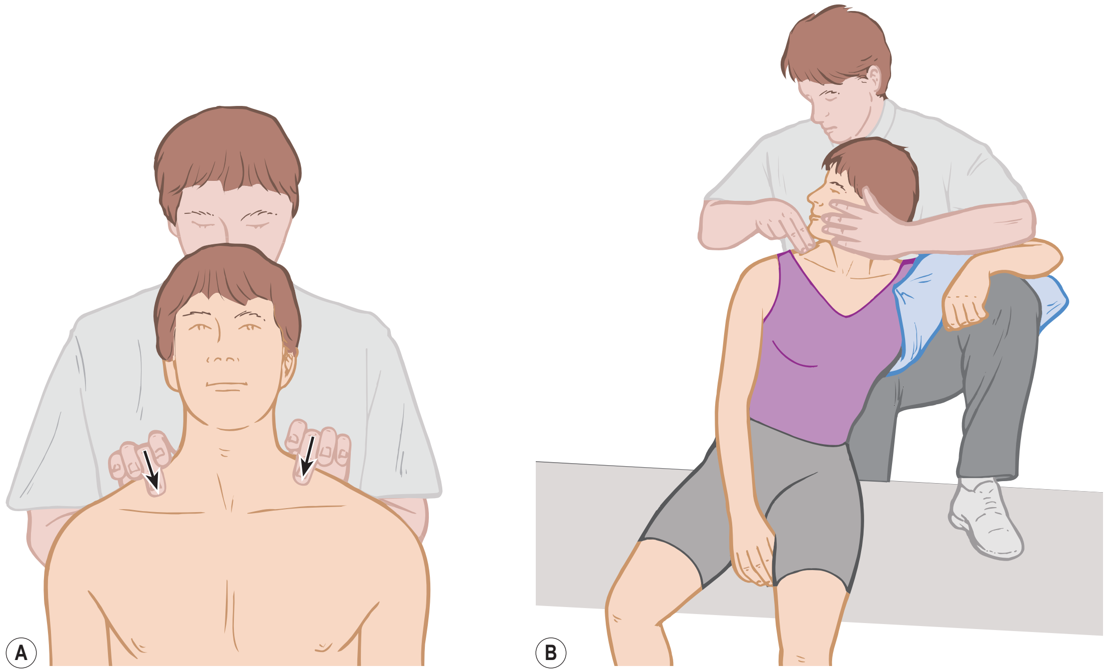


Figure 4.32 (A) Position for assessment of elevated first rib. (B) Position for treatment of elevated first rib.

- The practitioner places his hands so that the fingers can draw the upper trapezius fibres lying superior to the first rib, posteriorly.
- The tips of the practitioner's middle and index, or middle and ring fingers, should be eased caudally until they rest on the superior surface of the posterior shaft of the first rib.
- Symmetry should be evaluated as the patient breathes normally.
- The commonest dysfunction relates to one of the pair of first ribs becoming 'locked' in an elevated position (i.e. it is locked in, unable to fully exhale).
- The superior aspect of this rib will palpate as tender and attached scalene structures are likely to be short and tight (Greenman 1996). (The various ways in which rib dysfunctions are described are summarized in Box 4.9).

Or:

- The patient is seated and the practitioner stands behind.
- The practitioner places his hands so that the fingers can draw the upper trapezius fibres lying superior to the first rib, posteriorly.
- The tips of the practitioner's middle and index, or middle and ring fingers, should be eased caudally until they rest on the superior surface of the posterior shaft of the first rib.

Box 4.9 **The semantics of rib dysfunction descriptions**

A rib that is unable to move into full exhalation can be described as being:

- *locked in its inhalation phase*
- *elevated* – unable to move to its exhalation position
- an *inhalation restriction* (osteopathic terminology). Therefore, if one of a pair of ribs fails to descend as far as its pair on exhalation, it is described as an elevated rib, unable to move fully to its end of range on exhalation ('inhalation restriction' or 'restricted in inhalation').

A rib that is unable to move into full exhalation can be described as being:

- *locked in its exhalation phase*
- *depressed* – unable to move to its inhalation position
- an *exhalation restriction* (osteopathic terminology).

Therefore, if one of a pair of ribs fails to rise as far as its pair on inhalation, it is described as a depressed rib, unable to move fully to its end of range on inhalation ('exhalation restriction' or 'restricted in exhalation').

To avoid confusion, the two shorthand terms *elevated* and *depressed* are most commonly used to describe these two possibilities.

- The patient exhales fully, and shrugs his shoulders and as he does so the palpated first ribs should behave symmetrically.
- If they move asymmetrically (one moves superiorly more than the other), this suggests either that the side that moves most cephalad is elevated, or that the side that does not rise as far as the other is locked in a depressed (exhalation phase) position.
- The commonest restriction of the first rib is into elevation and the likeliest soft-tissue involvement is of shortness of the anterior and medial scalenes (Goodridge & Kuchera 1997).

Notes on rib dysfunction

- Unless direct trauma has been involved in the aetiology of dysfunctional rib restriction patterns, it is very unusual for a single rib to be either elevated or depressed.
- Most commonly, groups of ribs are involved in any dysfunctional situation of this sort.
- As a general rule, based on clinical experience, the most superior of a group of depressed ribs or the most inferior of a group of elevated ribs, is treated first.
- If this 'key rib' responds to treatment (using positional release or any other form of mobilization), the remainder of the group commonly release spontaneously.
- Positional release methods, as described in this chapter, are remarkably effective in normalizing rib restrictions, often within a matter of minutes.
- As with almost all musculoskeletal problems, whether such normalization is retained depends largely on whether the cause(s) of the dysfunction is ongoing (breathing pattern disorders, asthma, repetitively imposed stress – as examples) or not.

Treatment of elevated first rib

- The patient is seated and the practitioner stands behind with his contralateral foot on the table, patient's arm draped over practitioner's knee (Fig. 4.32B).
- The practitioner's ipsilateral hand palpates the tender point on the superior surface of the first rib.
- Digital pressure to the point should be sufficient to allow the patient to ascribe a value of '10' to the discomfort.
- Using body positioning, the practitioner induces a side-shift (translation) of the patient *away* from the treated side.
- At the same time, using his contralateral hand, the practitioner eases the patient's head into slight extension, side-flexion away from, and rotation towards, the tender point, in order to fine-tune, until tenderness in the palpated point reduces by at least 70%.
- This is held for not less than 90 seconds.

Figure 4.33 Position for assessment of rib status – ribs 2 to 10.

Assessment and treatment of elevated and depressed ribs (ribs 2–12)

Identification of rib dysfunction is not difficult.

Restrictions in the ability of a given rib to move fully (as compared with its pair) during inhalation indicates a *depressed* status, while an inability to move fully (as compared with its pair) into exhalation indicates an *elevated* status as discussed in Box 4.9 (Fig. 4.33).

Assessment of rib status (ribs 2–10)

- The patient is supine or seated, and the practitioner places a single finger contact on the superior surfaces of one pair of ribs.
- The practitioner's dominant eye determines the side of the table from which he is approaching the observation of rib function – right eye dominant calls for standing on the patient's right side.
- The fingers are observed as the patient inhales and exhales fully (eye focus is on an area between the palpating fingers so that peripheral vision assesses symmetry of movement).
- If one of a pair of ribs fails to rise as far as its pair on inhalation, it is described as a depressed rib, unable to move fully to its end of range on inhalation ('exhalation restriction'). See Box 4.9.

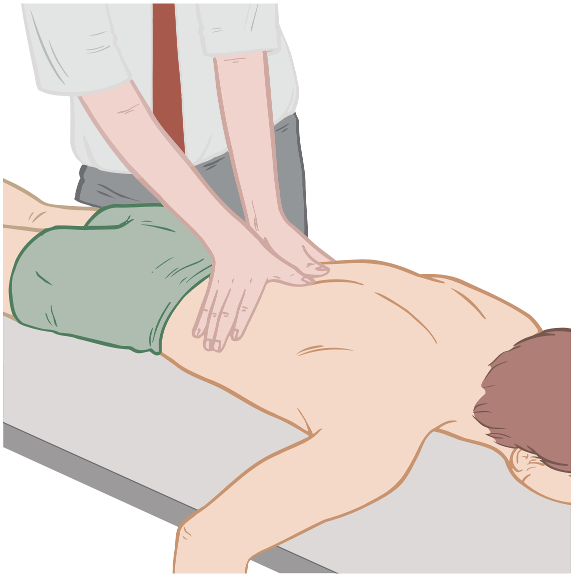


Figure 4.34 Position for assessment of rib status – ribs 11 and 12.

Figure 4.35 Positional release of an elevated rib while monitoring a tender point on the posterior surface close to the angle of the ribs in an interspace above or below the affected rib. The ease position may involve the flexed knees being allowed to fall to one side or the other, with fine-tuning involving positioning of the head, neck and/or the arms. Assessment of the influence of respiratory function on the tender point pain is also used.

- If one of a pair of ribs fails to fall as far as its pair on exhalation it is described as an elevated rib, unable to move fully to its end of range on exhalation ('inhalation restriction'). See Box 4.9.

Assessment of rib status (ribs 11 and 12)

- Assessment of the eleventh and twelfth ribs is usually performed with the patient prone, with a hand contact on the posterior shafts in order to evaluate the range of inhalation and exhalation motions (Fig. 4.34).
- The eleventh and twelfth ribs usually operate as a pair, so that if any sense of reduction in posterior motion is noted on one side or the other, *on inhalation*, the pair are regarded as depressed, unable to fully inhale ('exhalation restriction'). See Box 4.9.
- If any sense of reduction in anterior motion is noted on one side or the other, *on exhalation*, the pair are regarded as elevated, unable to fully exhale ('inhalation restriction'). See Box 4.9.
- Depressed rib strains produce points of tenderness on the anterior thorax, commonly close to the anterior axillary line while elevated ribs produce points of tenderness posteriorly, in the intercostal spaces close to the angles of the ribs.

Treatment of elevated ribs (ribs 2–10)

(see Fig. 4.4B,F)

- Elevated ribs produce tender points on the posterior thorax, commonly in the intercostal space above or below the affected rib, at the angle of the ribs posteriorly (see Fig. 4.4B).
- In order to gain access to these for palpation or treatment purposes, the scapula requires distraction or lifting.
- This is done by the arm of the affected side of the supine patient being pulled across the chest, or the shoulder being raised by a pillow (Fig. 4.35).
- The practitioner/therapist stands on the side of the disorder, and palpation of the tender point, once identified, is continuous, as positional change is engineered.
- The patient's knees should be in a flexed position during treatment of elevated ribs, and should be allowed to move toward the side of the dysfunction.
- If this fails to achieve ease (perceived either as palpated change or a reduction in sensitivity of the palpated tender point), the knees are moved towards the opposite side, in order to evaluate the effect on palpated pain and tissue tone.

- As a rule, reported pain from the tender point will reduce by around 50% as the knees fall to one side or the other.
- The head may then be turned towards, or away, from the affected side to further fine-tune and release the stress in the palpated tissues.
- Additional fine-tuning for elevated ribs may be accomplished by raising the arm or shoulder cephalad, in effect exaggerating the positional deformity.
- The influence of respiratory function should also be used to evaluate which stage of the breathing cycle reduces discomfort (in the tender point) most.
- If identified the patient is asked to maintain that phase for as long as is comfortable.

Treatment of depressed ribs (ribs 2–10)

- The tender points for a depressed rib are located in the intercostal spaces above or below the affected rib, on the anterior axillary line (see Fig. 4.4A,H).
- For treatment of depressed ribs, the patient may be supine or in a partially seated, recumbent position.
- If supine, the knees are flexed and falling to one side or the other, whichever produces better release in the tissues being palpated at the anterior axillary line.
- Depending on the response of the tissues and the reported levels of discomfort in the tender point, the head may be turned towards, or away from, the affected side to further fine-tune and release the stress in the palpated tissues.
- For additional fine-tuning, the practitioner/therapist stands on the side of dysfunction and draws the patient's arm, on the side of dysfunction, caudad until release is noted.
- In some cases, the other arm may need to be elevated, and even have traction applied, to enhance release of tender point discomfort (Fig. 4.36).
- Once the tender point being monitored reduces in intensity by 70% or more, this is held for not less than 90 seconds.

Alternatively:

- The patient may be seated (Fig. 4.37) and resting against the support offered by the practitioner's flexed leg (foot on table) and trunk.
- The practitioner palpates the tender point with one hand and uses the other to support the head, guiding it into rotation for fine-tuning, as a combination of flexion and side-flexion/rotation is encouraged by modification of the position of the supporting leg.
- Once the tender point being monitored reduces in intensity by 70% or more, this is held for not less than 90 seconds.

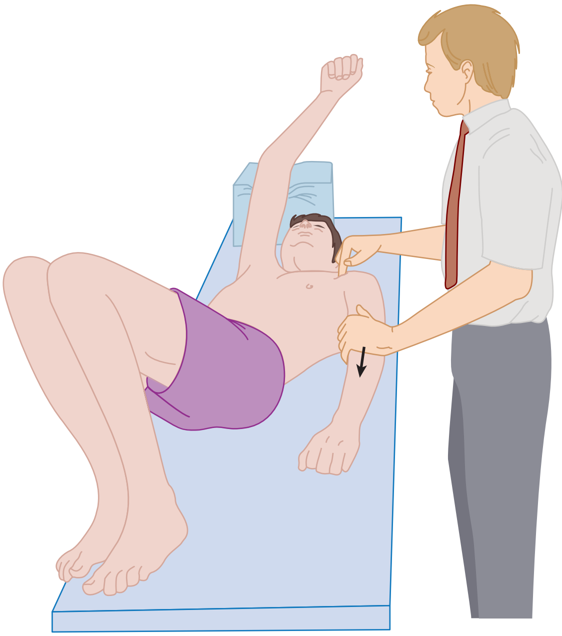


Figure 4.36 Positional release of a depressed rib involves the monitoring of a tender point on the anterior axillary line, in an interspace above or below the affected rib. Ease is achieved by positioning of flexed legs, head and/or arms, as well as use of the respiratory cycle, until a position is found in which the palpated pain eases by at least 70%, or vanishes from the tender point.

Figure 4.37 Alternative position for treatment of depressed ribs (see text).

- A notable improvement in respiratory function is commonly noted after this simple treatment method, with an obvious increase in the excursion of the thoracic cage and subjective feelings of 'ease of breathing' being reported.

Interspace dysfunction

(see Fig. 4.4G,H)

- Tender points for strains of the interspace tissues lie between the insertions of the contiguous ribs into the cartilages, close to the sternum.
- Ribs may be noted to be over-approximated, and the pain reported when the tender points are palpated may be very strong.
- The more recent the strain (frequently a sequel of excessive coughing), the more painful the points.
- Oedema and induration may be palpable.
- In chronic conditions, pressure on these soft tissues produces a reactivation of the extreme tenderness noted in more recent strains.
- These strains are found in costochondritis, the persistent pain noted in cardiac patients.
- Tenderness in these points may well relate to respiratory dysfunction, and their release assists (together with breathing pattern rehabilitation) in normalization.
- These areas of tenderness are common in people with asthma and following bronchitis, as well as the all-too-common pattern of upper chest breathing relating to patent or incipient hyperventilation, which produces major stress of the intercostal structures and the likelihood of such tender points being located on palpation (Perri & Halford 2004; Sachse 1995).

Treatment of interspace dysfunction and discomfort

- Treatment involves placing the patient supine while the tender point is contacted by the practitioner/therapist, *or the patient* (Fig. 4.38).
- The practitioner/therapist should be on the side of dysfunction with his caudad hand providing contact on the point, unless the patient is performing this function.
- The cephalad hand cradles the patient's head/neck and flexes this, and eases it towards the side of dysfunction, at an angle of approximately 45° towards the foot of the bed.
- If fine-tuning is efficient, the pain on palpation will ease rapidly, and the position of ease should then be maintained for 90 seconds.

Figure 4.38 Treatment of interspace dysfunction involves flexion of the head and neck and usually the thoracic spine towards the palpated tender point, which lies close to the sternum. A seated position (not illustrated) offers an alternative for achieving this positioning.

Alternatively:

- This same procedure for release of interspace dysfunction tender points can be achieved in a seated position, and can be taught as a home treatment to the patient.
- The point is located and the patient – on her own, or with assistance – is flexed gently towards the side of pain until it vanishes.
- This position is held for 90 seconds, after which another point can be located and treated.

It is hard to envisage a simpler protocol.

A note on induration technique (a derivative of SCS)

Texan chiropractor Marsh Morrison (1969) recommended gentle palpation, using extremely light touch, as a means of feeling a 'drag' sensation (see Chapter 2 and notes on palpation in other chapters) alongside the spine – as lateral as the tips of the transverse processes.

Drag palpation identifies areas of increased hydrosis, a physiological response to increased sympathetic activity, a seemingly invariable feature in skin overlying trigger points and other forms of reflexively active myofascial areas ('hyperalgesic skin zones') (Lewit 1999).

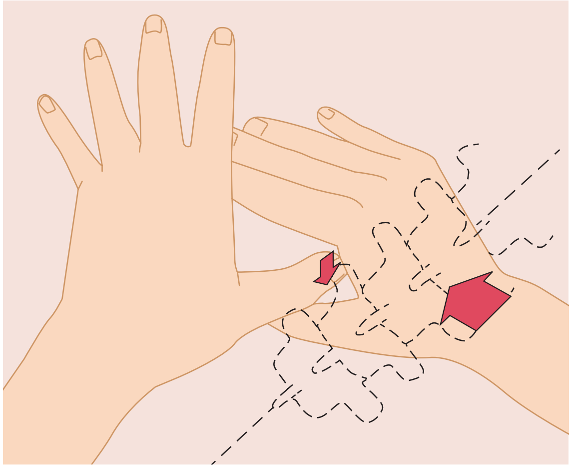


Figure 4.39 Induration technique method for paraspinal soft tissue dysfunction – described fully in the text.

Once drag is noted, pressure into the tissues normally results in a report of pain.

- The practitioner/therapist stands on the side of the prone patient opposite the side in which pain has been identified in paraspinal tissues.
- Once located, tender or painful points (lying no more lateral than the tip of the transverse process) are palpated for the degree of their sensitivity to pressure.
- Once confirmed as painful, pressure is maintained by firm thumb pressure while, with the soft thenar eminence of the other hand, the tip of the spinous process most adjacent to the pain point is very gently eased towards the pain (ounces/grams of pressure only), effectively crowding and slackening the tissues being compressed by the thumb, until pain reduces by at least 70% (Fig. 4.39).
- Direct pressure of this sort (lightly applied) towards the pain should lessen the degree of tissue contraction as well as sensitivity.
- If it does not do so, then the angle of push on the spinous process towards the painful point should be varied slightly so that, somewhere within an arc embracing a half circle, a direction is identified that largely abolishes the pain as well as lessening the subjective feeling of tissue-tension.
- This position is held for 20 seconds, after which the next point is treated.
- A spinal treatment is possible using this extremely gentle approach which incorporates the same principles as SCS and functional technique, the achievement of 'ease' along with pain reduction as the treatment focus.

That method can usefully accompany the various SCS treatment applications for spinal dysfunction described in this chapter.

Flexion strains of the thoracic spine

- According to Jones et al. (1995), the tender point for a flexion strain of the first thoracic segment is located on the superior surface of the manubrium, on the midline (see Fig. 4.4G).
- Tender points for flexion strains of the second to the sixth thoracic segments lie on the sternum approximately ½ to ¾ of an inch (1–2 cm) apart (see Fig. 4.4G).
- Anterior T7 point lies close to the midline, bilaterally under the xiphoid. Other anterior T7 tender points are found on the costal margin close to the xiphoid.
- T8–T11 anterior (flexion strain) dysfunction produces tender points which lie in the abdominal wall, approximately 1 inch (2.5 cm) lateral to the midline (see Fig. 4.4A).
- A horizontal line ½ inch (1 cm) below the umbilicus locates the tenth thoracic anterior (flexion) strain tender point.
- 1 and 3 inches (2.5–7.5 cm) above T10 lie the points for T9 and T8, respectively.
- 1½ inches (3 cm) below the T10 point is T11.
- The T12 point lies on the crest of the ilium at the mid-axillary line (see Fig. 4.4A).

Note: In a rotation strain of the mid-thoracic region, it is possible for extension and flexion strains to coexist, say flexion (anterior) strain on the left and extension (posterior) strain on the right.

Treatment for anterior thoracic flexion strains

Upper thoracic flexion strains, semi-seated or supine:

- Treatment of upper thoracic flexion strains (T1–T6) may be carried out with the patient semi-seated or supine on the treatment table.
- The patient should be supported by cushions to enhance upper thoracic flexion, while the tender point is monitored by one hand, and the practitioner's other hand assists in fine-tuning to the position of ease (Fig. 4.40A).

Alternatively:

- If treated without cushions for support, the supine patient's head is flexed towards the chest while the tender point is contacted as a monitor of ease. (This is a very similar position to that used to treat interspace dysfunction, see Fig. 4.38.)
- Fine-tuning is usually by slight rotation of the head/neck towards or away from the side of

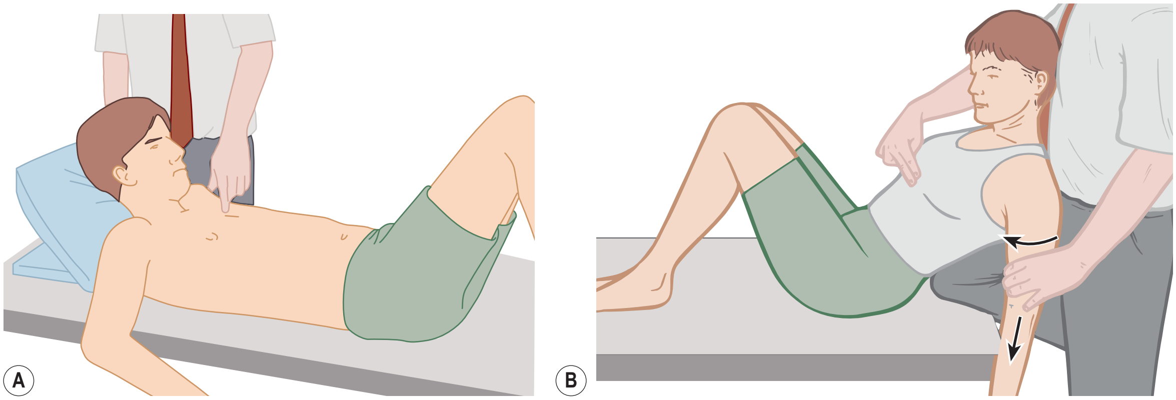


Figure 4.40 Treatment of upper thoracic spinal flexion strain. (A) Fine-tuning may involve positioning of the head–neck in rotation and or side-flexion in addition to flexion. (B) Semi-seated position for assessment and treatment of T2–T6 flexion strain.

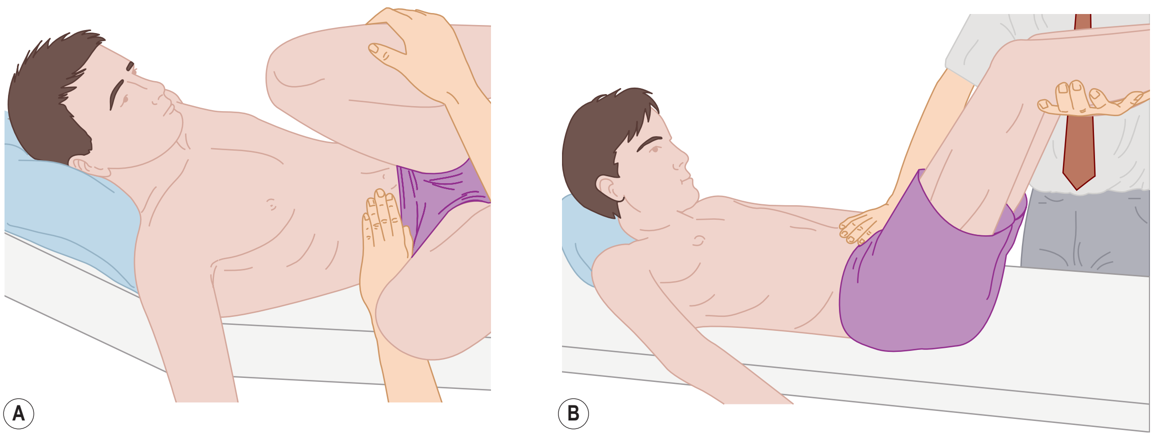


Figure 4.41 (A,B) Lower thoracic flexion strains involve positioning the supine patient into flexion while the tender point on the abdominal wall is palpated.

dysfunction. The head may be supported in flexion by the practitioner/therapist's thigh for the necessary 90 seconds of release time.

Semi-seated:

- Jones's method for dealing with flexion strain of the upper thoracic spine, in non-bed-bound patients, had the patient seated on a treatment table, leaning back onto the practitioner/therapist's chest/abdomen, so that forced flexion of the upper body can easily be achieved as shown in Figure 4.40B.
- A variety of changes in the position of the patient's arms may then be used as part of the fine-tuning process in order to introduce 'ease' into different thoracic segments.
- The practitioner palpates the tender point with one hand and utilizes the other to add fine-tuning variations.

Lower thoracic flexion strains:

- For treatment of lower thoracic flexion strains (Fig. 4.41), a pillow should be placed under the supine patient's neck and shoulders.
- If helpful in reducing sensitivity in the tender point, another pillow should be placed under the buttocks, allowing the lower spine to move into flexion, or the patient's knees should be flexed and supported by the practitioner/therapist's (hand or thigh), standing at waist level while palpating the tender point.
- Fine-tuning is achieved by movement into side-bending and/or rotation, one way or the other, using the patient's legs as a lever (for treatment of T8).
- T9–T12 flexion strains involve the same position – patient's head and buttocks on a pillow, or the

patient's flexed knees supported by the practitioner/therapist, while the practitioner's caudad hand palpates the abdominal tender point.

- Fine-tuning is by means of a movement that introduces slight side-bending, or which slightly alters the degree of flexion (Fig. 4.41).
- The tender point should be constantly monitored and tenderness should reduce by at least 70%.
- T12 treatment requires more side-bending than other thoracic strains.
- Once a position has been found where tenderness reduces by 70% or more, this is maintained for 90 seconds.

See Chapter 6 for suggestions regarding treating these points in a bed-bound patient.

Jones et al. (1995) describe the treatment of lower thoracic flexion strains as follows:

> ***This one procedure is usually effective for any of this group. To permit the supine patient to flex at the thoracolumbar region, a table capable of being raised at one end is desirable [Fig. 4.41A]. A flat table may be used if a large pillow is placed under the patient's hips, raising them enough to permit flexion to reach the desired level of the spine. With the patient supine, the physician raises the patient's knees and places his own thigh below those of the patient [as in Fig. 4.43]. By applying cephalad pressure on the patient's thighs, he produces marked flexion of the patient's thoracolumbar spine. Usually, the best results come from rotation of the knees moderately towards the side of tenderness. These joint dysfunctions account for many low-back pains that are not associated with tenderness of the vertebrae posteriorly. The pain is referred from the anterior dysfunction, into the low lumbar, sacral and gluteal areas. Treatment directed to the posterior pain sites of these dysfunctions, rather than to the origins of the pain, has been disappointing.***

To summarize:

- Treatment for flexion strains involving the ninth thoracic to first lumbar level is usually achieved by placing the patient supine in flexion, using a cushion for the upper back and flexing the knees and hips, which are usually rotated towards the side of dysfunction (see Figs 4.41, 4.42).
- Tender points will be found close to the abdominal midline, or slightly to one side (see Fig. 4.4A), and should be palpated during this manoeuvre.
- The practitioner/therapist's cephalad hand palpates the tender point while the patient's position is modified until tenderness in the point reduces by 70% or more.
- This position is held for 90 seconds, after which a slow return is made to a neutral position.
- The position of ease usually involves marked flexion through the joint, as well as appropriate side-bending and rotation, resulting in reduction of sensitivity in the tender points on the anterior body surface.

Extension strains of the thoracic spine

- These strains are treated in a similar manner to that used for extension strains of the cervical spine.
- Tender points are usually found on, or close to, the spinous processes, bilaterally, or in the lateral paravertebral muscle mass.
- It is usual to find that the lower the strain, the closer is the tender point to the transverse process (see Fig. 4.4F).
- Direct extension (backwards-bending) is the usual method used for SCS treatment of this region, with the patient side-lying, seated, supine or prone.

Prone:

- Figure 4.42A illustrates SCS treatment of an extension strain in the upper thoracic region, with the patient prone.

Side-lying:

- If the patient is side-lying the patient's arms should be placed resting on a pillow to avoid rotation of the spine (Fig. 4.42B).
- See Chapter 6 for Schwartz's (1986) suggestions regarding treating these points in relation to a hospitalized or bed-bound patient.
- For the T5–T8 thoracic spine levels the arms are usually placed slightly above head level, to increase extension.

Seated:

- Any thoracic spine extension strains may be treated with the patient seated, either on the treatment table or on a stool, with the therapist standing to one side (Fig. 4.42C).
- Ideally, the patient's feet should be on the floor for stability.
- One of the practitioner's hands palpates the tender point located in relation to a particular segmental strain area, while the other hand fine-tunes the patient into a position where 'ease' is

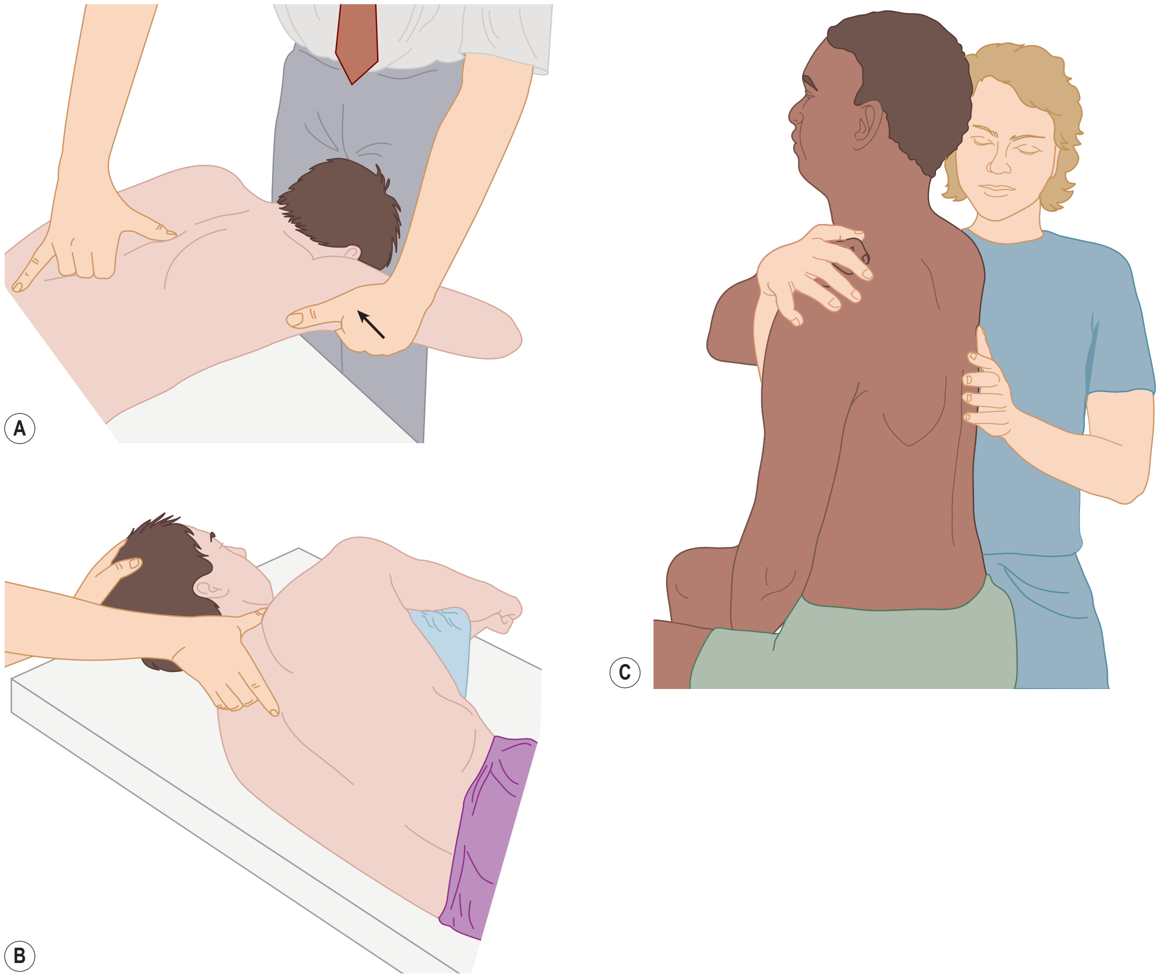


Figure 4.42 (A) Position of ease for tender points relating to extension strains of the upper thoracic region of the spine when treating the prone patient. (B) Side-lying position for treatment of thoracic extension strains. (C) Seated patient with practitioner to one side.

achieved, and tenderness in the point drops by at least 70%.

- After 90 seconds a slow return to a neutral position should be made.

Flexion strains of the lumbar spine

- Gross positioning is virtually the same as for thoracic flexion strains, with tender points on the anterior surface (abdomen mainly) and the ease position involving taking the patient into flexion (see Fig. 4.4A for the positions of these points).
- L1 has two tender points: one is at the tip of the anterior superior iliac spine and the other on the medial surface of the ilium just medial to the anterior superior iliac spine (ASIS).
- The tender point for second lumbar anterior strain is found lateral to the anterior inferior iliac spine (AIIS).
- The tender point for L3 is not easy to find but lies on the lateral surface of the AIIS, pressing medially.
- L4 tender point is found at the insertion of the inguinal ligament on the ilium.
- L5 points are on the body of the pubes, just to the side of the symphysis.

SCS method

- Treatment for all of these points is similar to that used for thoracic flexion strains except that the patient's knees are placed together (Fig. 4.43).
- In bilateral strains both sides should be treated.

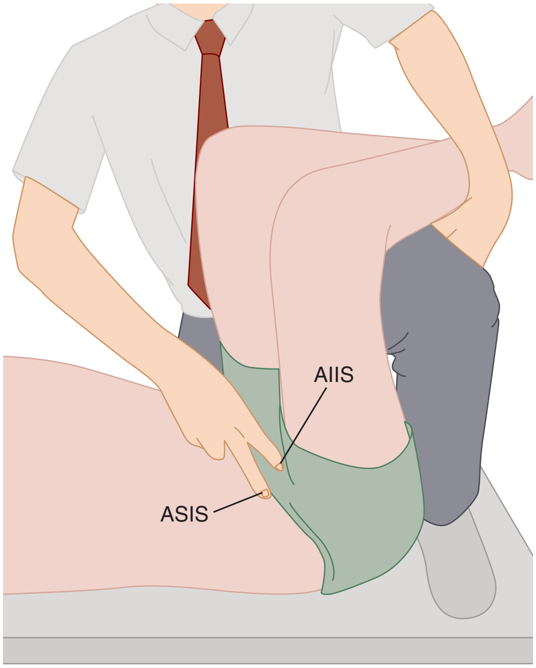


Figure 4.43 Position of ease for flexion strain of segments from T9 to the lower lumbar regions usually require positioning into flexion, side-bending and rotation, until ease is achieved in the monitored tender point on the lower abdominal wall or the ASIS area. AIIS, anterior inferior iliac spine; ASIS, anterior superior iliac spine.

- L3 and L4 usually require greater side-bending in the fine-tuning process.

Extension strains of the lumbar spine

See also various treatment options for this region, described in Chapter 6.

L1, L2

- L1 and L2 tender points are located close to the tips of the transverse processes of the respective vertebrae (see Fig. 4.4B).
- Extension strains relating to these joints may be treated with the patient prone, seated or side-lying, using the tender points to monitor changes of discomfort as the ease position is sought.

Prone (Fig. 4.44A):

- If the patient is prone, the practitioner/therapist stands on the side opposite the strain, grasping the leg on the side of the dysfunction/tender point, just above the knee, bringing it into extension and adducting it towards the practitioner/therapist, in a scissor-like movement.

Side-lying (Fig. 4.44B):

- If the patient is side-lying, with the side of dysfunction uppermost, the upper leg can be extended to introduce extension into the region of the strain, while fine-tuning is accomplished by slightly adducting or abducting the leg.
- When an ease position has been established with the palpated tender point less painful by at least 70%, or when a marked degree of tissue change is noted, this should be maintained for 90 seconds, before a slow return to neutral.

See Chapter 6 for Schwartz's (1986) suggestions regarding treating these points in a bed-bound patient. Side-lying alternative (Fig. 4.44C):

- In some cases of low-back dysfunction relating to extension strains, a tender point is located on the sacral sulcus (see Fig. 4.4B).
- Rather than using hip extension (as in Fig. 4.44A,B) hip flexion may be helpful in achieving ease (Fig. 4.44C).
- Fine-tuning to achieve ease may involve adduction or abduction of the leg, or altering the degree of rotation in the upper body.

L3, L4

- The tender point for extension strain of L3 is found about 3 inches lateral to the posterior superior iliac spine, just below the superior iliac spine. L4 tender point lies an inch or two lateral to this following the contour of the crest (see Fig. 4.4B).
- Treatment of L3 and L4 extension strains is accomplished with the patient prone, practitioner/therapist on the side of dysfunction, or in side-lying (Fig. 4.44A–C).
- The practitioner/therapist's knee or thigh can be usefully placed under the raised thigh of the patient to hold it in extension while fine-tuning it, accomplished usually by means of abduction and external rotation of the foot.
- This procedure can also be performed with the patient side-lying, dysfunction side uppermost.
- The practitioner/therapist's foot should be placed on the bed behind the patient's lower leg.
- The patient's uppermost leg is raised and the extended thigh of this leg can then be supported on the practitioner/therapist's thigh.
- Rotation of the foot and positioning of the patient's leg in a more anterior or posterior plane, always in a degree of extension, is the fine-tuning mechanism to reduce or remove pain from the palpated tender point during this process.

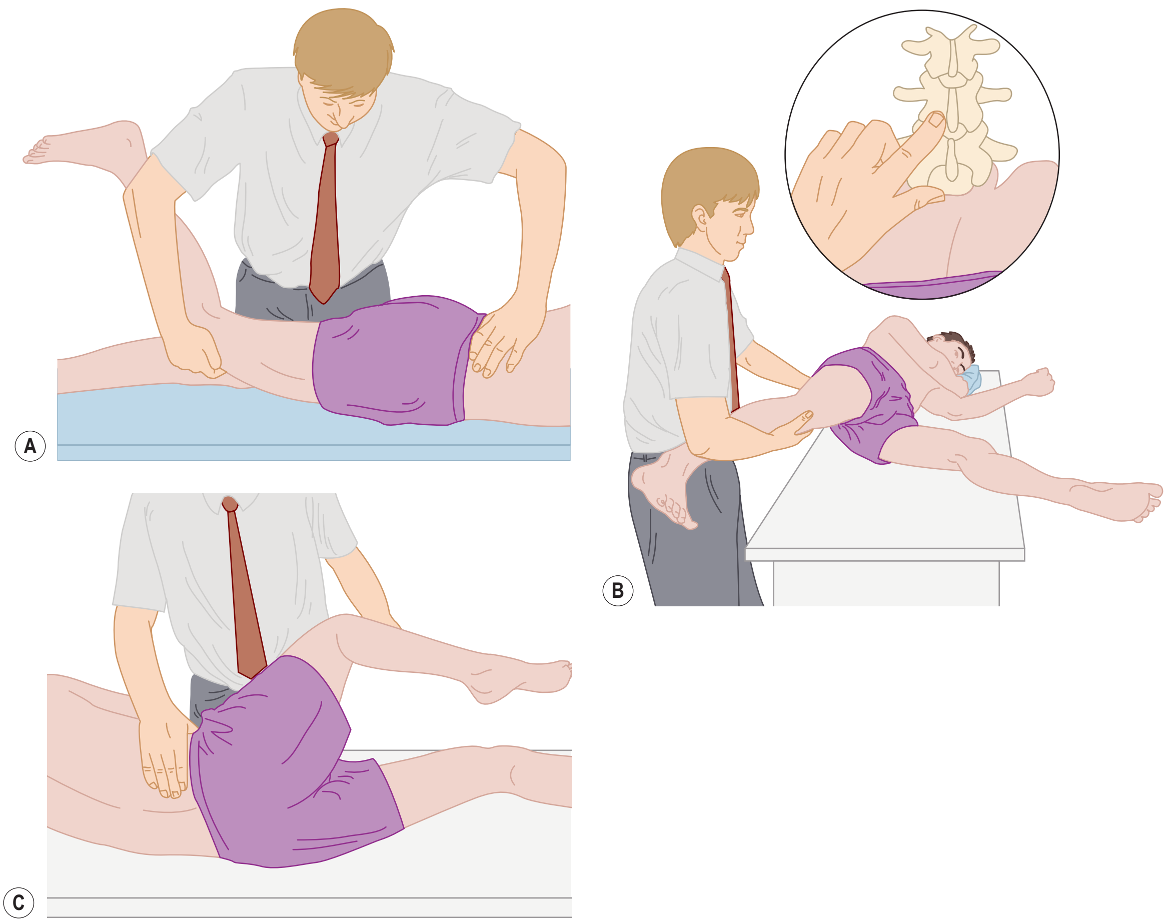


Figure 4.44 (A) Position of ease for a tender point associated with an extension strain of the lumbar spine usually requires use of the legs of the prone patient as means of achieving extension and fine-tuning. (B) Side-lying position for treatment of lumbar extension strains. (C) Some lumbar extension strains, where, for example, the tender point lies in the superior sacral sulcus, may ease if the hip is flexed in the side-lying position as illustrated.

L5

- There are various L5 tender points for extension strain as shown in Figure 4.4B.
- These are all treated as in extension strains of L1 and L2 (Fig. 4.44A–C) using scissor-like extension of the prone patient's leg on the side of the dysfunction, and fine-tuning by variation in position (or treated in side-lying).
- In some cases, the contralateral leg may be placed in flexion (over the edge of the table) to achieve ease of the tender point.
- As in all SCS protocols, once a 70% reduction in sensitivity of the tender point has been achieved, this should be held for 90 seconds before slowly returning to neutral.

SCS for psoas dysfunction (and for recurrent sacroiliac joint problems)

- The tender point for iliopsoas is located approximately 2 inches (5 cm) medial, and slightly inferior, to the anterior superior iliac spine.
- The practitioner stands on the side contralateral to that being treated.
- With the widely separated knees of the supine patient (Fig. 4.45) flexed, and the ankles crossed, the limbs are raised by flexing the hips – supported by the practitioner's leg.
- The process involves finding the amount of hip flexion that reduces palpated pain in the tender point markedly, at which time fine-tuning is

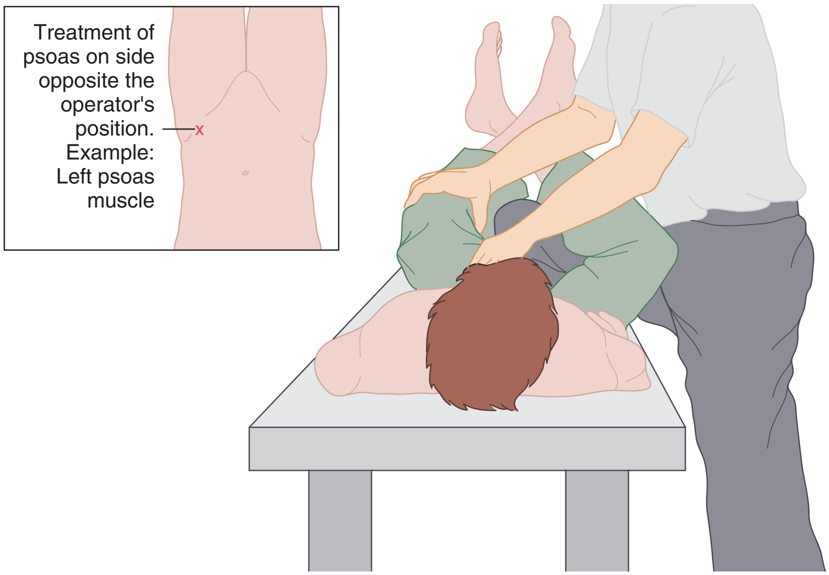


Figure 4.45 Positional release for psoas dysfunction. *(After Vleeming.)*

introduced in which small amounts of side-flexion or rotation are introduced to assess the effects on tenderness.

- When tenderness drops by at least 70% the position is maintained for not less than 90 seconds, before slowly returning the patient to neutral.

Jones et al. (1995) report:

> ***Any time there is a knee complaint place that leg's foot on top (in the leg crossing stage). This treatment produces flexion, marked external rotation and abduction of the femoral joint. Whenever you have a patient with a sacro-iliac problem that keeps recurring, be sure to check for this dysfunction. It is also common when there are no sacro-iliac dysfunctions.***

Sacral tender points and low back pain

In 1989, osteopathic physicians Ramirez and colleagues identified a series of 'new' tender points, collectively known as medial sacral tender points. These tender points were found to relate directly to low back and pelvic dysfunction and were found to be amenable to very simple SCS methods of release (Ramirez et al. 1989).

A few years later, Cislo et al. (1991) described additional sacral foramen tender points, which they identified as being related to sacral torsions. Cislo et al. have provided clear guidelines as to the usefulness of these in the treatment of low back pain associated with sacral torsion, using counterstrain methods.

The original identification of the 'new' medial sacral points occurred when a patient with chronic low back pain and pelvic hypermobility was being treated (Ramirez et al. 1989). Use of counterstrain methods was found to be efficient using anterior and posterior lumbar tender points; however, despite relative comfort, the patient was left with 'tender points in the middle of the sacrum, associated with no problems'. These were originally ignored but when the patient's back pain recurred, the sacral points were re-evaluated and a number of release positions were attempted. Recognizing that the usual 'crowding' or 'folding' of tissue to induce ease in tender points was impossible in the mid-sacral area, the researchers then experimented with application of pressure to various areas of the sacrum.

Ramirez et al. (1989) explained their progress from then on:

> ***In the 3 weeks following this initial encounter with the unnamed sacral tender points, 14 patients with the presenting complaint of low back (sacral or lumbar, with or without radicular) pain demonstrated tenderness at one or more of the new sacral tender points. Ultimately we found six new tender points, all of which were relieved by positional release techniques to the sacrum.***

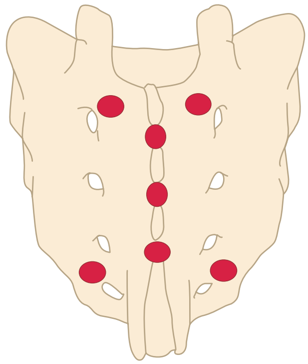


Figure 4.46 Common location of positions of tender points relating to sacral and low back dysfunction.

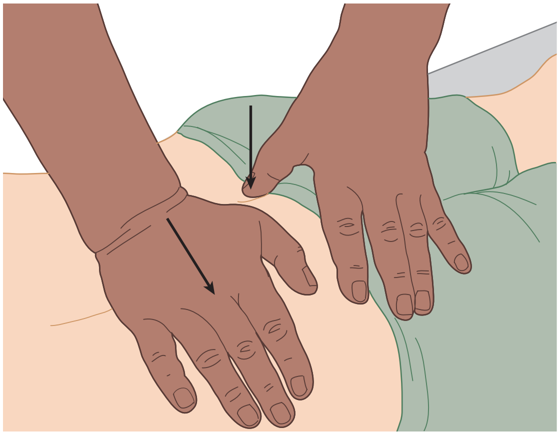


Figure 4.47 SCS treatment of medial sacral tender points relating to sacral and low back dysfunction.

Location of the new sacral medial tender points

Collectively known as the 'medial sacral tender points', these are located as follows:

- There are two possible cephalad tender points that lie just lateral to the midline, approximately 1.5 cm medial to the inferior aspect of the posterior superior iliac spine (PSIS) bilaterally, and they are known as PS1 (for posterior sacrum). See Figure 4.46 where these two points (left and right) are identified by the letter A.
- The caudad two tender points are known as PS5 and may be located approximately 1 cm medial and 1 cm superior to the inferior lateral angles of the sacrum, bilaterally. See Figure 4.46, where these two points (left and right) are identified by the letter E.
- The remaining two tender points may be located on the midline: one (PS2) lies between the first and second spinous tubercles of the sacrum, identified as being involved in sacral extension, and the other (PS4) lies on the cephalad border of the sacral hiatus, which is identified as a sacral flexion point. See Figure 4.46, where these two points (superior and inferior) are identified by the letters B and D.
- Schwartz identified a seventh point lying between the second and third sacral tubercles (PS3), which relates to sacral extension. See Figure 4.46, where this point is identified by the letter C.

How to identify medial sacral tender points

Cislo et al. (1991) note that when they first started trying to identify the precise locations of the sacral tender points they used drag palpation, as described earlier in this chapter, and more fully in Chapter 2.

However, they state:

> ***We have found that when these tender points occur in groups the associated sudomotor change is frequently confluent over the mid-sacrum. For this reason, we have begun to check all six points on all patients with low back pain, even in the absence of sudomotor changes.***

They report that this process of localization can be rapid if the bony landmarks are used during normal structural examination.

Treatment of medial sacral tender points (*Fig. 4.47*)

- With the patient prone, pressure on the sacrum is applied according to the location of the tender point being treated.
- Pressure is always straight downwards, in order to induce rotation around a perceived transverse or oblique axis of the sacrum.
- The PS1 tender points require pressure to be applied at the corner of the sacrum *opposite the quadrant in which the tender point lies*, i.e. left PS1 requires pressure at the right inferior lateral angle of the sacrum.
- The PS5 tender points require pressure to be applied *near the sacral base, on the contralateral side*, i.e. a right PS5 point requires downward – to the floor – pressure on the left sacral base just medial to the sacroiliac joint.
- The release of PS2 (sacral extension) tender point requires downwards pressure (to the floor) *at the apex of the sacrum in the midline.*

- The lower PS4 (sacral flexion) tender point requires pressure to *the midline of the sacral base*.
- Schwartz tender point PS3 (sacral extension) requires the same treatment as for PS2 described above.
- In all of these examples it is easy to see that the pressure is attempting to *exaggerate the existing presumed distortion* pattern relating to the point, which is in line with the concepts of SCS and positional release as explained earlier.

Jones (1995, p. 84) is on record as describing his approach to the use of the sacral tender points identified by Ramirez et al. (1989):

> ***To keep this simple and practical, I search for the tender points. When one is found I press on the sacrum as far away from the tender point as possible.***

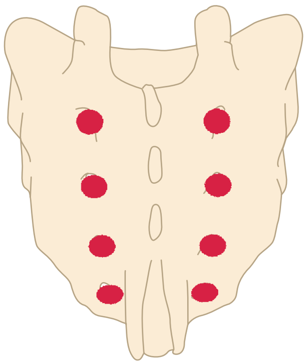


Figure 4.48 Sacral foramen tender points as described in the text.

What if medial sacral points are too sensitive?

From time to time, pressure on the sacrum itself was found to be too painful for particular patients, and a refinement of the techniques of SCS was therefore devised for the medial points (not the midline points).

- The patient is placed on a table, prone, with head and legs elevated (an adaptable McManus-type table can achieve this, as can appropriately sited pillows and bolsters), inducing extension of the spine, which usually relieves the palpated pain by approximately 40%.
- Different degrees of extension (and sometimes flexion) are then attempted to find the position which reduces sensitivity in the point(s) most effectively.
- When this has been achieved, side-bending the upper body or the legs away from the trunk is carefully introduced, to assess the effects of this on the palpated pain.
- As in all SCS procedures, the final position is held for 90 seconds once pain has been reduced by at least 75% in the tender point(s).

Identification of sacral foramen tender points

Additional tender points were later identified as a result of problems attempting to treat a 'difficult' patient (Cislo et al. 1991) (Fig. 4.48).

A patient with low back pain, with a recurrent sacral torsion, was being treated using SCS methods with poor results. When muscle energy procedures were also found to be inadequate, a detailed survey was made of the region, and an area of sensitivity that had previously been ignored was identified in one of the sacral foramina.

Experimentation with various release positions for this tender point resulted in benefits and also in the examination of this region in other patients with low back pain and evidence of sacral torsion.

All the patients (who were examined) demonstrated tenderness at one of the sacral foramina, ipsilateral to the engaged oblique axis (of the sacrum) (Cislo et al. 1991).

These foramen tender points have been named according to their anatomical position and are to be differentiated from sacral border tender points previously identified by Jones, and from the medial tender points as discussed above.

Clinically, these tender points are located by their positions relative to the posterior superior iliac spine.

- The most cephalad of the points (SF1, sacral foramen tender point 1) is 1.5 cm (1 inch) directly medial to the apex of the PSIS.
- Each successively numbered sacral foramen tender point (SF2, SF3, SF4) lies approximately 1 cm below the preceding tender point location.

Locating sacral foramen tender points

Evaluation of the sacral foramina should be a fairly rapid process.

- If a sacral torsion is identified, the foramina on the ipsilateral side should be examined by palpation and the most sensitive of these is treated as described below.
- A left torsion (forward or backward) involves the foramina on the left side.
- Alternatively, palpation of the foramina using the skin-drag method (see Chapter 2) may reveal dysfunction, even if the precise nature of that dysfunction is unclear.
- If there is obvious skin-drag over a foramen, and if compression of that foramen is unduly painful,

some degree of sacral torsion is suggested – on the same side as the tender foramen.

Treatment protocol for sacral foramen points

For treatment of a tender point located over a left-side sacral foramen (Fig. 4.49A):

- The patient lies prone with the practitioner/therapist on the side of the patient contralateral to the foramen tender point to be treated – right side in this example.
- The right leg (in this example) is abducted to about 30°.
- The practitioner/therapist, applies pressure to the sensitive foramen with his left hand (in this example) with the patient ascribing a value of '10' to the resulting discomfort.
- The practitioner/therapist then applies pressure to the ilium a little lateral to the patient's right PSIS, directed anteromedially, using his right forearm or hand (in this example). This should reduce reported levels of sensitivity from the tender point.
- Variations in angle of pressure and slight variations in the position of the right leg are used for fine-tuning.
- The degree of reduction of sensitivity in the palpated sacral foramen tender point should achieve 70%.
- The position of ease is held for 90 seconds before a slow return to neutral (leg back to the table, contact released) is passively brought about.
- Whether the sacral torsion is on a forward or backward axis, it should respond to the same treatment protocol as described.

Tensegrity and the pelvis

When envisaging the internal biomechanics of the effects of treating medial sacral points, or sacral foramen points, as described above, it may be helpful to keep the balance between compression and tension forces and other tensegrity concepts in mind (Figs 4.49B,C). See Figure 4.49C for a tensegrity structure.

Pubococcygeus dysfunction

The tender point for pubococcygeus dysfunction lies on the superior aspect of the lateral ramus of the pubis, approximately a thumb width from the symphysis (Fig. 4.50).

Method

- The patient lies supine as the ipsilateral leg is flexed (Fig. 4.51) until sensitivity in the palpated point drops by at least 70%.
- Long-axis compression through the femur towards the pelvis may be useful as part of fine-tuning.

Coccygeal ('filum terminale cephalad') lift

Goodheart described a method that relies on the crowding or slackening, of spinal dural tissues, with the coccyx being used as the means of achieving this.

Startling results in terms of improved function and release of hypertonicity in areas some distance from the point of application are claimed (Goodheart 1985). Goodheart's term for this is a 'filum terminale cephalad lift': it is proposed that this be shortened to 'coccygeal lift', at least in this text.

This method focusses on normalizing flexion/extension dysfunction between the spinal column and the spinal cord, despite the spiral nature of the manner in which the spine copes with forced flexion (Illi 1951).

Goodheart and Walther report that there is frequently a dramatic lengthening of the spinal column after application of this procedure, with Goodheart mentioning specifically that, in good health, there should be no difference greater than about half an inch in the measured length of the spinal column sitting, standing and lying, using a tapeless measure which is rolled along the length of the spine.

Goodheart quotes from the work of Upledger and of Breig in order to substantiate physiological and pathological observations which he makes relating to the dura, its normal freedom of movement, and some of its potential for problem-causing when restricted (Breig 1978; Upledger & Vredevoogd 1983).

Breig states that, using radiography, microscopic examination and mechano-elastic models, it has been shown that there are deforming forces, which relate to normal movements of the spine, impinging on the spinal cord and meninges, from the brainstem to the conus medullaris and the spinal nerves.

Upledger, in discussion of the physiological motion of the central nervous system, recalls that, when assisting in neurosurgery in 1971, in which extradural calcification was being removed from the posterior aspect of the dural tube in the midcervical region, his task was to hold the dura with two pairs of forceps during the procedure. However, he states:

> ***The membrane would not hold still, the fully anaesthetized patient was in a sitting position and it became apparent that the movement of the dural membrane was rhythmical, independent of the patient's cardiac or respiratory rhythms.***

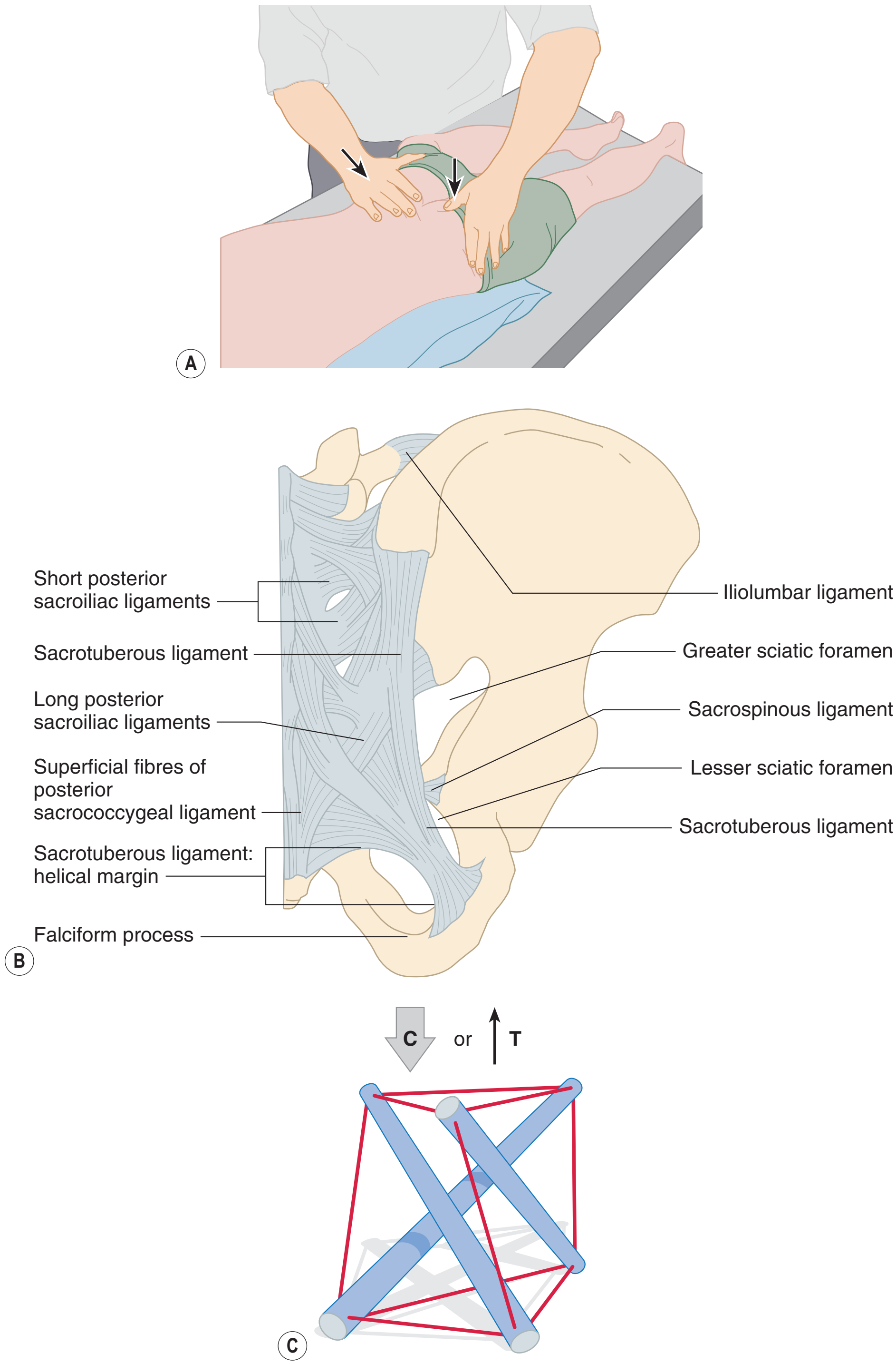


Figure 4.49 (A) SCS treatment of sacral foramen tender points relating to sacral torsion dysfunction. (B) Joints and ligaments on the posterior aspect of the right half of the pelvis and fifth lumbar vertebra. (C) A simple model of a tensegrity structure in which internal tensions 'T' and externally applied compression 'C' forces are absorbed by the component solid and elastic structures by adaptation of form. *(B from Gray's Anatomy, 38th edn.; C from Chaitow 1999.)*

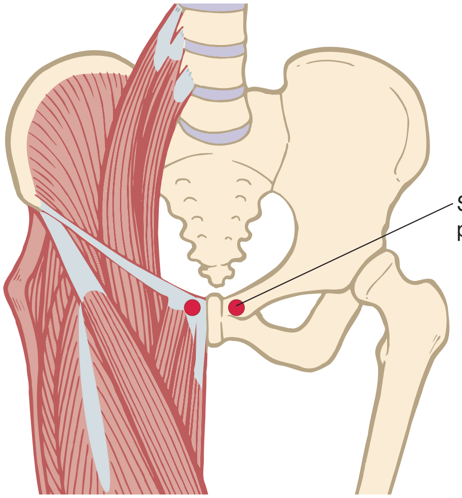


Figure 4.50 Common location of pubococcygeus tender point.

Figure 4.51 Treatment of pubococcygeus dysfunction.

Goodheart states:

Tension can be exerted where the foramen magnum is attached to the dura, and also at the 1st, 2nd and 3rd cervicals, which if they are in a state of fixation can limit motion. The dural tube is completely free of any dural attachment all the way down to the 2nd anterior sacral segment where finally the filum terminale attaches to the posterior portion of the 1st coccygeal segment. The release which comes from the coccygeal lift cannot be just a linear longitudinal tension problem. The body is intricately simple and simply intricate and once we understand the closed kinematic chain and the concept of the finite length of the dura, we can see how spinal adjustments can sometimes allow compensations to take place.

What may be happening during this 'lift'?

The anatomy of what is happening and the process of using this procedure is suggested to be as follows (Sutherland 1939; Williams & Warwick 1980):

- The dura mater attaches firmly to the foramen magnum, axis and third cervical vertebrae, and possibly to the atlas, with a direct effect on the meninges.
- Its caudad attachments are to the dorsum of the first coccygeal segment by means of a long filament, the filum terminale.
- Flexion of the spine alters the length of the intervertebral canal, while the cord and the dura have a finite length (the dura being approximately 2.5 inches longer than the cord, allowing some degree of slack when the individual sits), which Goodheart reasons requires some form of 'arrangement' between the caudal and the cephalad attachments of the dura, a 'take-up' mechanism to allow for maintenance of proper tension on the cord.
- Measurement of the distance between the external occipital protuberance to the tip of the coccyx shows very little variation from the standing to the sitting and lying positions.
- However, if all the contours between these points are measured in the different positions, a wide variation is found: the greater the degree of difference the more likely there is to be spinal dysfunction and, Goodheart postulates, dural restriction and possible meningeal tension.
- Tender areas of the neck flexors or extensors are used as the means of monitoring the effect of coccygeal lift procedure, to judge whether the palpated pain and/or hypertonicity eases, so indicating the ideal degree of lift.

Method as described by Goodheart (1985)

See below for modifications that simplify application:

- With the patient prone, the practitioner stands at waist level.
- After palpation and identification of the area of greatest discomfort and/or hypertonicity in the cervical spinal musculature with the practitioner's cephalad hand, the index finger of the caudad hand is placed so that the tip of the index or middle finger

is on the very tip of the coccyx, while the hand and fingers follow precisely the contours of the coccyx and sacrum (Fig. 4.52).

- This contact slowly and gently takes out the available slack as it lifts the coccyx, along its entire length including the tip, directly towards the painful contact on the neck, using anything up to 15 lb (7 kg) of force.

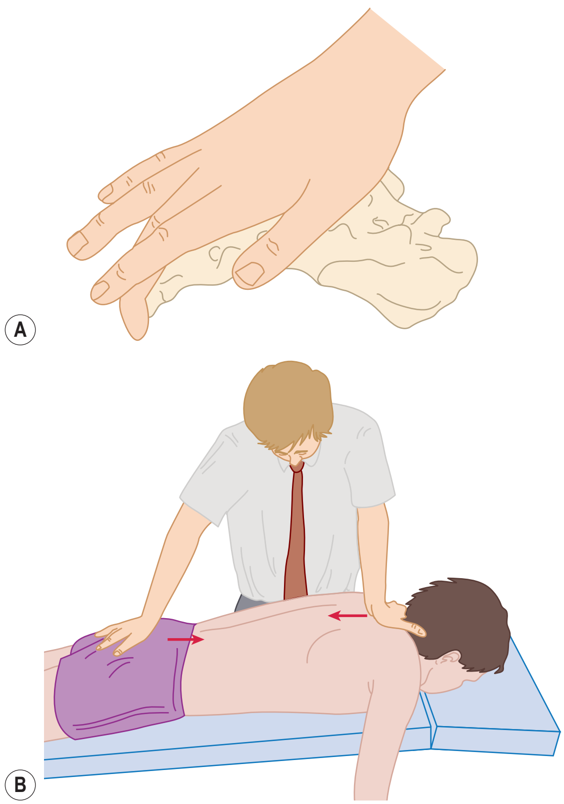


Figure 4.52 (A,B) Goodheart's coccygeal lift – see text for full descriptions.

- If the painful monitoring point does not ease dramatically, the direction of lift is altered (by a few degrees only) slightly towards one shoulder or the other.
- Once the pain has been removed from the neck point, *and without inducing additional pain in the coccyx*, this position is maintained for up to 1 minute.
- Additional ease to the restricted or torsioned dural sleeve can be achieved by using the hand palpating the cervical structures to impart a gentle caudal traction by holding the occipital area in such a way as to lightly compress it, while easing it towards the sacrum (so moving the upper three cervical segments inferiorly) as the patient exhales.
- This hold is maintained for four or five cycles of breathing.

Goodheart and others report dramatic changes in function following use of this procedure, including lengthening of the spine so that it measures equally in all positions, reduction in cervical dysfunction, removal of chronic headaches and release of tension in psoas and piriformis.

Coccygeal lift variation

The author has commonly found that the following variations make application of the coccygeal lift less difficult to achieve (Fig. 4.53):

- Once identified, the patient can be requested to apply the compressive force to the cervical tender point being used as a monitor until ease is achieved.
- This frees the practitioner so that positioning and application of the coccygeal lift is less stressful.
- The position described above, as advised by Goodheart and Walther, can be awkward if the practitioner is slight and the patient tall.
- A side-lying position of the patient allows for a less uncomfortable application of the procedure, for the practitioner.
- In this instance, the patient monitors the pain in the cervical area.

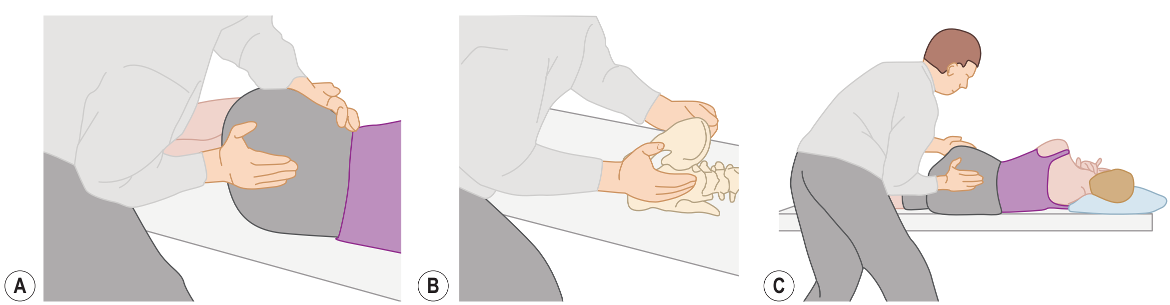


Figure 4.53 (A–C) Coccygeal lift variation – see text for full descriptions.

- The practitioner stands at upper thigh level, behind the side-lying patient, and makes contact along the whole length of the coccyx (the tip of which is cushioned in the hyperthenar eminence, see Fig. 4.53 A-C), with the elbow braced against his own hip/abdomen area.
- The force required to achieve the lift is applied by means of the practitioner leaning into the hand contact, while the caudad hand stabilizes the anterior pelvis of the patient.
- As in Jones's SCS methods, the patient reports on the changes in palpated pain levels until a 70% reduction is achieved.

Morrison's 'inguinal lift'

American chiropractor Marsh Morrison was responsible for popularizing a number of methods that bear a close resemblance to SCS, and which certainly fall into the context of positional release methods.

Morrison maintained that most women who periodically wear high heels present with a degree of what he termed 'pelvic slippage' that is associated with undue pelvic and low back stress (Morrison 1969).

The use of the inguinal lift is meant to enable low back manipulation and mobilization methods to be more effective, by balancing ligamentous and muscular tension patterns (see Chapter 8 for variations on this theme). Morrison recommended its application when low back problems failed to respond to more usual methods, since he maintained that the pelvic imbalance could act to prevent the normalization of spinal dysfunction.

Method

- The patient lies supine with legs slightly apart.
- The superior margin of the pubis should be palpated, close to the inguinal area.
- Pain will be found on the side of 'slippage'.
- This painful site is palpated *by the patient* who reports a numerical value for the pain, where '10' is the greatest pain imaginable, with the objective of reducing pain during the procedure, from a starting level of 10, by at least 70%.
- The patient (if male) should be asked to hold the genitals towards the non-treated side.
- Whether the patient is male or female, a second person should be in the room, since the practitioner is in a vulnerable position when contacting the inguinal area.
- The practitioner stands to the side of the patient, just below waist level on the side to be treated, and places the flat table-side hand on the inner thigh so that the web between finger and thumb comes into contact with the tendon of gracilis, at the ischiopubic junction.
- It is important, in order to minimize the potential sensitivity of the region, that the contact hand on the gracilis tendon should be relaxed, not rigid, with the 'lift' effort being introduced via a whole-body effort, rather than by means of pushing with that hand.
- Light pressure, superiorly directed, is then introduced to assess for discomfort.
- If the pressure is tolerable, the hemipelvis on the affected side is 'lifted' towards the shoulder on that side until pain reduces adequately in the palpated tender point, and this position is held for 30 seconds.
- The author has found that by supporting the ischial tuberosity with the non-tableside hand during the 'lift' a greater degree of pain reduction in the palpated point may be achieved.

Morrison described 'multiple releases' of tension in supporting soft tissues, as well as a more balanced pelvic mechanism.

The author suggests that this method may be usefully applied to lower abdominal 'tension' as well as to pelvic imbalances.

By removing the tension from highly stressed ligamentous and other soft tissues in the pelvis, some degree of rebalancing normalization may occur. Whether this involves the same mechanisms as are thought to occur when SCS is applied, or whether it relates directly to Goodheart's coccygeal lift method, remains for further evaluation. It is an example of positional release, involving a palpated pain point being used as a monitor, and so fits well with SCS methodology.

See Chapter 9 for discussion and illustration of a number of similar ligament balancing methods.

Gluteus medius

The commonest tender point for gluteus medius dysfunction lies laterally, on the posterior superior iliac spine.

Method

- The prone patient's ipsilateral leg is extended at the hip and abducted (Fig. 4.54), until reported pain reduces by at least 70%.

Medial hamstring (semimembranosus)

The tender point for the medial hamstrings is located on the tibia's posteromedial surface on the tendinous attachment of semimembranosus (Fig. 4.55).

Method

- The patient lies supine, with the affected leg off the edge of the table, so that the thigh is extended and slightly abducted, and the knee is flexed (Fig. 4.56).

Figure 4.54 Common location of gluteus medius tender point and treatment position.

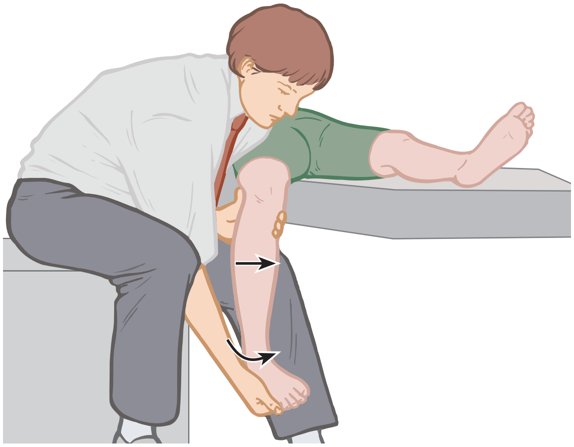


Figure 4.56 Treatment of medial hamstrings using the tender point as a monitor of discomfort.

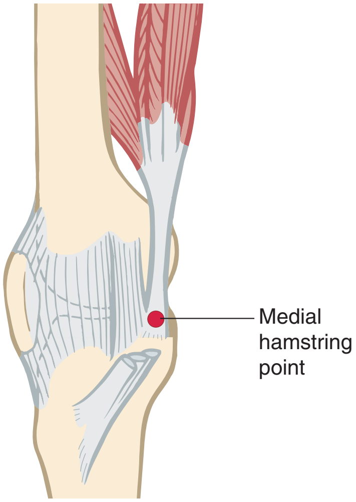


Figure 4.55 Common location of medial hamstring tender point, and treatment position.

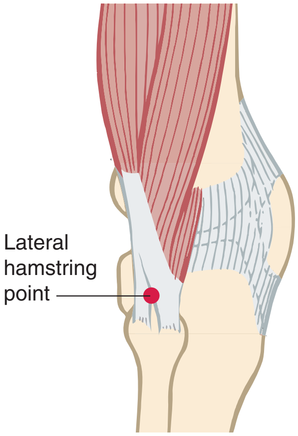


Figure 4.57 Common location of lateral hamstring tender point.

- Internal rotation of the tibia is applied for fine-tuning to reduce reported sensitivity in the tender point by at least 70%.

Method

- The patient lies supine, with the affected leg off the edge of the table so that the thigh is extended and slightly abducted, and the knee is flexed (Fig. 4.58).
- Adduction or abduction, as well as external or internal rotation of the tibia, is introduced for fine-tuning, to reduce reported sensitivity in the tender point by at least 70%.

Lateral hamstring (biceps femoris)

The tender point for the lateral hamstring is found on the tendinous attachment of biceps femoris on the posterolateral surface of the head of the fibula (Fig. 4.57).

Tibialis anterior

The tender point for tibialis anterior is found in a depression on the talus, just medial to the tibialis anterior tendon, anterior to the medial malleolus (Fig. 4.59).

Figure 4.58 Treatment of the lateral hamstring using the tender point as a monitor of discomfort.

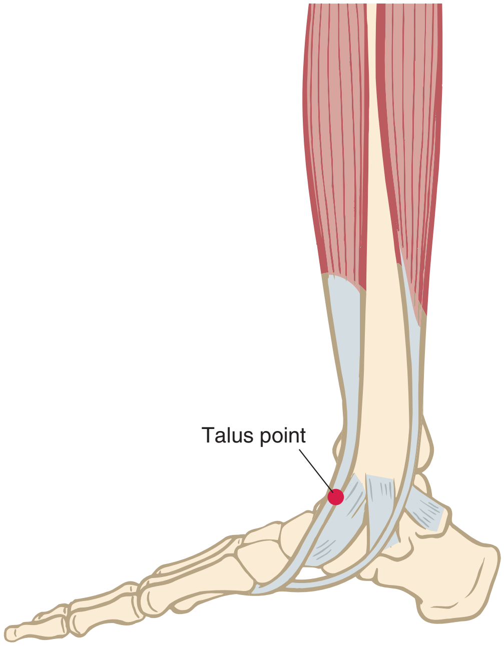


Figure 4.59 Common location of tibialis anterior tender point.

Method

- The prone patient's ipsilateral knee is flexed as the foot is inverted and the ankle internally rotated to fine-tune (Fig. 4.60), until reported sensitivity in the palpated tender point reduces by at least 70%.

Figure 4.60 Treatment of tibialis anterior using the tender point as a monitor of discomfort.

SIDE-EFFECTS AND REACTIONS

(McPartland 1996)

Despite the extreme gentleness of the methods involved in the application of all positional release in general, and SCS in particular, in about one-third of patients there is likely to be a reaction in which soreness, or fatigue may be experienced, just as in more strenuous therapeutic measures.

This reaction is considered to be the result of homeostatic adaptation processes in response to the treatment, and is a feature of many apparently very light forms of treatment. Since the philosophical basis for much bodywork involves the concept of the treatment itself acting as a catalyst, with the normalization or healing process being the prerogative of the body itself, the reaction described above is an anticipated part of the process.

It is logical and practical to request that the patient refrain from excessive activity for some hours following SCS treatment to avoid disturbing any 'resetting' of tone that may have occurred.

McPartland (1996) notes that between one-quarter and one-third of patients treated by SCS have some reaction, despite the gentleness of these approaches.

Very occasionally there are extensive 'muscle release' reactions. These are usually transitory and seldom last more than a few hours. However, patients should be forewarned of the possibility, to allay anxiety. No treatment is needed for the reaction if it occurs, as it is itself merely evidence of an adaptation process and passes rapidly.

In relation to positional release methods applied to the cranium (see Chapter 5) it is important to highlight a report on iatrogenic effects from inappropriately applied cranial treatment (most of which involves positional release methodology) (McPartland 1996). This report presented nine illustrative cases, of which two involved intra-oral treatment. All cases seemed to involve excessive force being used, and this highlights the need for care and gentleness in all cranially applied treatment, particularly when working inside the mouth.

CLINICAL REASONING

With the information in this and subsequent chapters, and using the basic principle of identifying areas of tenderness in shortened structures, and easing these by positioning, it should be possible for the reader to become familiar with the clinical possibilities offered by PRT in general and SCS in particular, without becoming bound by rigid formulaic procedures.

At its simplest, SCS suggests the following procedures if tissues are restricted or painful, with some tissues displaying 'tightness' and others, 'looseness':

- Consider the tight structures as primary sites for tender point location (see Chapter 2).
- Locate the most tender local point using simple palpation, such as 'drag' (see Chapter 2).
- Monitor this point while positioning and fine-tuning the tissues to reduce the perceived pain by not less than 70%.
- Hold the position of comfort/ease for up to 90 seconds.
- Slowly return to neutral, and reassess.
- Anticipate an instant functional improvement (e.g. greater range of motion) and some reduction in pain/discomfort that should commonly continue over the coming hours and days.

The reader is urged to re-visit the various text boxes in this chapter that cover different aspects of clinical decision-making:

- Box 4.1: Ideal settings for application of SCS/PRT
- Box 4.2: SCS application guidelines
- Box 4.3: Counterstrain positioning guidelines
- Box 4.4: Timing and SCS
- Box 4.5: Which points to treat first?
- Box 4.6: Some of the effects of sustained compression
- Box 4.7: SCS: contraindications and cautions
- Box 4.8: Indications for SCS (alone or in combination with other modalities)
- Box 4.9: The semantics of rib dysfunction descriptions.

SCS and other positional release methods are most appropriate in acute and subacute settings. They can also offer benefits in chronic conditions, but by their noninvasive, indirect, nature are not capable of modifying structural changes (fibrosis, etc.).

The end-result of such positioning, if painless, slowly performed and held for an appropriate length of time (Box 4.4), is:

- A reduction in sensitivity of the neural structures
- A resetting of these to painlessly allow a more normal resting length of muscle to be achieved
- Reduced nociceptor activity (see Chapter 1)
- Enhanced circulation as hypertonicity decreases.

Hopefully, the explanations in this chapter will have produced sufficient awareness to allow experimentation with the principles involved, in clinical settings, involving both the areas presented and others.

As long as the guiding principles of producing no additional pain, while also relieving pain from the palpated tender point during the positioning and fine-tuning, are adhered to, no damage can result, and a significant degree of pain relief and functional improvement is possible.

The following chapter explores different models of positional release – functional and facilitated positional release for example, where tissues are guided to their 'ease' positions using palpated features of modified tone, rather than relying on patient feedback, as in counterstrain.

THIS CHAPTER

This chapter has offered a detailed overview of the use of counterstrain, including the modified Goodheart model.

Mechanisms, guidelines and exercises provide a comprehensive foundation for the safe clinical application of this versatile methodology.

NEXT CHAPTER

The next chapter details functional (including cranial) and facilitated positional release methods.

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