Chapter | 9 |

Visceral positional release: the counterstrain model

Edward Goering

CHAPTER CONTENTS

INTRODUCTION TO AND DEFINITION OF VISCERAL POSITIONAL RELEASE

Positional release treatment for the viscera has been developed following many different pathways. Manual practitioners who use positional release treatment to relieve tender points associated with somatic dysfunction, recognize the value of these findings. Somatic and visceral dysfunctions that have tender points as a manifestation are effectively treated with a variety of techniques. Understanding this premise allows us to apply this concept to musculoskeletal complaints as well as to visceral complaints.

First, recognize that tissue texture changes, asymmetries of anatomical landmarks, restriction of motion and tenderness (TART, see Chapter 2) are observable and palpable somatic manifestations. The tissue texture changes palpated in association with somatic dysfunction are manifest through the action of the sympathetic and parasympathetic (autonomic) nervous system. Local cytokine factors alter water content and blood flow to and from an area of dysfunction. Motion restriction and anatomical landmark asymmetries manifest through the action of the peripheral or somatic nervous system. Tenderness is due to increased sensitivity of the peripheral, autonomic and central nervous systems. The somatic dysfunctions will be reflected as tender points directly related to their primary disorder when we look at the anatomy.

Positional release techniques are usually indirect and passive techniques. The manipulative procedure places the tissues in a position of ease, removing the distortion created by the inciting dysfunction. A simple mesenteric lift applied to the painful abdomen, held until relaxation and return of normal functioning occurs, is an indirect manoeuvre that is therapeutic with or without appreciation of the associated region of tenderness generated by the dysfunctional tissue. On some occasions, a direct force may be applied. For example, a shearing force may be required in some visceral or vascular structures to activate restorative physiological mechanisms (Gashev 2002). Activation of these mechanisms results in a normal physiological functioning of the visceral or vascular structures. In the walls of visceral structures are the interstitial cells of Cajal that are believed to influence the contraction of many visceral and vascular organs (Huang & Xu 2010).

Providing the appropriate activating energy through manipulative procedures is the goal of the procedures.

HISTORY

Dr Still recognized that manipulation of the viscera was very effective (Still 1911). Although there are very few descriptions of the techniques used by Dr Still, some of his early students, McDonnell (1994) and Barber (1898) described some of his techniques, as did Riggs (1901), Hazzard (1905), Woodall (1926), Goetz (1909), Smith (1912), Gaddis (1922), Teal (1922), Murray (1925), Young (1947, 1948), Hoover (1947, 1948, 1950) and Sutherland (1990).

Hoover called it a *ventral technique*, and addressed only the abdomen. Sutherland had techniques for both the pelvis and the abdomen. Woodall's applications were gynaecological.

In the more recent past, as scientific understanding of the clinical practice of manual medicine has evolved and improved, growth of the visceral positional release approaches has expanded. Barral is perhaps the most prolific author, innovator and teacher of visceral manipulation, currently. Many of the techniques adopted by positional release treatment clinicians are based on Barral's teachings (Barral 1995). Combining these treatment techniques with a good history, examination and thoughtful treatment has resulted in the identification of many specific tender point locations (as in the counterstrain model, described in Chapter 3). These techniques have grown from clinical understanding to clinical results. As with strain/counterstrain, developed by Dr Lawrence Jones, the basic scientific understanding is still evolving. Other current authors and educators in visceral technique include: Bensky (1995), Barral (1988, 1989, 1993, 1996, 1991, 1999), Lossing (1997), Finet & Willame (2000), Davidson (1992) and Blackman (2001).

Many of these approaches are not related to tender point location and reduction of pain, but are more focussed on restoring natural motion characteristics of each viscus. The balanced ligamentous tension (BLT) approach is used most often. (See Chapter 8 on BLT for further discussion of this approach.) For the sake of simplicity and clarity, this chapter focusses on reduction of visceral dysfunction related to somatic tender point pain with somatic positional release (counterstrain) procedures.

Over the years of working with positional release as it relates to tender points, it has become apparent that, on occasion, tender points and somatic dysfunctions resolve more quickly than the 90 seconds of holding tissues in an 'ease' position, initially recommended by Jones et al. (1995). This was a quandary for many of the practicing clinicians using his methods. Over the last decade, leading educators in this field, have given much effort to the better understanding of this question, e.g. Edward Goering, DO, DVM; Brian Tuckey, PT; Tim Hodges, LMT and Randy Kusonose, PT. The resolution of the problem regarding timing, is considered to relate to the origin of the type of dysfunction, and to variations in the physiological processes involved. Musculoskeletal complaints, for the most part, appear to require a more extended period of time (90 seconds) in the treatment ('ease') position. However, visceral treatments commonly require substantially shorter treatment time. This is thought to be due to the anatomical structure and physiological aetiology of the nociceptive and proprioceptive input that causes/maintains the tender point (Baily & Dick 1992) – the manifestation of the visceral dysfunction, whether somatic or visceral. From a clinical perspective, it is relatively easy to explain the treatment time, resolution of symptoms and body system to which the tender point is related.

THEORY

Trauma, disease and postural/structural abnormalities result in the abnormal force vectors and energy that are stored in the visceral structures. Each visceral organ will manifest pathological effects differently. Treatment requires understanding of the different structures and functions involved with each organ. Treatment of the visceral organs specifically will help the clinician to recognize their unique effect on the body tissues.

With visceral manipulation, it is important to recognize which structure is actually being treated. Many of the solid organs are not specifically treated; rather the supportive and suspensory structures are the focus of treatment. Barral refers to treatment of the liver and states that the primary focus is often the suspensory ligament structure. In treatment of the kidneys, focus is on superior or inferior displacement; however, when treating the ureters, traction may be applied to the structure, resulting in resolution of symptoms.

A sound understanding of visceral somatic reflexes is required for the clinician to develop a good working knowledge of these techniques. The amount of time required for treatment of specific structures may vary from 15 to 90 seconds. This variation is dependent upon the structures being treated and the physiological mechanism being activated.

Indirect manipulative techniques are very effective and having a tender point to help direct the treatment technique increases efficacy. Applying the same process to other systems in the body has shown to improve effectiveness of the treatments (Jones et al. 1995).

The lymphatic system is known to be affected by the endothelial nitrous oxide synthetase (ENOS) system. Traction or stress over the valvular region of the lymphatic vessel causes an increased release of nitrous oxide that, in turn, induces increased relaxation of the muscular layer. This increased stretch will result in a strong contraction of the muscular wall of the vessel (Ribera et al. 2013). In the visceral system, the tubular structures are also affected by changes in the level of nitrous oxide synthetase activation, in the endothelium. This increased activation results in increased levels of nitrous oxide, which affect the interstitial cell of Cajal that, in turn, affects the tension and contractility of the visceral structure. The muscular component of the visceral wall is also directly affected by nitrous oxide (Huang & Xu 2010). This change reduces nociceptive activation, reducing sympathetic tone and manifestations of visceral dysfunction, resulting in reduction or removal of tender points and palpated TART changes (see Chapter 2).

The term 'referred pain' is used for pain localized not at the site of its origin, but in areas that may be adjacent or at a distance from that site, generally comprised in the same metameres. Pain can be referred by deep somatic or by visceral structures. Myofascial pain syndrome is a typical syndrome characterized by referred pain from deep somatic structures (see Chapter 7). Referred pain from visceral organs is most important from a clinical point of view. The patterns of referred pain originating from various viscera are important for a correct diagnosis. Different pathogenetic mechanisms may be involved in the onset of referred pain: convergence of impulses in the central nervous system and reflexes inducing muscle contraction, sympathetic activation and antidromic activation of afferent fibres, which induces so-called 'neurogenic inflammation' (Procacci & Maresca 1999).

Realizing that consistent pain patterns are generated by the various visceral structures is a well-accepted phenomenon. Discovering and utilizing this property of visceral pain helps improve the results of manipulative therapeutic procedure. Visceral pain patterns have demonstrated consistent patterns and characteristics (Gebhart & Bielefeldt 2008). Studies have demonstrated cutaneous pain patterns consistent with visceral organ hyperalgesia. For example Tozzi et al. (2012) have demonstrated that the manipulative treatment of the kidney has reduced low back pain. The recognition of TART changes in the tissues of the body is an accepted osteopathic concept and physiological process, the description of which is presented in more detail in Chapter 2. These changes lay the basic groundwork for the clinical utilization of tender points discovered for specific organ systems to be treated.

INDICATIONS, CONTRAINDICATIONS AND COMPLICATIONS

1. Visceral dysfunction can be associated with a known medical diagnosis. Almost all medical diagnoses of the viscera have a component that is functional within the visceral structure or its attachments. These changes are separate and often different from the somatic manifestations of the dysfunction.
2. Visceral dysfunction can manifest with secondary somatic dysfunction. This is treated in a more typical musculoskeletal way.

Contraindications

These include abdominal aneurysm, internal bleeding, uncontrolled infections, active inflammatory bowel disease and severe pain with evaluation or manipulation. Medical indications for acute emergency medical evaluation are also contraindications for visceral manipulation. Pregnancy is a relative contraindication.

PALPATION AND EVALUATION

Identification of the visceral dysfunctional component is obtained by careful history and physical evaluation, including palpatory examination. This includes the motility and mobility of the specific visceral structures to be evaluated, including attachment evaluation. Barral (1995) describes in detail the appropriate evaluations of mobility and motility of the organs and supportive structures. Findings may include oedema, temperature changes and associated musculoskeletal alterations. Careful evaluation of the body following the initial visceral diagnosis allows tender points to be identified. Over time, these have been shown to be consistently located.

Visceral dysfunctions generally present as deep multisegmental restrictions, and tender points related to these areas are often resistant to typical positional release treatment if directed towards somatic structures. Recognizing that such points may represent a manifestation of a visceral dysfunction is important, so that application of the correct viscerally oriented positional manoeuvres may be implemented.

Visceral tender points are consistently found in the same location, and often elicit a sharper response from the patient. They tend to resolve more quickly and completely than typical somatic tender points.

The case study that follows in Box 9.1 is followed by illustrated examples of the application of the counterstrain model of visceral positional release.

Bronchus

(Fig. 9.1)

These patients may have a history of reactive airway disease or recent pulmonary infection. They present with shortness of breath and reduced rib excursion; the tender

Box 9.1 Case history: gastroesophageal reflux disease (GERD)

A 36-year-old male presented to an outpatient ambulatory care clinic complaining of persistent mid-epigastric discomfort with a history of gastroesophageal reflux disease (GERD) diagnosed by his primary care physician 1 year ago. He also complained of a dull pain in the mid-posterior thoracic spine. He described persistent heartburn, a bitter taste in his mouth upon arising in the morning and occasional wakening in the night with coughing. His symptoms persisted, despite medication prescribed by his physician: a proton pump inhibitor (PPI) and a histamine receptor antagonist (H2 blocker), for more than 6 months. He had not had any weight loss, or bleeding from his stomach or intestines. He tried conservative measures, such as not eating after 6 pm in the evening, not drinking alcohol or caffeine or eating chocolate, all of which could lower the tone of the lower oesophageal sphincter muscle and exacerbate the GERD symptoms. He considered elevating the head of his bed next.

Physical examination

The patient's vital signs were normal. His heart and lung examinations were also normal and his abdomen was non-distended, non-obese, with active bowel sounds in all four quadrants. There was no hepatosplenomegaly or tenderness to percussion or palpation. Musculoskeletal and osteopathic structural examination was by observation and palpation: the patient sat with a forward bent posture. There was acute tenderness over the inferior surface of the anterior left sixth rib on the anterior axillary line (gastroesophageal sphincter counterstrain point), anterior inferior sternum (anterior sixth thoracic counterstrain point) and on the medial end of the seventh rib as it attached to the sternum (left anterior seventh thoracic counterstrain point); there were also tender points on the posterior surface of the left second and third ribs (stomach counterstrain tender point) and diffuse TART (tissue texture changes, asymmetry, altered range of motion and tenderness) changes noted over the T5 through T8 left paravertebral region.

Assessment

1. Gastroesophageal reflux disease
2. Somatic dysfunction in the thoracic region, rib cage and abdomen.

Treatment plan

Osteopathic manipulative treatment using strain/counterstrain of the anterior seventh and sixth thoracic tender points reduced much of the somatic complaints. Treatment of the anterior sixth rib counterstrain point also resulted in partial treatment of the pain emanating from the oesophagus. Resolution of these secondary somatic dysfunctions (from visceral stimuli) resulted in reduced somatic pain; however, tenderness identified with specific organ structures remained.

Treatment of the organs suspected as involved with the indirect manoeuvre, described later in the text, e.g. the oesophagus, gastroesophageal sphincter and stomach, resulted in marked improvement of the patient. He noted that he was able to stand erect and his 'heartburn' was dramatically reduced. Over the next 6 weeks with intermittent treatment he had complete resolution of symptoms and was able to discontinue all medications.

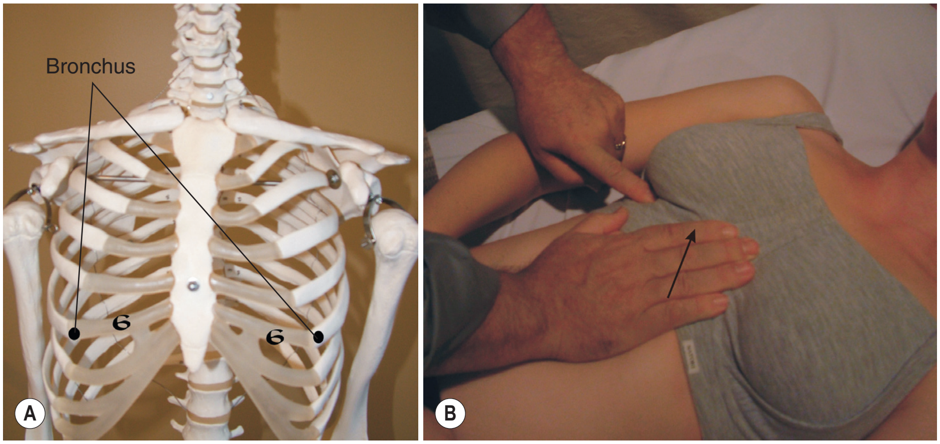

Figure 9.1
(A) Bronchus.
(B) Example of the strain/counterstrain visceral treatment technique.

point is found on the inferior aspect of the sixth rib on the anterior axillary line of the affected bronchi.

Treatment is performed by placing the patient in the supine position. Hand placement is over the lower one-third of the sternum with a gentle compression and fascial glide toward the ipsilateral shoulder compressing the pulmonary tissue in an indirect manner.

Oesophagus

(Fig. 9.2)

These patients may have a history of gastroesophageal reflux disease that is not responsive to medication. The tender points seen with these patients are typically at AT6 (on the midline at the xipho–sternal junction) and left AT7 (on the midline, or inferolateral to the tip of the xiphoid). However, they will also have a tender point over the manubriosternal junction.

Treatment of this dysfunction is accomplished with a seated patient in front of the operator in a slouched position and gentle fascial glide of the oesophagus superiorly from the left inferior aspect of the xyphoid process. This is an indirect positional release. There is also a second tender point for this distal oesophagus over the left second rib. Treatment is essentially the same, except the patient will be in a supine position as the fascial glide is performed.

Pancreas

(Fig. 9.3)

These patients may have a history of gastric upset, perhaps severe mechanical trauma. The tender point associated with this dysfunction is on the ninth rib just lateral to the medial edge of the scapula.

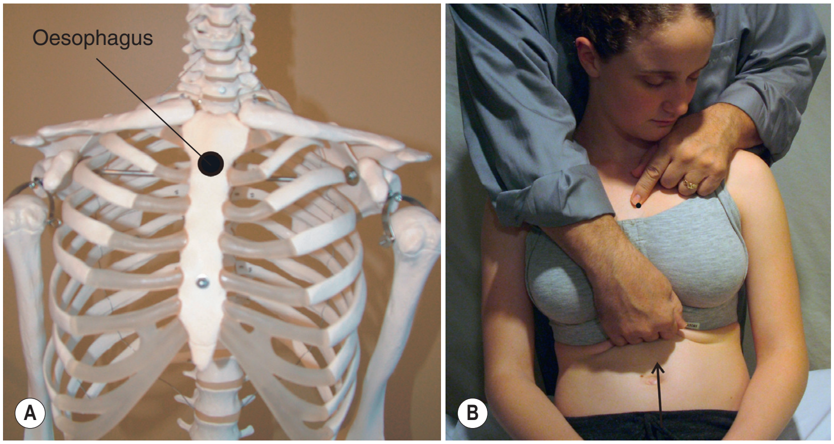

Figure 9.2 (A) Abdominal viscera – oesophagus. (B) Example of the strain/counterstrain visceral treatment technique.

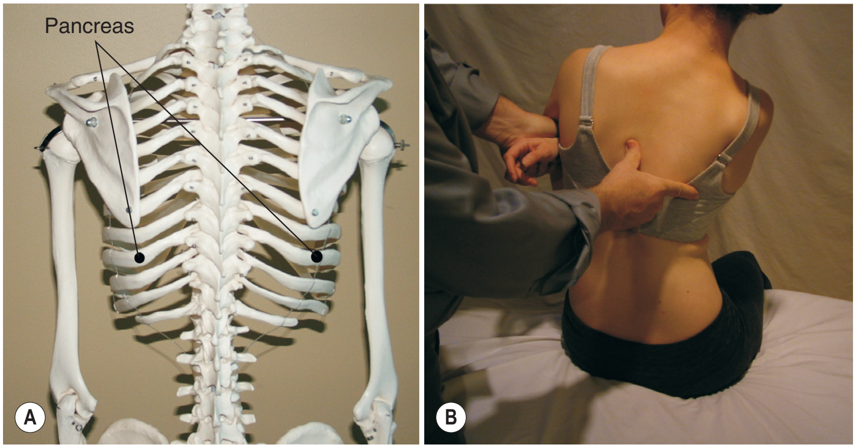

Figure 9.3 (A) Abdominal viscera – pancreas. (B) Example of the strain/counterstrain visceral treatment technique.

Treatment is performed with the patient seated; the arm on the affected side is adducted across the chest with the hand under the opposite arm. There is rotation of the upper body away from the side of the tender point and slight side-bending toward the side of the tender point. This positioning indirectly reduces tension on the posterior capsule. In a study utilizing myofascial release, soft tissue and strain/counterstrain treatment for 20 minutes/day resulted in a significant reduction in length of stay for patients with pancreatitis (Radjieski 1998).

Ureter

(Fig. 9.4)

Patients with this problem present with deep abdominal discomfort. They may have a history of renal infection, lithiasis or other urinary problem affecting the ureter. The tender point for this organ is located lateral to the PSIS, about 2 cm inferior and lateral, and it is bilateral.

Treatment for this problem is with a supine patient, lower trunk rotated away from the tender point side. The operator places an open hand over the kidney region on the ipsilateral side (superior and lateral to the umbilicus). A firm downward pressure is followed with a fascial glide in a caudad and slightly lateral direction.

Bladder

(Fig. 9.5)

These patients may have a history of recurrent sterile urinary tract problems. The tender points are often found adjacent to the low ilium sacroiliac tender point. These are over the posterior-superior aspect of the pubis.

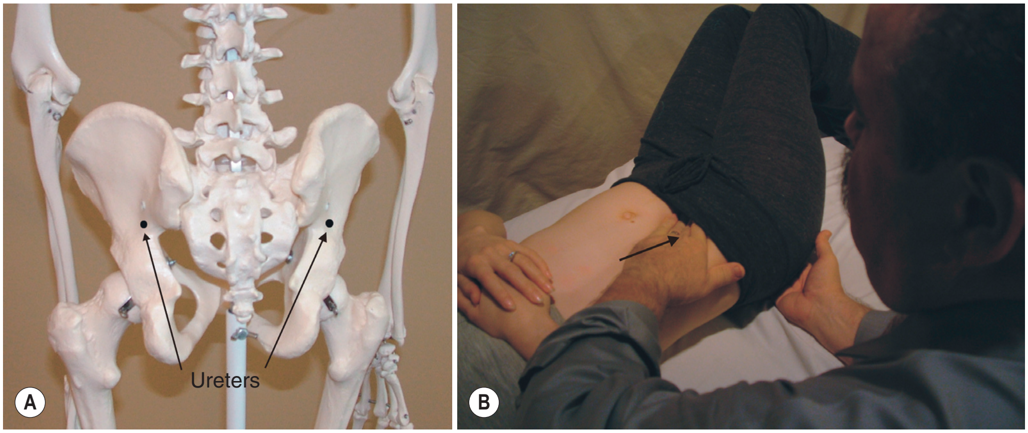

Figure 9.4 (A) Urogenital system – ureter. (B) Example of the strain/counterstrain visceral treatment technique.

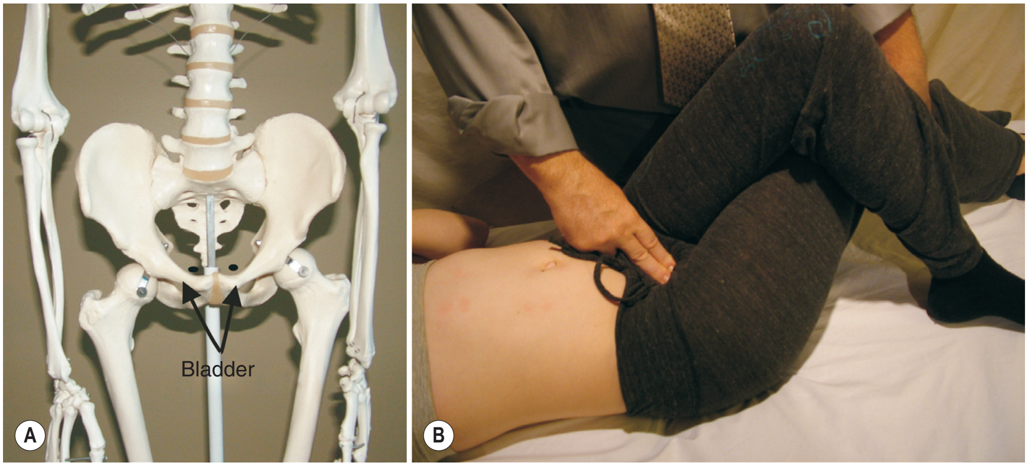

Figure 9.5 (A) Urogenital system – bladder. (B) Example of the strain/counterstrain visceral treatment technique.

The following case studies (Boxes 9.2 and 9.3) provide examples of therapeutic application of the technique in clinical practice.

Box 9.2 Case history: bladder pain following UTI

A 32-year-old Caucasian female, recently recovered from a urinary tract infection which was treated successfully with antibiotics, returned to her care provider, with dysuria, urgency and dull low back pain. During the physical evaluation, tender points were identified on the right lateral PSIS, and on the right inferior lateral quadrant, just above the pubic tubercle. These were identified as tender points associated with ureter and bladder visceral dysfunction. Following treatment, the patient's complaints resolved.

Box 9.3 Case history: reactive airway disease

An 18-year-old white male presented after recent hospitalization for severe exacerbation of his asthma. Medications included systemic corticosteroids, albuterol inhaler and corticosteroid inhaler. He continues to have restricted breathing and tenderness over ribs 4, 5 and 6. Following treatment of his anterior rib dysfunction, tenderness remains on the inferior lateral aspect of the right sixth rib. Applying the treatment protocol for the right bronchus resulted in complete resolution of his somatic dysfunction and visceral dysfunction.

They do not respond to low ilium sacroiliac treatment. This dysfunction is treated with the supine patient with the involved leg extended, with the uninvolved leg flexed and resting lateral to the knee on the involved side. The operator stands on the uninvolved side grasping the back of the involved-side knee in the popliteal fossa, lifting it gently inducing slight hip flexion and internal rotation of the involved-side leg. Adduction of the involved-side leg should be fairly marked.

THIS CHAPTER

This chapter has shown that visceral manipulation is a well-established modality in the treatment of many visceral complaints. The relationship between the body and viscera is well identified and documented. This approach utilizing the viscera-somatic relationship to identify a tender point, in the tradition of the strain-counterstrain model, becomes somewhat intuitive. Understanding the unique location of the specific tenderness developed as a result of the visceral disorder is helpful in the speed of correction and accuracy of treatment. Many of the manoeuvres are well known to practitioners of visceral manipulation. An understanding of the relationship between these separate manifestations will lead to more accurate and effective treatment, as well as a fuller understanding of the symptoms presented by the patient.

NEXT CHAPTER

The next chapter, by Anthony J. Lisi, DC, offers an overview as well as detailed protocols for assessment and rehabilitation as used in the McKenzie method.

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Chapter 10

Overview of the McKenzie method

Anthony J. Lisi

CHAPTER CONTENTS

INTRODUCTION

Clinicians, who use manual means to treat musculoskeletal conditions, face the stark realization that many of our diagnostic and therapeutic methods are not supported by significant external evidence. Much of what is used in the field is an extension of one's clinical training, where the methods of one's mentors become the basis for ongoing practice. This is likely expanded by personal experience and collegial interaction. These manners of knowledge derivation are *integration* processes. Although useful in themselves, such processes require the parallel track of *synthesis* processes – systematic collection of data through clinical science and outcomes research (controlled clinical trials, systematic reviews, etc.). Indeed, the combination of both types of processes in the approach to clinical practice – termed *syntegration* – has been described as a more complete knowledge-based approach to patient care than either one alone (Errico 2005).

Although there are no shortage of manual practice approaches based on integration processes (such as mentoring and personal experience), there are few methods that are supported by data from synthesis processes. One notable exception is mechanical diagnosis and therapy of the spine, also known as the McKenzie method (1981). The McKenzie approach allows the clinician the rare opportunity to take methods supported by reasonable published data and integrate them with clinical experience, to improve patient care.

The McKenzie method is often incorrectly equated with spinal extension exercises alone. While these and other exercises are important components of the technique, McKenzie is more correctly understood as a system of diagnosis and treatment based upon predictable responses to mechanical examination. The diagnostic element of McKenzie is often overlooked by those who are not familiar with the system.

Perhaps the most defining element of the McKenzie diagnostic approach is the central role it gives to patient response. As a patient is put through a series of positions and repetitive movements, reactions are assessed. Does the range of motion increase or decrease? Does pain intensity rise or fall? Does the location of the pain change? These findings are considered more important than any palpatory assessment. Actually, in many cases, a successful McKenzie examination can be performed without the provider ever touching the patient!

At first, this approach may seem incongruous to the manual practitioner; and, indeed, those manual providers who would say, 'Palpation is all' may never reconcile with those McKenzie practitioners who would say, 'Palpation is anathema'. However, clinicians who are comfortable navigating the vast waters between these extreme positions can find a blend of approaches that works best for the particular patient's benefit.

This chapter provides an overview of the McKenzie method. It is aimed at introducing clinicians unfamiliar with this system to the principles and approaches used therein. After reading this chapter, providers should be able to incorporate elements of mechanical diagnosis and therapy into their clinical approach. For further education, the reader is directed to McKenzie's texts and to the McKenzie Institute (www.mckenziemdt.org).

EXAMINATION

The heart of the McKenzie assessment procedure is the mechanical examination (McKenzie 1981; Taylor 1996). While the full assessment also includes patient history and postural analysis, this chapter focusses exclusively on the mechanical examination. Furthermore, appropriate diagnosis of a patient with neck or back pain also requires a thorough physical examination, including orthopaedic and neurological assessment, and analysis of imaging, laboratory and/or other tests when indicated (Chou et al. 2007; Nordin et al. 2008). In a given patient, mechanical examination may not be indicated or may be contraindicated. Therefore, depending upon the reader's clinical training and licensure, before relying on mechanical examination he/she must first reach an appropriate diagnosis of mechanical neck or back pain, or ensure that the patient has been diagnosed by a suitable colleague.

This chapter presents information on mechanical assessment of the lumbar and cervical spine. The McKenzie methods have also been applied to management of extremity conditions, however that is beyond the scope of this text. Indeed the vast majority of published evidence supporting the use of McKenzie principles relates to the lumbar spine.

The mechanical examination is an assessment of the patient's response to end-range loading (the application of forces). The load can be applied singularly and sustained, or repetitively. This method is different from many other forms of musculoskeletal examination because it is patient-driven. That is, the patient performs much of the examination (via active range of motion) and the patient's responses to the examination manoeuvres are considered more important than what the provider may sense via palpation. During the course of the examination, the patient learns which positions and movements are beneficial, and which are harmful; thus the entire process interweaves patient education and active care. McKenzie advocates making the patient as independent as possible – to minimize the chances of becoming reliant on the provider – and this process begins during the examination.

Lumbar spine

The mechanical examination process of the lumbar spine is outlined in Box 10.1 and Figures 10.1–10.13.

Box 10.1 **Lumbar spine mechanical examination**

Static (sustained posture at end-range)

- Sitting slouched, sitting erect
- Standing slouched, standing erect
- Lying prone in extension, lying supine in flexion

Dynamic (repetitive end-range movements)

- Active:
  - Flexion standing, extension standing
  - Flexion supine (knee to chest); extension prone (prone press-up)
  - Side-gliding, right or left, standing or prone.
- Passive:
  - Mobilization (grades 3–4) in flexion, extension, right or left rotation.

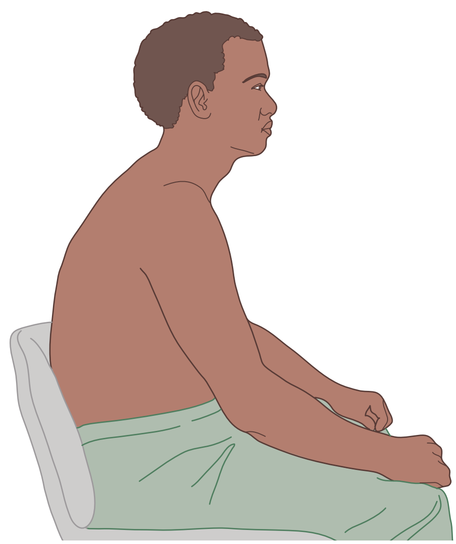

Figure 10.1 Sitting slouching.

At first the patient is instructed to assume a series of static sustained postures at end-range. The significance of the patient's response to these positions is discussed below; however, at this point, it is noteworthy to consider that each position attempts to elicit a change in patient symptomatology by varying the spinal configuration through a range of flexion to extension. This includes sitting slouched (Fig. 10.1), sitting erect (Fig. 10.2), standing slouched (Fig. 10.3) and standing erect (Fig. 10.4).

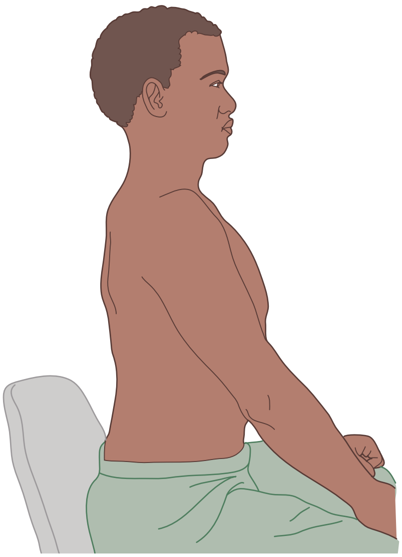

Figure 10.2 Sitting erect.

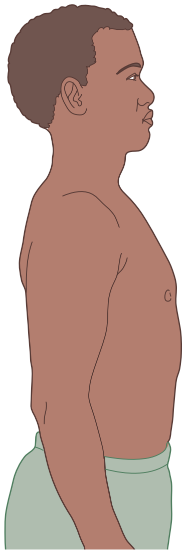

Figure 10.4 Standing erect.

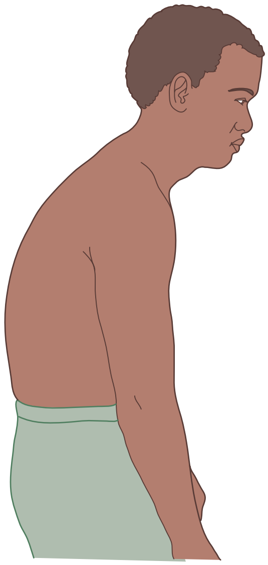

Figure 10.3 Standing slouched.

Note that the slouched positions put the lumbar spine in a position of relative flexion, while the erect postures introduce relative extension to the spine. Next, the patient will lie supine and then prone, so introducing relative flexion and extension, respectively. To increase extension the patient may lie propped up on the forearms (Fig. 10.5). To increase the amount of flexion, the patient may bring the knees to the chest (Fig. 10.6). If a patient's response (as explained below), is demonstrated at any point during the examination it is not necessary to further increase the given amount of flexion or extension. For instance, if symptoms change during supine lying, knees to chest would not be added.

The dynamic portion of the examination is the assessment of the effects of repetitive end-range movements. This includes both active and passive motions. The active movements are standing flexion (Fig. 10.7), standing extension (Fig. 10.8), prone extension (prone press-ups, as in Fig. 10.5) and supine flexion (knees to chest, as in Fig. 10.6). The patient is instructed to perform each of these movements up to 10 times in sequence, with the response assessed after each series of repetitions.

Note that up to this point, the entire mechanical examination can be performed without touching the patient, or with only minimal contact to guide the patient through the positions and movements. If the appropriate patient response has occurred (as explained below), the examination is complete. However, if a patient does not exhibit the desired clinical change, further assessment is needed, and the examiner moves on to passive dynamic movements, which are essentially grade 3–4 mobilizations. These are performed supine in flexion (Fig. 10.10), prone in extension (Fig. 10.11) and side-lying in rotation to the right and left (Fig. 10.13).

One variable not discussed above is side-gliding (Fig. 10.9) – or horizontal (x-axis) trunk translation. In the McKenzie system, a patient who initially presents with an antalgic list is also assessed for the response to side-gliding, both standing and prone, active and passive (Fig. 10.12). This assessment is typically reserved only for those patients with an initial tendency to list, with the transition movement performed in the direction that would neutralize the list.

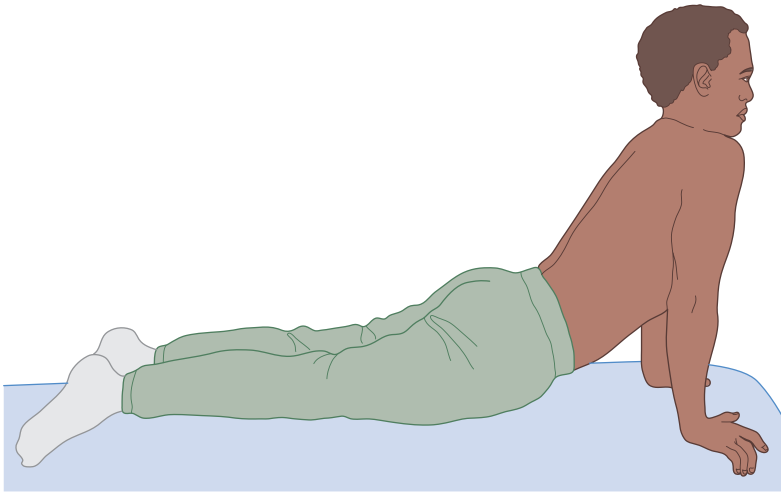

Figure 10.5 Lying prone in extension (press-ups).

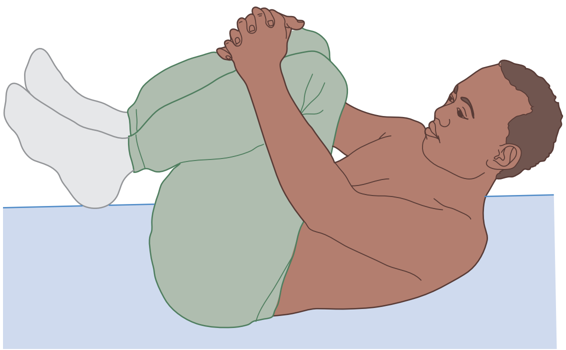

Figure 10.6 Lying supine in flexion (knees to chest).

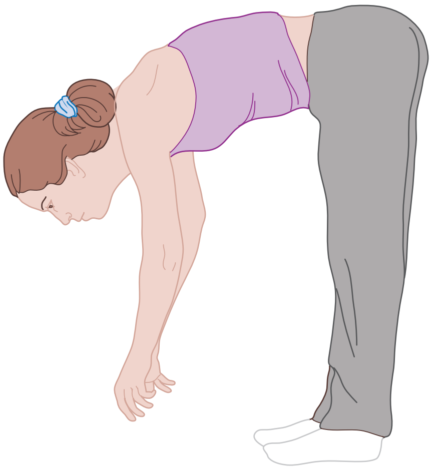

Figure 10.7 Standing in flexion.

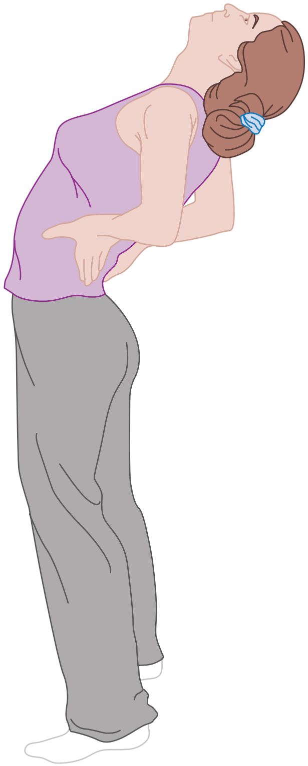

Figure 10.8 Standing in extension.

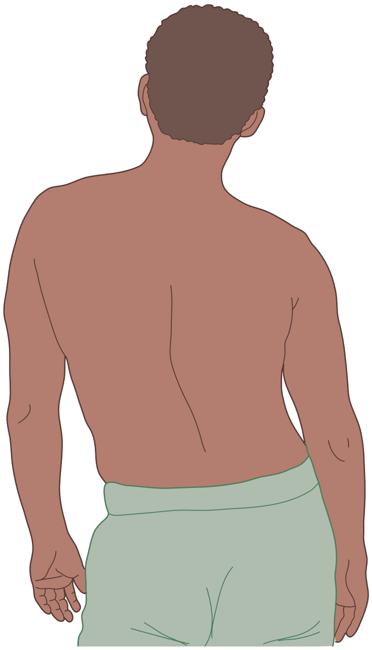

Figure 10.9 Side-gliding.

Figure 10.10 Supine flexion.

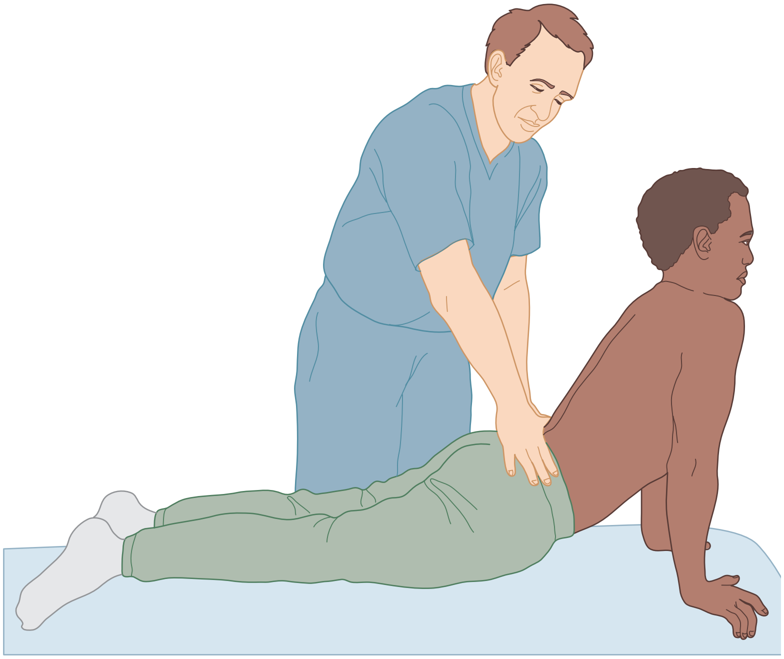

Figure 10.11 Prone extension.

Cervical spine

The mechanical examination process of the cervical spine is outlined in Box 10.2 and Figures 10.14–10.22. As with the lumbar spine, the examination proceeds first through a series of patient static sustained end-range postures, then repetitive active end-range motions, and finally, if needed, repetitive passive end-range motions (i.e. examiner manual assessment). The cervical spine examination has been subject to perhaps more revision than the lumbar spine examination, and consequently, greater variation seems to exist between seasoned McKenzie practitioners regarding the sequence and relevance of examination manoeuvres. As a baseline introduction for the novice, generally the

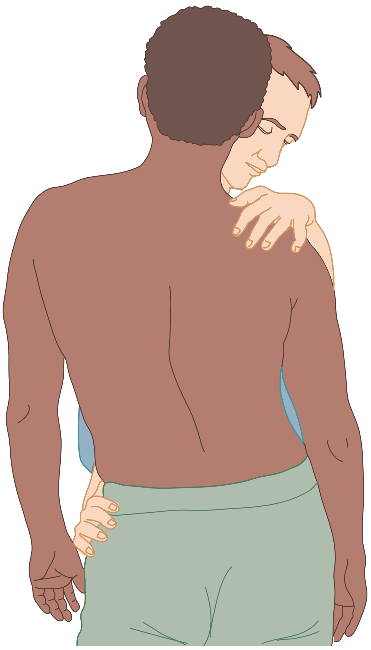

Figure 10.12 Side-gliding, with overpressure.

Box 10.2 **Cervical spine mechanical examination**

Static (sustained posture at end-range)

- Protrusion, retraction
- Flexion, retraction + extension
- Retraction + left lateral flexion, retraction + right lateral flexion
- Retraction + left rotation, retraction + right rotation

Dynamic (repetitive end-range movements)

- Active:
  - Protrusion
  - Retraction
  - Retraction + extension
  - Flexion
  - Lateral flexion
  - Rotation.
- Passive:
  - Mobilization (grades 3–4) in retraction plus either extension, right/left rotation or right/left lateral flexion.

Figure 10.13 Side-lying rotation.

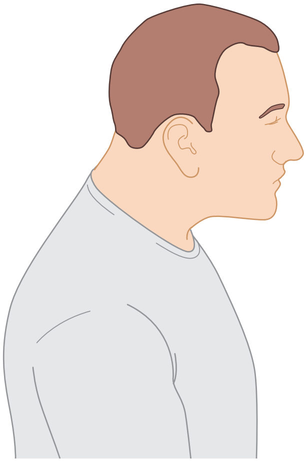

Figure 10.14 Protrusion.

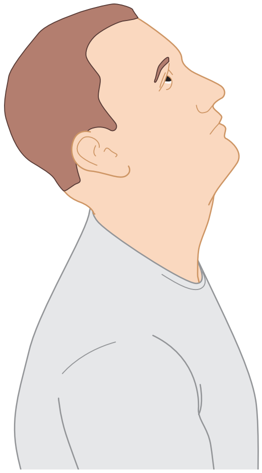

Figure 10.17 Retraction extension seated.

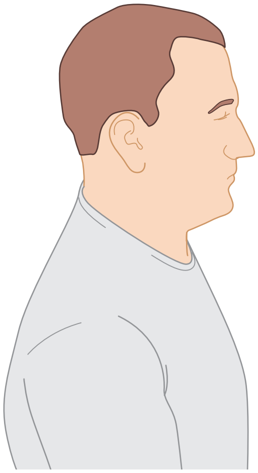

Figure 10.15 Retraction.

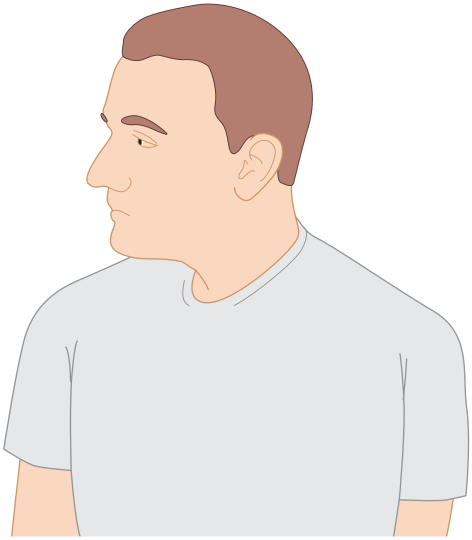

Figure 10.18 Right rotation.

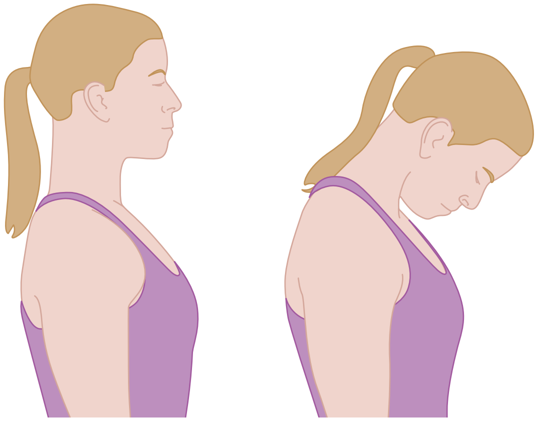

Figure 10.16 Flexion.

sagittal plane motions – protrusion, retraction, flexion and retraction plus extension – are performed first and have the greater weight (Figs 10.14–10.17). Rotation and/or lateral flexion movements (Figs 10.18–10.21) are typically reserved for cases in which the sagittal plan assessment has not revealed significant findings.

The examiner should consider the complex spinal mechanics associated with key examination movements. First, protrusion places the upper cervical region at the end-range of extension, while the lower cervical region is at the mid-range of flexion. Retraction places the upper cervical region at the end-range of flexion while the lower cervical region is at the mid-range of extension. Finally retraction plus extension places the upper cervical region

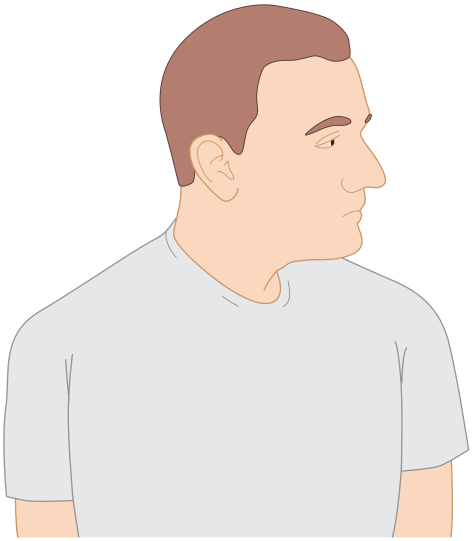

Figure 10.19 Left rotation.

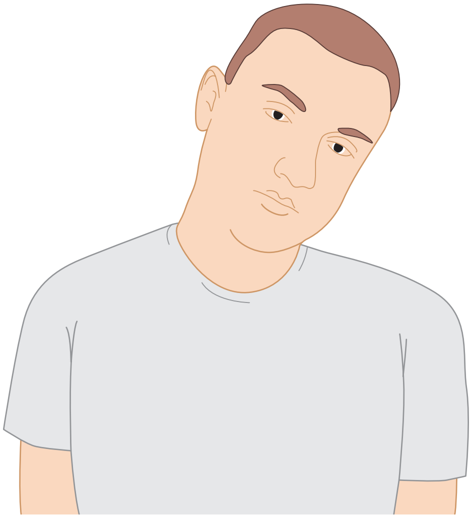

Figure 10.21 Left lateral flexion.

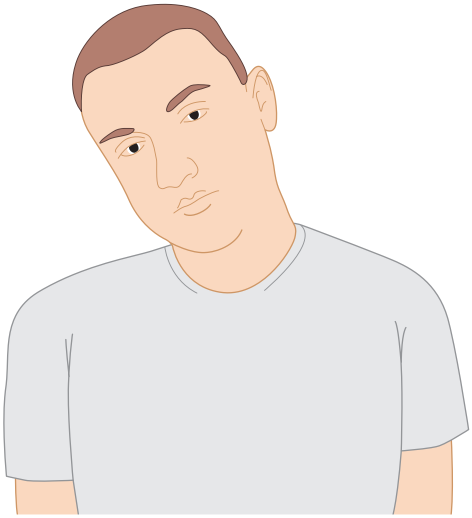

Figure 10.20 Right lateral flexion.

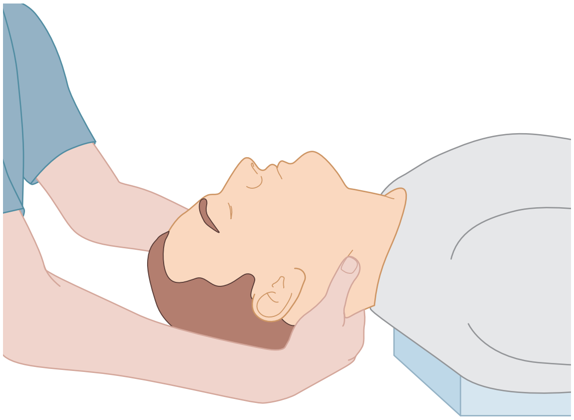

Figure 10.22 Retraction extension mobilization.

at the end-range of extension and the lower cervical region also at the end-range of extension. Analysis of findings associated with these movement tests can lead to treatment strategies targeting the involved regions.

Assessment of retraction, and/or retraction plus extension, is often performed with the patient supine and his/her head placed beyond the edge of the treatment table. This may be difficult for patients to achieve on their own, and is often guided by minimal hand contact of the examiner, which can be increased to full passive mobilization if needed (Fig. 10.22). This position can place certain patients at risk of injury and therefore must be employed with appropriate case selection. Relative contraindications can include cervical spinal stenosis, cervical instability, previous cervical spine surgery, cerebrovascular insufficiency, vertigo and general patient intolerance. However, with appropriate discretion, these manoeuvres can be performed safely and can yield important clinical information.

EXAMINATION FINDINGS

Whether evaluating the lumbar or cervical regions, while proceeding through the above mechanical examination, the clinician assesses the patient's response in terms of two main variables: range of motion and pain.

First, has the range of motion in any given direction increased, decreased or remained stable?

In this context, an improvement in antalgia is considered an increase in range of motion, such that the patient with an initial left list (shoulders left relative to the pelvis) who stands straighter after a manoeuvre is said to have gained right lateral flexion.

On the other hand, a patient who initially could flex the trunk forward 45° and after several repetitions of flexion can subsequently only flex 25°, clearly has a decrease in range of motion. As might be expected, an increase in range of motion that was initially restricted is considered a desirable finding; a decrease in range is undesirable.

Next, has the patient's pain complaint changed?

Pain is monitored in terms of intensity and location. The intensity of pain, simply, can increase, decrease or remain unchanged.

The location or distribution of pain may change independent of pain intensity. Thus, the pain may spread away from the lumbar region into the buttock, thigh and leg, becoming more distal in its distribution.

Alternatively, lower extremity pain may decrease or disappear, leaving a smaller distribution of lumbar pain only.

The former example, where pain moves distally, is called 'peripheralization'; the latter, where pain shrinks to a more proximal location, is called 'centralization' (Fig. 10.23). These terms are of great importance in the McKenzie system and will now be discussed in more detail.

Since McKenzie's original description, other authors have applied somewhat varied definitions to centralization, with the key concept remaining the abolition of distal pain in response to positions or repeated movements (Aina et al. 2004). Some studies have defined centralization as occurring as long as distal pain is eliminated during the course of treatment over days or weeks; whereas others require distal symptoms to be abolished during the examination. There has been some disagreement as to whether the distal pain must be abolished entirely or simply decreased. Apart from pain, reduction of distal paraesthesia has also been called centralization. These prior differences notwithstanding, it is important to clarify the following defining points. After the patient has assumed a particular position or performed a given repeated movement, centralization is said to have occurred in the following circumstances:

- The most distal symptoms (pain or paraesthesia) are eliminated or substantially decreased.
- If the patient presents with local low back pain only, that pain is eliminated.
- The change in distal pain is the defining element, and is often independent of proximal pain. That is, if a patient with low back pain and leg pain experiences relief of leg pain, yet an increase of low back pain, that patient is still said to have centralized. The converse of this is also true: the patient with relief of low back pain and an increase in leg pain has peripheralized.

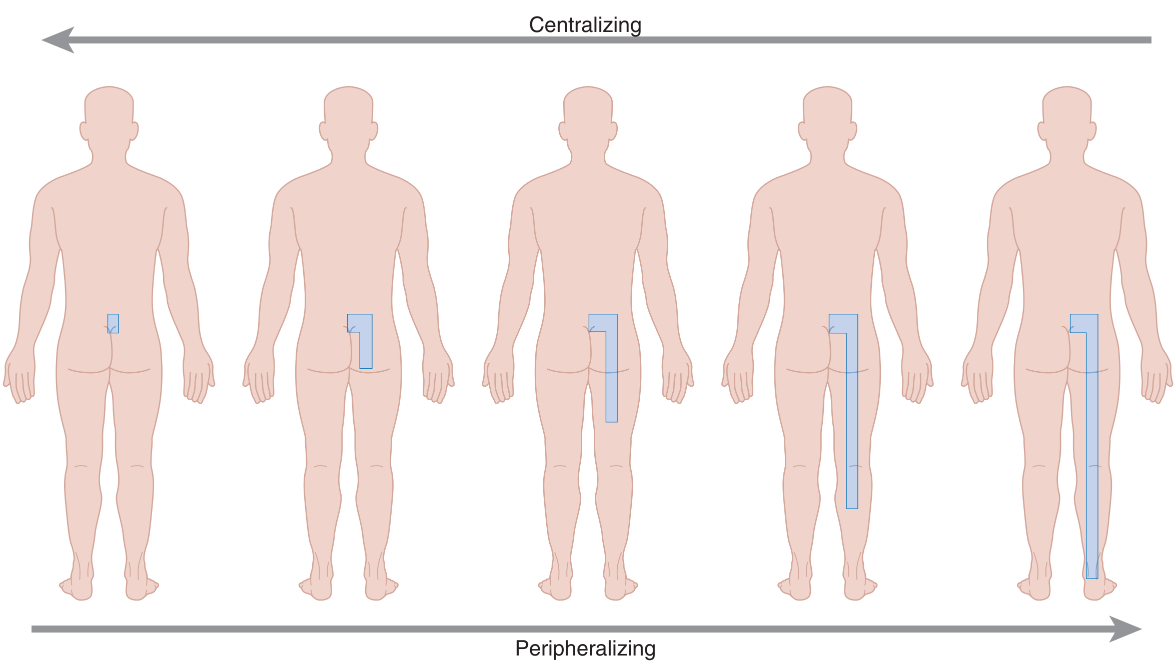

Figure 10.23 Representation of centralization and peripheralization. Moving from left to right depicts peripheralization; from right to left centralization.

- The reduction in symptoms is of some duration – seconds to minutes, perhaps hours in excellent responders. There must be some plasticity to the change. (This also applies to peripheralization; in contrast, for example to the palpation of a latent myofascial trigger point, which may cause distal pain while pressure is applied, but results in elimination of distal pain essentially instantly when pressure is removed. If a patient has peripheralized, the distal pain will linger for some time after the posture or repeated movements have ceased.)

As will be seen, achieving centralization is considered advantageous to the patient, and achieving peripheralization is considered disadvantageous (Donelson et al. 1991). For this reason, if centralization begins to occur during the course of a particular movement examination, that movement is continued. If peripheralization begins to occur, that movement is ceased. As an example, consider a patient with low back pain radiating to the right buttock. If after four repetitions of standing extension, the buttock pain has resolved and the back pain has decreased, additional repetitions of extension would be continued to see if the back pain would decrease further. However, if the back and buttock pain remained, and pain began to be felt in the posterior thigh also, extension would be halted and the examination would continue through the other motions.

THE SYNDROMES

McKenzie has classified mechanical low back and neck pain into three syndromes: postural, dysfunction and derangement. Each syndrome is defined by a theoretical model of the underlying pathology, plus patient history, postural assessment and mechanical examination findings (Table 10.1). The validity of the theoretical models remains largely undemonstrated, but as McKenzie has stated, the observed clinical phenomena in response to mechanical assessment are important, regardless of the proposed mechanisms, for these phenomena provide guidance for conservative management that has been shown to improve clinical outcome. In order to achieve that outcome, the McKenzie approach outlines treatment implications or strategies for each syndrome. These include strategies for educating patients on proper posture/ergonomics, patient self-care exercises and manual therapy.

Postural syndrome

The postural syndrome includes patients who are experiencing pain simply due to poor posture. The presumed pathology here is that there is no pathology: this is normal tissue being brought to pain by prolonged loading, for which it is not suited. Consider an index finger supporting a load while in a position of flexion. Normal joints, ligaments, capsules and muscles are able to resist this load without discomfort. Now consider that same load being applied with the finger in a position of hyperextension. That same normal anatomy will now be subjected to loading that is biomechanically disadvantageous, and discomfort will result.

During examination, postural syndrome patients will have a full range of motion. Repetitive end-range motions do not typically bring on or worsen their pain. This pain is intermittent and only initiated by prolonged (inappropriate) postural overload; thus the patient may be asymptomatic during the examination. The examination procedure likely to be positive is the sustained static posture. Some patients may experience the onset of pain when in a given position for under a minute, while others may take several minutes or more. The practicality of such a prolonged examination varies from one clinical setting to another; however, history findings will guide the examiner to the most likely culpable postures. For instance, the young computer programmer who experiences low back pain after working for many hours will most likely be found to be positive in prolonged seated flexion, rather than prone extension.

Treatment implications for the postural syndrome patient are straightforward – instruct the patient to avoid the problematic posture that is causing pain. Here, it is argued that this advice is the most important intervention and perhaps the only intervention a patient really needs. Giving the patient appropriate education on body mechanics and exercise aimed at strengthening supporting muscles empowers the individual to care for himself.

If the patient truly has full and painless range of motion, it is argued that manual treatment aimed at joints and or myofascial structures is unnecessary and may inappropriately contribute to patient dependence on the provider. To be sure, the patient without any articular or myofascial restriction may be very rare in given clinical populations. Nevertheless, if such a patient is encountered, it is likely that appropriate education and activation will be of greatest value.

Dysfunction syndrome

The dysfunction syndrome patient is characterized by chronic soft-tissue contracture or fibrosis. This may be facet joint capsular fibrosis, nerve root adhesions, etc. Such situations may arise in response to a major trauma or to cumulative microtrauma.

Upon examination, these patients will demonstrate a restriction in range of motion in one or more directions. Pain will be elicited at the inappropriately premature end-range. However, this pain will diminish essentially instantly when the patient returns to neutral. During the course of a repetitive motion examination, there may be a gradual increase in the restricted range of motion, as the

Table 10.1 A brief summary of the McKenzie syndromes

Syndrome	Mechanical examination findings	Pathology model	Treatment strategies
Postural	AROM is full and pain-free Repetitive motions are pain-free Sustained posture at normal end-range causes pain	Normal tissue being strained by prolonged inappropriate posture	Avoid painful positions; maintain correct posture
Dysfunction	AROM is restricted in one or more directions with local pain at end-range Repetitive motions are painful at end-range, but may increase range of motion	Chronic soft-tissue contracture or fibrosis (facet capsular fibrosis, nerve root adhesions)	Repetitive motions that increase pain are indicated to break adhesions and increase elasticity This applies to: Patient exercises Patient posture/ergonomics Manual treatment
Derangement	AROM is restricted in one or more directions; painful at end-range Repetitive motion reveals centralization (± peripheralization)	Discogenic pain with competent annulus (contained annular tear, internal disc disruption or herniated disc)	Motions that centralize are indicated Motions that peripheralize are contraindicated This applies to: Patient exercises Patient posture/ergonomics Manual treatment
	AROM is restricted in one or more directions; painful at end-range Repetitive motion reveals peripheralization only (no centralization)	Discogenic pain with incompetent annulus (non-contained annular tear, internal disc disruption or herniated disc)	Avoid peripheralization Often poor prognosis; often poor response to conservative treatment

AROM, active range of motion.

shortened soft tissue is repeatedly brought to tension. This can be thought of as the spinal analogue to the clinical presentation of chronic hamstring tightness. An initial simple stretch of hip flexion is painful. Removing the stretch relieves the pain. Repeating the stretch is painful, yet again; however, doing so, may start to increase the hip flexion range of motion.

In contrast to the postural syndrome, the therapeutic approach to the dysfunction syndrome patient is to strive for repeated motions that *increase* pain. It is postulated that these motions are required in order to break inappropriate adhesions and increase overall elasticity. These motions are indicated for patient home exercise as well as clinician manual therapy.

One point of clarification is that McKenzie stresses patient self-reliance as the primary goal of treatment. Thus, it would be preferred to have the patient perform the exercises alone if he can achieve the proper response. If the patient is unable to reach any lasting decrease in pain and increase in range of motion by exercise alone, only then would the clinician add manual therapeutic means (in accordance with pain reproduction). Furthermore, the clinician would keep these interventions to a minimum, with the intention of simply assisting the patient to become independent as quickly as possible.

Most contemporaries in spine care would certainly agree on the importance of patient independence and active care; however, the suggestion that *any* amount of passive care leads to patient dependence on the provider has not been demonstrated. Thus, the McKenzie stipulation that *all* passive care be omitted in patients who demonstrate success with self-care can be viewed as a guiding suggestion, rather than an admonition. Consequently, the clinician can find rich opportunity to blend manual therapies with repeated motion exercises that both attempt to stretch inappropriately shortened tissue, and educate the patient on the importance of self-sufficiency in the process.

Derangement syndrome

The portion of the McKenzie methods supported by the most significant evidence is the approach to the derangement syndrome patient. In short, derangement refers to lumbar intervertebral disc pathology. McKenzie originally described seven subcategories of derangement. However, in the 2003 revision of his text (McKenzie & May 2003) these have been collapsed into three subcategories. For the purposes of this chapter we will consider derangement to be divided into two subcategories only, corresponding with the relevant supporting evidence.

Lumbar intervertebral disc pathology includes both pathoanatomy (morphometric changes) and pathophysiology (changes in function, namely nociception). The pathoanatomy includes a wide spectrum of structural changes visible on advanced imaging: internal disc disruption, disc bulges and focal herniated discs, with or without nerve root compromise. In each of these cases, a distinction can be made between situations in which the outer annulus is fully intact, and those in which it is breached in one or multiple places. The former is called 'contained' pathology, where the outer annulus contains any distortion present; the latter is 'non-contained' pathology, where the hydrostatic mechanism of the disc is compromised (Fardon & Milette 2001).

As has been shown numerous times, the mere presence of disc pathology as seen on imaging does not correlate with symptoms (Boden et al. 1990; Boos et al. 1995). However, a very interesting relationship has been shown to exist regarding symptomatic, i.e. painful, lumbar discs. It has been demonstrated that patients with low back pain who exhibit centralization upon McKenzie examination are very likely to display a painful lumbar disc(s) with contained pathology, as evidenced by provocative discography (Donelson et al. 1997; Laslett et al. 2005). Conversely, those patients who exhibit peripheralization without centralization are very likely to display a painful lumbar disc(s) with non-contained pathology as evidenced by provocative discography. In other words, the presence of centralization and/or peripheralization upon mechanical examination is highly correlated with painful lumbar discs upon discography. Moreover, patients who centralize (whether or not they peripheralize also) are likely to demonstrate contained pathology, whereas those who peripheralize only (and do not centralize) are likely to demonstrate non-contained pathology.

During mechanical examination, derangement syndrome patients will display restriction in active range of motion in one or more directions. Pain will be produced at the premature end-range and perhaps during the range of motion prior to that point (this is in contrast to the pain of the dysfunction syndrome, which is only elicited at the restricted end-range). Repetitive motion examination will reveal centralization and/or peripheralization. When centralization occurs, it is typically in response to one given direction of motion only; the opposing direction very commonly, but not always, will cause peripheralization. The motion that results in centralization is called that patient's *directional preference*. In the lumbar spine, extension has been shown to be the most common directional preference (Donelson et al. 1991).

A number of studies have examined the frequency with which centralization occurs in patient populations. In one retrospective study, it was seen that 76 of 87 patients (87%) experienced centralization of symptoms in response to repeated end-range movements in a single direction (Donelson et al. 1990). In each case, movement in the opposite direction always exacerbated distal symptoms.

A prospective study examining only sagittal motions in 145 patients with low back pain, with or without lower extremity pain, demonstrated a frequency of 47% (Donelson et al. 1991). In a prospective descriptive analysis of the centralization phenomenon in 289 patients with low back pain or neck pain, with or without extremity symptoms, 30.8% of subjects were classified as centralizers, 23.2% as non-centralizers and 46% as partial reduction (Werneke et al. 1999). A systematic review of 62 previously published studies reported that in back and neck pain patients, the prevalence of centralization was 44.4% overall, and 74% in acute pain patients, whereas the prevalence of directional preference was 70% overall (May & Aina 2012). This review suggested that although more data are needed, currently the findings of centralization or directional preference appear to have utility in establishing treatment approaches and prognosis. A more recent study of 304 subjects found that centralization and directional preference are both associated with functional improvement in patients with neck pain (Edmond et al. 2014). Interestingly, this work provided more evidence that centralization and directional preference are individual diagnostic entities, each occurring in somewhat different patient subpopulations – centralization more likely in younger subjects and those with fewer comorbidities, and directional preference more likely in patients with acute pain.

Good reliability (kappa = 0.823; percentage agreement of 89.7%) has been shown among 40 physical therapists in deciding whether centralization, peripheralization or neither, had occurred (Fritz et al. 2000).

Another study also demonstrated good reliability between two physical therapists for classifying patients into McKenzie syndromes (kappa = 0.70; percentage agreement of 93%) (Razmjou et al. 2000). In this work, when centralization or peripheralization occurred, the reliability increased to excellent (kappa = 0.96; percentage agreement of 97%).

Other work has shown that patients who centralize achieve superior clinical outcomes compared with those who do not. Long (1995) investigated 223 subjects with chronic low back pain with or without lower extremity pain and found that the centralizer group had a significantly greater decrease in maximum pain intensity scores on the NRS-101 Pain Scale and a significantly higher return-to-work status. Improved return-to-work rates were also seen among centralizers in a study of 126 consecutive patients with low back pain, with or without leg pain

(Karas et al. 1997). The centralizers among 289 patients with low back or neck pain experienced a greater reduction in pain intensity on an 11-point pain scale, and increase in function as measured by the Oswestry Questionnaire or Neck Disability Index (Werneke et al. 1999).

For those patients who can be made to centralize, treatment is always aimed at achieving centralization and avoiding peripheralization. Thus, exercises, ergonomics and manual therapies are employed following the patient's directional preference. For instance, a patient who centralized upon repeated extension will be given extension exercise, advised to maintain lordotic postures and receive manual treatment favouring extension. As in the dysfunction syndrome, the McKenzie approach advocates refraining from passive treatment in cases where patients can achieve positive changes – in this instance centralization – by performing active exercises (Box 10.3).

Those patients who peripheralize only, and do not centralize upon any movement, present the clinician with a more challenging situation. In the absence of a clear directional preference, there is not one particular motion for which to strive. Avoiding peripheralization does remain a guiding principle for exercise, body mechanics and in-office care; however, this alone is not as valuable as having a particular direction/posture that results in positive change. In fact, it has been shown that these patients often have a poor response to conservative treatment, and may be more likely to require surgical intervention (Donelson et al. 1997).

Any discussion of managing patients with mechanical neck or low back pain would be remiss without considering the role that non-mechanical factors may have on a given patient's clinical presentation. Contemporary concepts describe a biopsychosocial model of the complex interaction between biological, psychological and social or cultural factors that influence physical health or illness (Suls et al. 2013). This is especially relevant to patients with spinal pain complaints, where pain-related fear has been shown to be positively associated with disability (Zale et al. 2013). In relation to the McKenzie assessment in particular, evidence suggests that mental (OR 1.16; 95% confidence interval (CI) 1.03–1.30) and depressive symptoms (OR 1.23; 95% CI 1.01–1.51) are associated with non-centralizers more so than centralizers (Christiansen et al. 2009). Thus, all clinicians treating patients with back or neck pain must account for and address the potential contribution of psychosocial factors.

In summary, remembering the following key points may be particularly helpful to the clinician. Centralization occurs with a frequency of 30.8–87%, and good to excellent inter-examiner reliability regarding assessment of centralization has been demonstrated.

A single preferred direction of motion typically results in centralization. When present, centralization and/or peripheralization indicate painful intervertebral disc pathology.

Box 10.3 **General note on manual therapy**

The McKenzie method emphasizes the primary importance of patient education and self-care. The technique includes a focussed role for manual therapy in the context of achieving desired mechanical outcomes.

As has been described in the text, centralization of symptoms and/or increase in restricted range of motion are advantageous for a patient. The goal of the McKenzie approach is to identify positions/movements that produce the advantageous results (diagnosis), and then apply these positions/movements to reach a positive outcome (treatment). Manual therapy is included in both diagnosis and treatment. However, in each case it is employed only as a second tier option for situations where active methods did not achieve the desired result.

In the McKenzie system, the mechanical methods can be thought of as existing on a continuum from active to passive means, as shown below.

ACTIVE → PASSIVE

Posture	Repeated active motions	Repeated active motions with clinician overpressure	Articular mobilization (grades 3–4)	Manipulation (grade 5)

The guiding principle is to utilize active methods first, moving sequentially further to the right on the spectrum only when the preceding method has failed. In some patients, successful diagnosis and outcome can be obtained with active methods from the start. Other cases will initially require the use of mobilization or manipulation in order to achieve centralization and/or increased range of motion. Yet, during the course of care, the intent is to use less of the passive and more of the active methods as quickly as possible, while still maintaining positive outcome.

The manual therapies described within the McKenzie method are joint mobilization and manipulation, with the latter considered more aggressive than the former. However, the eclectic clinician may blend other forms of soft-tissue therapies into this approach. Since the principles of centralization and peripheralization in particular are supported by significant evidence for those patients who demonstrate either, it would behove the clinician to strive for centralization and avoid peripheralization during the application of any myofascial release technique.

Pain that centralizes probably arises from a disc with a competent annulus; pain that peripheralizes but does not centralize, probably arises from a disc with an incompetent annulus. For patients with intervertebral disc pathology, those whose symptoms can be made to centralize have a better prognosis for response to conservative care than those whose symptoms cannot.

THIS CHAPTER

This chapter has presented an overview of an evidence-based approach to mechanical diagnosis and treatment called the McKenzie method. This method includes an assessment of a patient's response to mechanical positioning in order to reach a diagnosis and identify a treatment strategy. The discussion focussed on three diagnostic categories: postural syndrome, dysfunction syndrome and derangement syndrome, of both the lumbar and cervical regions. This chapter covered the application of these principles to manual therapy treatment planning.

NEXT CHAPTER

The next chapter, by Dylan Morrissey PT, PhD, contains details of the use of 'unloading'/kinesio-taping as a form of positional release.

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