To assist you as you complete the online component, the following pages comprise the sections from the Part B Course Manual that cover the first four modules from this course. Your complete Course Manual will be provided to you at the live course.

Remember, completion of this online component and a 75% pass on the final test at the end of the five modules is required for your entry into the live course.

The online component will take approximately five hours to complete. This projected time includes watching the content and videos, reviewing before and after each quiz, and also the review of the entire component following the final test completion before attending the live course.
MODULE ONE

INTRODUCTION AND EPIDEMIOLOGY

Objectives

By participating fully in this module, a participant will be able to:

1. Review the cardinal features of the McKenzie Method of Mechanical Diagnosis and Therapy and contrast with other management approaches.

2. Describe the major epidemiological factors associated with pain of cervical origin.

3. Describe the risk and prognostic factors related to cervical pain.
1. **Review the cardinal features of the McKenzie Method of Mechanical Diagnosis and Therapy and contrast it with other management approaches**

   Review by answering the following questions:

   - **Classification of sub-groups**
     - a. What are the unique features of Derangement Syndrome, which are not found in Dysfunction Syndrome or Postural Syndrome?
     
     - b. What are the unique features of Dysfunction Syndrome, which are not found in Derangement Syndrome or Postural Syndrome?
     
     - c. What are the unique features of Postural Syndrome, which are not found in Derangement Syndrome or Dysfunction Syndrome?
     
   - **Use of repeated movements**
     - a. What is the significance of using repeated movements?
b. What common difficulties arise when using repeated movements?
   
   
   
   
   
   c. What does an inconclusive response to repeated movement testing indicate?
   
   
   
   
   
   
   
   
   

   ▪ Focus On Centralisation
   
   
   
   
   
   
   
   
   
   

   b. How does it occur? (i.e. as a result of what testing methods?)
   
   
   
   
   
   
   
   
   

   c. Why does it occur? (i.e. theoretically?)
   
   
   
   
   
   
   
   
   

   d. In what patient group does it occur?
   
   
   
   
   
   
   
   
   

e. What is its clinical significance?

f. Does the literature support the MDT focus on centralisation?


g. Describe the differences between Directional Preference and Centralisation

- Treatment Perspective
  
a. Discuss the components of patient management when utilising MDT?
  
b. Discuss the clinician’s role and the patient’s role when utilising MDT?
  
c. Discuss the essential features of self management for long term control of symptoms i.e. prophylactic concept.
Progression of forces

a. Why is the concept of progression of forces utilised in MDT?

b. Describe the sequence of progression forces?

c. What is the main indication for progressing forces?

Contrast with other management approaches

a. How does the physical examination differ?

b. How does the management of patients differ?

c. How does the use of exercises differ?
2. **Describe the major epidemiological factors associated with pain of cervical origin.**

**Prevalence of neck pain and headache**
- Lifetime prevalence of neck pain is about 48% of adult population
- Yearly and monthly prevalence between 23% and 39%
- Lifetime prevalence of headache is 20% to 30% of adult population
- Monthly prevalence of headache is around 10%

**The natural history of neck pain**
- Recurrences, episodes, and persistent symptoms are common
- Acute and chronic definitions are insufficient to describe complexity of neck pain

**Implications of neck pain**
- The majority of those with neck pain experience low to moderate pain intensity and low to moderate disability
- Those with more persistent symptoms are more likely to be disabled
- Discomfort on daily activities can be greater than for those with back pain
- Of those with neck pain somewhere between 20% and 70% seek treatment
- Over 4% of all GP consultations involve neck pain

**Management**

Little or no evidence to support the use of:
- Heat, cold, acupuncture, laser, neck school, multidisciplinary biopsychosocial rehabilitation

Some evidence to support use of:
- Exercise and active treatment
- Early exercise for acute whiplash
- Manual therapy combined with exercise
- Traction
- Patient education
- Centralisation exercises

However, findings from systematic reviews are contradictory and conclusive evidence is lacking

3. **Describe the risk and prognostic factors related to cervical pain.**

**Risk factors**

Three classes of factors most commonly studied:
1. Individual
2. Physical or biomechanical
3. Psychosocial

Known factors associated with neck pain:
- Previous history neck pain
- Female gender
- Increasing age up to about 50
- Headache
- Back pain
- Distress
- Heavy or repetitive work
- Sitting
- Neck flexion

**Prognostic factors**

There is limited literature in this area. Some evidence for an association between the following factors and persistent neck pain:

- Previous history neck pain
- Severe initial symptoms
- Female gender
- Older age
- Distress
- No evidence of association between persistent pain and degenerative changes
REFERENCES FOR MODULE ONE


NOTES FOR MODULE ONE
MODULE TWO

MECHANICAL DIAGNOSIS:
CLASSIFICATION AND DEFINITION OF TERMS

Objectives

By participating fully in this module, a participant will be able to:

1. Identify and discuss indications and contra-indications for MDT.
2. Describe the clinical characteristics of the Derangement Syndrome.
3. Describe the clinical characteristics of the Dysfunction Syndrome.
4. Describe the clinical characteristics of the Postural Syndrome.
5. Describe the clinical characteristics of Spinal OTHER.
6. Differentiate between Derangement, Dysfunction, Postural and OTHER.
1. Identify and discuss indications and contra-indications for MDT.

**Indications**

**Triage:**
- 1. Mechanical neck pain
- 2. Cervical radiculopathy
- 3. Serious spinal pathology

Categories 1 + 2 are suitable for Mechanical Treatment. Category 3 needs referral for specialist opinion – therefore important to recognise ‘Red Flags’ that may indicate serious spinal pathology.

- Derangement = largest category
- Dysfunction = a few
- Postural syndrome = occasionally
- OTHER = chronic pain state, inflammatory, mechanically inconclusive, mechanically unresponsive radiculopathy, post surgery, lateral foraminal stenosis, trauma

**Contraindications – serious spinal pathology**

**Spinal cord**

Spinal cord lesions can present in a variety of ways depending where the cord is affected. Most commonly lower cervical levels are affected and lower limb signs and symptoms are present, less commonly upper cervical levels are affected and upper limb signs and symptoms are present.

**Fractures**

Fractures of the cervical spine or ligamentous instabilities of the upper cervical spine may be caused by a variety of traumatic events, such as motor vehicle accidents, diving into shallow water, falling from high places, or a number of athletic activities; or they may occur secondary to existing pathology such as rheumatoid arthritis.

**Tumours**

Rare occurrence in cervical spine, may be benign or malignant.

**Spinal infection**

Very rare occurrence in spine, especially rare in cervical spine.
Dizziness
Dizziness is a symptom with multiple causes. It is a common symptom in older populations, reported by 30% of people aged over 65 years. Dizziness maybe caused by:

- benign paroxysmal positional vertigo,
- postural hypotension,
- a vestibular condition,
- a mechanical cervicogenic condition
- cervical arterial dysfunction (CAD) e.g. vertebrobasilar insufficiency (VBI)
- or other medical conditions

When Dizziness appears cervicogenic in nature it is important to confirm the relationship between dizziness and the cervical spine.

Consider the following points:

- a close temporal relationship between neck pain and dizziness
- history of previous neck problems
- no clear indication of other causes of dizziness.

If the dizziness is associated with the neck pain in terms of onset, frequency and severity, And associated with neck movements, And there are no other related features cervical origin is likely.

### Differentiation between dizziness of cervical or other origin

#### Possibly cervical in origin
- Transient dizziness
- Neck pain
- Neck pain associated with dizziness
- Limited cervical movement
- Headache / upper limb symptoms
- Nausea

#### Non-cervical in origin
- Constant dizziness / vertigo
- Feelings of being pushed to one side
- Speech problems
- Swallowing problems
- Severe headache
- Sight problems
- Hearing problems
- Blackouts / falls
- Upper motor neurone signs & symptoms

(Cervical Arterial Dysfunction)

#### Symptoms possibly associated with VBI

Attempting to identify potential problems with vertebrobasilar insufficiency involves two components:

- items from history
- physical exam tests

Certain symptoms have been associated with VBI. These are listed below, but it is important to remember that none of these are diagnostic of the condition, the diagnostic accuracy of any has not been tested, and VBI may not be the only cause of such a symptom.

- dizziness / vertigo (often cited as the most common symptom)
- sudden head / neck pain
- drop attacks
- unsteadiness / in-coordination
extremity weakness
confusion
headache
hearing loss
diplopia
dysarthria
dysphagia
nausea / vomiting
blackouts / fainting
blurred vision / transient hemianopia
tinnitus
paraesthesia in mouth / tongue area
pallor and sweating

Tests historically used to detect VBI
Various test protocols have been described, all with the aim of detecting patients who may have symptoms related to VBI. Although there are minor variations to these pre-manipulation clinical tests essentially they use the same manoeuvres, with end-range positional tests in rotation, extension, a combination of rotation and extension, and sometimes a position that mimics the manipulation position.

Test Positions used:
- sustained left / right rotation
- sustained extension
- sustained extension / rotation
- simulated manipulation position

The position is sustained for between one to three minutes. However if during any sustained position symptoms are provoked the position is abandoned and the patient is contraindicated for manipulation.

Problems with vertebral artery tests
- reliability of test procedures has not been demonstrated
- validity of tests to predict VBI has not been demonstrated
- tests may be provocative in themselves
- tests ability to alter vertebral artery flow parameters has not been proven
- lack of specificity – previous manipulation or negative test result in the presence of impaired vertebral artery flow
- lack of sensitivity – positive test result in presence of unimpaired vertebral artery flow.

Implications for Mechanical Diagnosis and Therapy
Clinicians using the MDT are encouraged to screen for serious pathology during the history. Any indication that there are symptoms consistent with Cervical Arterial Dysfunction will alert the clinician to this possible contraindication. During the examination the McKenzie system uses a progression of forces that starts with mid to end range patient forces before progressing to end-range, before therapist overpressures or mobilisations are even considered. Clearly this has an in-built safety mechanism. Very rarely individuals are prone to vertebral artery damage with relatively trivial forces, hence the MDT progression of forces ensures that such a response is likely to be recognised before major damage has occurred. Equally this system of sequential force progressions allows time to establish the safety of one movement or level of force before progression to the next level.
MDT and safeguards with Cervical Arterial Dysfunction

During history;
- All clinicians need awareness of CAD symptoms.
- Specific questioning in the history should ensure that symptoms of CAD are screened for
- During the examination: always use the progression of forces – test safety of movement and degree of force before progressing to end-range, overpressures or mobilisation
- Monitor symptom response at all times
- Never progress forces if CAD symptoms are provoked
- Only progress forces if transient dizziness has improved (no longer provoked) with repeated movements
- Only progress to manipulation if all previous level of forces has decreased, but not abolished symptoms

2. Describe the clinical characteristics of the Derangement Syndrome

THE DERANGEMENT SYNDROME

Derangement Syndrome is a clinical presentation associated with mechanical obstruction of an affected joint. Directional Preference is an essential feature and Centralisation is an important phenomenon observed in the spine.

Features of Derangement
Derangement is the commonest of the three mechanical syndromes. Inconsistency and change is a characteristic of Derangement. Its clinical presentation is variable;

Pattern in the history:
- Location of pain may be local, referred or radicular or a combination
- Symptoms may move from side to side, proximally and distally
- Symptoms may be constant or intermittent
- Therefore they are variable during the day and over time
- Pain may arise gradually or suddenly, often with an insidious onset
- Onset may be accompanied by sudden disability
- Symptomatic and mechanical presentations are influenced by postural loading strategies during activities of daily living
- Movements and postures cause symptoms to increase/decrease, centralise/peripheralise, produce/abolish
- Sustained postures and activities can rapidly and progressively worsen or improve the severity and spread of pain
- May have history of previous episodes

Pattern in the examination:
- Mechanical presentation always includes diminished range or obstruction of movement
- May include temporary deformity, e.g. wry neck
- Deviation of normal movement pathways
- Loading strategies can cause lasting changes
- Repeated movements cause symptoms to produce/abolish, increase/decrease, and pain to centralise/peripheralise
- Repeated movements cause increase/decrease in range of movement
In the Derangement Syndrome forces must be applied that achieve reduction, and in doing so these loading strategies will centralise or make symptoms remain better.

Centralisation in the Cervical Spine

Pain Locations of Derangements – The location of pain in Derangements is categorised under three headings:

- Central or Symmetrical
- Unilateral or Asymmetrical above the elbow
- Unilateral or Asymmetrical below the elbow

Deformities Observed in the Cervical Spine

Kyphotic Deformity
The patient’s cervical spine is positioned in protrusion / flexion and the patient is unable to retract / extend.
Lateral Deformity (Lateral Deviation)
The patient’s cervical spine is positioned in lateral flexion and the patient is unable to laterally flex to the other side.

Lateral deviation of cervical spine (wry neck) – criteria and definitions

Lateral deviation
- head and upper cervical spine is visibly and unmistakably shifted to one side
- onset of deviation occurred with neck pain
- patient is unable to correct deviation voluntarily
- if patient is able to correct deviation they cannot maintain correction
- correction affects intensity of symptoms
- correction causes centralisation or worsening of peripheral symptoms.

Right and left deviation
- A right deviation exists when the vertebra above has laterally flexed to the right in relation to the vertebra below, carrying the head with it.
- A left lateral deviation exists when the vertebra above has laterally flexed to the left in relation to the vertebra below, carrying the head with it.

Contralateral and ipsilateral deviation
- Contralateral deviation exists when the patient’s symptoms are on one side and the head is shifted to the opposite side. For instance right arm pain with the head lateral shifted to the left.
- Ipsilateral deviation exists when the patient’s symptoms are on one side and the deviation is to the same side. For instance right arm pain with the head lateral shifted to the right.
3. **Describe the clinical characteristics of the Dysfunction Syndrome**

**THE DYSFUNCTION SYNDROME**

Pain from the Dysfunction Syndrome is caused by mechanical deformation of structurally impaired soft tissues. This abnormal tissue may be the product of previous trauma, or inflammatory or degenerative processes. These events cause contraction, scarring, adherence, adaptive shortening, or imperfect repair. Pain is felt when the abnormal tissue is loaded. Articular or contractile structures can be affected – the former is most common in the spine (described below). When affecting articular structures it is characterised by a painful restriction of *end range movement*.

Pattern in the history:
- History of trauma, Derangement, or years of poor posture or degenerative changes
- Present for at least 8-12 weeks
- Pain is Always local except in the case of an Adherent Nerve Root (ANR)
- Pain is ALWAYS Intermittent and produced only when loading structurally impaired tissue
- Symptoms cease when loading is ended, and the pain never lasts

Pattern in the examination:
- Consistent direction and amount of movement produces pain
- Restricted movement(s) in one or more planes
- Appropriate repeated movement will produce symptoms, which do not remain worse

4. **Describe the clinical characteristics of the Postural Syndrome**

**THE POSTURAL SYNDROME**

Pain from the Postural Syndrome is caused by mechanical deformation of soft tissues or vascular insufficiency arising from prolonged positional or postural stresses affecting the articular structures or the contractile muscles, their tendons or the periosteal insertions. *No* pathological changes occur in this syndrome. Patient's with Postural Syndrome rarely present for treatment in the clinic, but the prevalence is high in certain populations groups – students

Pattern in the history:
- Usually young
- Sedentary lifestyle
- Time is an essential causative factor
- Symptoms always local and intermittent
- But may have simultaneous cervical, thoracic, and lumbar pain
- Brought on only by prolonged static loading of normal tissues
- No pain with movement or activity
- Most common provocative posture is slumped sitting
Pattern in the examination:

- Poor posture – forward head posture, increased thoracic kyphosis,
- reduced lumbar lordosis.
- Posture correction abolishes
- No loss of movement
- Repeated movements have no effect
- Pain produced / abolished on static tests

5. **Describe the clinical characteristics of Spinal OTHER**
### McKenzie Classification – Spinal OTHER

<table>
<thead>
<tr>
<th>Serious pathology (list is not exhaustive)</th>
<th>Clinical findings (Red Flags)</th>
<th>Clinical Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cancer</strong></td>
<td>Age &gt;55, history of cancer, unexplained weight loss, progressive, not relieved by rest</td>
<td>May be primary site or metastases</td>
</tr>
<tr>
<td><strong>Cauda equina syndrome / cord compression</strong></td>
<td>Bladder / bowel dysfunction, saddle anaesthesia, global or motor weakness in legs. Clumsiness in legs</td>
<td></td>
</tr>
<tr>
<td><strong>Spinal fracture</strong></td>
<td>History of severe trauma, older age, prolonged steroid use OR young, active with sport related back pain</td>
<td>Compression fracture, stress fracture of the pars</td>
</tr>
<tr>
<td><strong>Spinal related infection</strong></td>
<td>Fever, malaise, constant pain, all movements worsen</td>
<td>Epidural abscess, discitis, transverse myelitis</td>
</tr>
<tr>
<td><strong>Vascular</strong></td>
<td>Vascular disease, smoking history, family history, age over 65, male&gt;female History of trauma, dizziness, diplopia, dysarthria and multiple other non-mechanical symptoms</td>
<td>Abdominal aortic aneurism, cervical artery dysfunction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Definition</th>
<th>Criteria (common)</th>
<th>Clinical examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chronic Pain Syndrome</strong></td>
<td>Pain-generating mechanism influenced by psychosocial factors or neurophysiological changes</td>
<td>Persistent widespread pain, aggravation with all activity, disproportionate pain response to mechanical stimuli, inappropriate beliefs and attitudes about pain.</td>
<td>RA, sero-negative arthritis, ankylosing Spondylitis</td>
</tr>
<tr>
<td><strong>Inflammatory</strong></td>
<td>Inflammatory arthropathy</td>
<td>Constant pain, morning stiffness, excessive movements exacerbate symptoms</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanically Inconclusive</strong></td>
<td>Unknown musculoskeletal pathology</td>
<td>Derangement, Dysfunction, Postural and subgroups of OTHER excluded. Symptoms affected by positions or movements BUT no recognisable pattern identified OR inconsistent symptomatic and mechanical responses on loading</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanically Unresponsive Radiculopathy</strong></td>
<td>Radicular presentation consistent with a currently unresponsive nerve root compromise</td>
<td>Symptoms presenting in a radicular pattern in the upper or lower extremity. Accompanied by varying degrees of neurological signs and symptoms. There is no centralisation and symptoms do not remain better as a result of any repeated movements, positions or loading strategies</td>
<td></td>
</tr>
<tr>
<td><strong>Post-Surgery</strong></td>
<td>Presentation relates to recent surgery</td>
<td>Recent surgery and still in post-operative protocol period</td>
<td></td>
</tr>
<tr>
<td><strong>Sacro-iliac (SIJ)/Pregnancy-Related Pelvic Girdle Pain (PGP)</strong></td>
<td>Pain-generating mechanism emanating from the SIJ or symphysis pubis</td>
<td>Three or more positive SIJ pain provocation tests having excluded the lumbar spine and hip</td>
<td>If related to pregnancy: PGP</td>
</tr>
<tr>
<td><strong>Spinal Stenosis</strong></td>
<td>Symptomatic degenerative restriction of spinal canal or foramina</td>
<td>Lumbar Spine: older population, history of leg symptoms relieved with flexion activities and exacerbated with extension, longstanding loss of extension. Cervical Spine: arm symptoms consistently produced with closing foramen, abolished or decreased with opening</td>
<td>Lumbar stenosis, cervical lateral foraminal stenosis</td>
</tr>
<tr>
<td><strong>Structurally Compromised</strong></td>
<td>Soft tissue and/or bony changes compromising joint integrity</td>
<td>Mechanical symptoms (ROM restricted, clunking, locking, catching). May have sensation of instability Long history of symptoms or history of trauma. Irreversible with conservative care.</td>
<td>Painful structural scoliosis, painful osteoporosis, grade 3-4 spondylolisthesis, upper cervical structural instability – RA</td>
</tr>
<tr>
<td><strong>Trauma/Recovering Trauma</strong></td>
<td>Recent trauma associated with onset of symptoms</td>
<td>Recent trauma associated with onset of constant symptoms / recent trauma associated with onset of symptoms, now improving and pain intermittent</td>
<td>Post whiplash</td>
</tr>
</tbody>
</table>

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6. Differentiate between the Derangement, Dysfunction, Postural and OTHER

CLASSIFICATION ALGORITHM

History and Physical Examination

Exclude Serious Pathology

Provisional MDT classification

- Loading strategies centralise or make symptoms better
- Pain only produced at limited end range
- Pain only on static loading, no effect of repeated movements
- Not consistent with the 3 McKenzie Syndromes

Derangement | Dysfunction | Postural | OTHER

Classification confirmed within 3-5 visits
(reduction or remodelling process may continue for longer)
REFERENCES FOR MODULE TWO


NOTES FOR MODULE TWO
MODULE THREE

ANATOMICAL CONSIDERATIONS RELATED TO MECHANICAL DIAGNOSIS AND THERAPY (MDT)

Objectives

By participating fully in this module, a participant will be able to:

1. Describe the relevant structure and function of the cervical spine
2. Describe the key biomechanical features of the cervical spine.
3. Describe the features of aging and degeneration in the cervical spine and how they may relate to clinical presentations
MODULE THREE
ANATOMICAL CONSIDERATIONS RELATED TO MECHANICAL DIAGNOSIS AND THERAPY (MDT)

1. Describe the relevant structure and function of the cervical spine.

Cervical anatomy
Cervical motion segment is not just a smaller version of the lumbar motion segment. Anatomical differences include:

- absence of intervertebral discs at occiput-C1 and C1-C2
- atypical vertebral bodies atlas and axis
- uncinate processes forming uncovertebral joints (joints of Luschka)
- foramen transversarium in transverse process of C1-C6 through which vertebral arteries pass

Functionally the cervical spine is divided into two distinct regions.
1) Upper Cervical Occiput - C2
2) Mid and Lower Cervical C2 - T1

Functional anatomy
Intervertebral disc:
Adult cervical disc differs from lumbar, comprises of four distinct structures
- a crescent-shaped anterior annulus fibrosis, thick anteriorly, tapered laterally
- central fibro-cartilaginous core of nucleus
- periosteofascial tissue overlying the uncovertebral area
- a thin posterior annulus fibrosis

Uncinate processes:
- Uncinate process makes the cervical interbody joint a saddle-shaped joint – upwards concavity in frontal plane; upwards convexity in sagittal plane
- saddle-shaped joints have 2 axes of motion perpendicular to each other
- 2 movements are permitted: flexion / extension in the sagittal plane; rotation in the plane of the zygapophyseal joints cradled by the uncinate processes
- this explains coupling of rotation / lateral flexion
- uncovertebral joints (develop from uncinate processes) are best developed at C2-C4 and least developed or absent at C5-C7
- joints facilitate sagittal translation and rotation
- uncovertebral joints present in bipedal animals that have to look about in an upright position; absent in quadrupeds who do this by bending necks laterally.

Zygapophyseal joints:
- complete the motion segment articulations, guide and steady movement.
- the orientation of the zygapophyseal joints allows for a range of
- antero-posterior translatory movement that is much greater than elsewhere in the spine.
2. **Describe the key biomechanical features of the cervical spine.**

**Range of movement**

Key features:
- most rotation occurs at C1-C2
- less rotation at other segments
- flexion / extension available at all segments
- flexion / extension = combination of translation and sagittal rotation
- flexion / extension are initiated in lower cervical spine (C4-C7)
- passive range is greater than active
- range decreases with age
- paradoxical motion may occur at some sections – as whole spine moves into flexion some segments extend
- range differs depending on whether performed from flexion to extension or extension to flexion
- range varies over time in the same individual
- during retraction / protrusion upper and lower cervical spine move in opposite directions
- retraction = maximal upper cervical flexion and some lower cervical extension
- protrusion = maximal upper cervical extension and some lower cervical flexion
- average head translation = 45mm (spread 2-75mm)
- rotation / lateral flexion are obligatorily coupled – rotation always accompanies lateral flexion; lateral flexion always accompanies rotation.

**Effect of movement:**

Flexion has the following effects:
- displacement of intradiscal matter posteriorly
- enlargement of intervertebral foramen
- enlargement of spinal canal
- tensioning effect on nerve roots, dura, and spinal cord
- superior facets move upwards and forwards - relative opening of facet joints.

Extension has the following effects:
- displacement of intradiscal matter anteriorly
- narrowing of intervertebral foramen
- narrowing of spinal canal
- slackening effect on nerve roots, dura, and spinal cord
- superior facets move downwards and backwards - relative closing of facet joints

Rotation / lateral flexion:
- displacement of intradiscal matter contralaterally
- narrowing of intervertebral foramen ipsilaterally
- lateral flexion tensioning effect on contralateral nerve roots and dura
- contralateral facets opened, ipsilateral facets closed

Arm movements:
- combination of shoulder depression and abduction, elbow extension, supination, and wrist and finger extension has a tensioning effect on the brachial plexus / upper limb nerve roots.
3. **Describe the features of aging and degeneration in the cervical spine and how they may relate to clinical presentations**

**Ageing and degeneration:**

Certain changes occur within the cervical motion segment and are deemed to be 'normal' – some of these changes occur relatively early in life. Changes include:

- formation of uncovertebral clefts in intervertebral discs of children from uncinate processes – clefts spread medially
- producing horizontal fissuring of posterior annulus fibrosus by early adulthood
- existence of enclosed nucleus pulposus contained by intact annulus fibrosus until early adulthood only
- ageing changes differ at upper / lower cervical spine
- uncovertebral joints are best developed at C2-C4 and least developed or absent at C5-C7
- at upper levels fissuring dissects disc from lateral to medial
- at lower levels fissuring starts from the centre and radiates in all directions
- disc thinning is a common radiographic finding
- lead to osteophyte formation at zygapophyseal and uncovertebral joints
- posterior bulging of the disc into epidural space
- arthrosis of zygapophyseal and uncovertebral joints occurs most severely and frequently at upper and middle levels
- spondylosis of intervertebral disc occurs most severely and frequently at lower cervical levels (especially C5-C7)

‘Degenerative’ changes may result in the following clinical presentations:

- osteophytes from zygapophyseal and uncovertebral joints can encroach on intervertebral foramen – nerve root
- osteophytes from uncovertebral joints can encroach on foramen transversarium – vertebral artery
- posterior bars formed by bulging discs, osteophytes, and buckling ligamentum flavum can reduce area of spinal canal – spinal cord
- radicular and myelopathy symptoms can be caused by ‘hard’ stenotic changes or by ‘soft’ disc protrusions.
REFERENCES FOR MODULE THREE


NOTES FOR MODULE THREE

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MODULE FOUR

HISTORY AND PHYSICAL EXAMINATION

Objectives

By participating fully in this module, a participant will be able to:

1. Describe the components of the history section of the McKenzie cervical assessment form and discuss the clinical relevance of each section.

2. Describe the components of the physical examination section of the McKenzie cervical assessment form and discuss the clinical relevance of each section.

3. Define and demonstrate the appropriate use of terms involved in completing the McKenzie cervical assessment form.

4. Accurately complete the McKenzie cervical assessment form.
1. Describe the components of the history section of the McKenzie cervical assessment form and discuss the clinical relevance of each section.

**Patient:**
- Age
- Occupation / leisure activities
- Functional disability from present episode
- Functional disability score
- VAS score

**Symptoms:**
- Symptoms this episode – Body chart
- Duration
- Status - improving / unchanging / worsening
- Onset
- Symptoms at onset
- Constant or intermittent
- What makes the pain worse / better? Looking for directional preference.
- Means of recording:
  - Circle used to signify “always”
  - Underline used to signify “sometimes”
  - Oblique line used to signify “no effect”
  - Diurnal pattern

**Previous Episodes:**
- Location of symptoms
- Frequency
- History
- Treatment.

**Specific questions: Red Flags**
- Dizziness / tinnitus / nausea
- Gait / Upper limb abnormality - tingling / numbness / weakness
- Medications
- General Health
- Imaging
- Recent / Major surgery
- Accidents
- Night pain
- Unexplained weight loss
- Other
2. Describe the components of the physical examination section of the McKenzie cervical assessment form and discuss the clinical relevance of each section.

- **Postural Observation**
  - Sitting posture, its effects on pain and the effect of correction
  - Observation of posture sitting and standing

- **Deformity** - presence and relevance
  - Protrusion
  - Lateral

- **Neurological examination**

  Criteria for conducting a neurological examination
  - paraesthesia in the upper limb
  - weakness in the upper limb
  - arm or forearm symptoms, especially in a radicular pattern.

  Neurological examination may involve four components:
  - sensation
  - muscle power
  - reflexes
  - nerve tension tests.

<table>
<thead>
<tr>
<th>Root level</th>
<th>Typical area of Sensory loss</th>
<th>Common motor Weakness</th>
<th>Reflex</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>Top of shoulder</td>
<td>Shoulder elevation</td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>Lateral arm</td>
<td>Shoulder abduction</td>
<td>Biceps</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
<td>Elbow flexion</td>
<td>Biceps</td>
</tr>
<tr>
<td>C7</td>
<td>Middle finger(s)</td>
<td>Elbow extension</td>
<td>Triceps</td>
</tr>
<tr>
<td>C8</td>
<td>Little finger</td>
<td>Thumb extension</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Medial border Forearm</td>
<td>Finger abduction / Adduction</td>
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</tr>
</tbody>
</table>

- **Movement Loss**

<table>
<thead>
<tr>
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<th>Maj</th>
<th>Mod</th>
<th>Min</th>
<th>Nil</th>
<th>Pain</th>
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</thead>
<tbody>
<tr>
<td>Protrusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

  - Range of movement
  - Pain or stiffness that stops the movement
  - Movement pathway – deviation
  - Confidence and willingness to move
  - Curve reversal

- **Repeated Movements**
Selecting repeated movements
   - Frequently the movements that have the greatest effect on symptoms are cervical retraction, extension and flexion. For this reason the repeated movement testing usually commences in the sagittal plane.
   - In the case of a wry neck, lateral movements are always explored first.
   - Or Lateral movements are introduced if sagittal plane movements worsen or peripheralize symptoms.
   - Performing the movements in sitting is functionally easier, and much easier for the patient to perform in their home or workplace. Performing the exercises in sitting also allows the patient to attain end range.
   - If further testing is required, the movements should be performed unloaded. Patients with severe and acute Derangements, especially those with a kyphotic deformity, will need to be tested unloaded.
   - Force progressions can be added in both positions as required.

Once a repeated movement decreases, abolishes or centralises pain, and thus it is apparent that the directional preference has been determined further testing is unnecessary.

Monitor symptoms and Mechanical response
   - Establish symptoms present prior to testing
   - Ask about pain response during the movement
     Is it - During the movement (Pain During Movement) PDM
     Or - At end range (End Range Pain) ERP
   - Establish symptoms after testing
   - Observe and record the mechanical response – increased, decreased, no effect
### History and Physical Examination

#### Static Tests

- A clue for the need to apply static tests is when the patient reports in their history that sustained postures, rather than single movements provoke symptoms.
- If repeated movements fail to provoke the symptoms static tests should be performed. This is especially likely in patients with Postural syndrome or patients with intermittent pain from a Derangement.
- Pre-existing symptoms, especially the most distal, should be noted, and then monitored whilst the static posture is maintained.
- Positions can be maintained for up to five minutes, when the patient returns to the neutral position, and again reports symptom intensity and location.

#### STATIC TESTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protrusion</td>
<td>Flexion</td>
</tr>
<tr>
<td>Retraction</td>
<td>Extension: sitting / prone / supine</td>
</tr>
</tbody>
</table>

#### TEST MOVEMENTS

Describe effect on present pain —

**During:** produces, abolishes, increases, decreases, no effect, centralising, peripheralising.

**After:** better, worse, no better, no worse, no effect, centralised, peripheralised.

<table>
<thead>
<tr>
<th>Pretest symptoms sitting:</th>
<th>Symptoms During Testing</th>
<th>Symptoms After Testing</th>
<th>Mechanical Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep PRO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET EXT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET EXT</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pretest symptoms lying:</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>RET</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET EXT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET EXT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If required pretest pain sitting:</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LF - R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep LF - R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF - L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep LF - L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROT - R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROT - L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLEX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep FLEX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part B: The Cervical and Thoracic Spine

Module Four

History and Physical Examination

- Other
  - Sometimes if testing of the cervical spine has been inconclusive and it is suspected that the pain originates from another site, such as the shoulder or thoracic spine, these sites may require a more detailed examination. If applicable Vertebral artery tests should be performed.

Provisional Classification:

Having gained the information provided by the patient about the history of their problem, and conducted an appropriate and thorough physical examination, including the relevant repeated movements; certain conclusions can now be drawn.

- Serious spinal pathology has been identified and the patient should be referred for further medical evaluation.
- The patient has mechanical neck pain with or without nerve root symptoms.
- A provisional classification of Derangement, Dysfunction, or Postural Syndrome has been established.
- If the result of the mechanical testing is inconclusive, further mechanical testing should be continued over a few days to confirm a mechanical classification or OTHER.
- Once a provisional classification has been determined then the appropriate principles of management should be provided.

PROVISIONAL CLASSIFICATION

<table>
<thead>
<tr>
<th>Derangement</th>
<th>Dysfunction</th>
<th>Postural</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central or Symmetrical</td>
<td>Unilateral or Asymmetrical above elbow</td>
<td>Unilateral or Asymmetrical below elbow</td>
<td></td>
</tr>
</tbody>
</table>

3. Define and demonstrate the appropriate use of terms involved in completing the McKenzie assessment terms.

Module Four Quiz activity

4. Accurately complete the McKenzie assessment forms

Using the information from case study in the Appendix complete a McKenzie cervical assessment form
THE McKENZIE INSTITUTE
CERVICAL SPINE ASSESSMENT

Date ____________________________

Name ____________________________ Sex M / F

Address ____________________________

Telephone ____________________________

Date of Birth ____________________________ Age ____________________________

Referral: GP / Orth / Self / Other ____________________________

Work: Mechanical stresses ____________________________

Leisure: Mechanical stresses ____________________________

Functional Disability from present episode ____________________________

Functional Disability score ____________________________

VAS Score (0-10) ____________________________

HISTORY

Present Symptoms ____________________________

Present since ____________________________ improving / unchanging / worsening ____________________________ or no apparent reason ____________________________

Commenced as a result of ____________________________

Symptoms at onset: neck / arm / forearm / headache ____________________________

Constant symptoms: neck / arm / forearm / headache ____________________________

Intermittent symptoms: neck / arm / forearm / headache ____________________________

Worse bending sitting turning lying / rising ____________________________

am / as the day progresses / pm when still / on the move ____________________________

other ____________________________

Better bending sitting turning lying ____________________________

am / as the day progresses / pm when still / on the move ____________________________

other ____________________________

Disturbed Sleep Yes / No ____________________________

Pillows ____________________________

Sleeping postures prone / sup / side R / L ____________________________

Surface firm / soft / sag ____________________________

Previous Episodes 0 1-5 6-10 11+ Year of first episode ____________________________

Previous History ____________________________

Previous Treatments ____________________________

SPECIFIC QUESTIONS

Dizziness / tinnitus / nausea / swallowing / +ve / -ve ____________________________

Gait / Upper Limbs: normal / abnormal ____________________________

Medications: Nil / NSAIDS / Analg / Steroids / Anticoag / Other ____________________________

General health: Good / Fair / Poor ____________________________

Imaging: Yes / No ____________________________

Recent or major surgery: Yes / No ____________________________

Night pain: Yes / No ____________________________

Accidents: Yes / No ____________________________

Unexplained weight loss: Yes / No ____________________________

Other ____________________________

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**EXAMINATION**

**POSTURAL OBSERVATION**
- Sitting: Good / Fair / Poor
- Standing: Good / Fair / Poor
- Protruded Head: Yes / No
- Why neck: Right / Left / Nil
- Correction of Posture: Better / Worse / No effect
- Relevant: Yes / No

**NEUROLOGICAL**
- Motor Deficit
- Sensory Deficit
- Reflexes
- Dural Signs

**MOVEMENT LOSS**
- Protrusion: Maj / Mod / Min / Nil / Pain
- Flexion: Lateral flexion R / L
- Retraction: Rotation R / L
- Extension: Rotation R / L

**TEST MOVEMENTS**
Describe effect on present pain – During: produces, abolishes, increases, decreases, no effect, centralising, peripheralising. After: better, worse, no better, no worse, no effect, centralised, peripheralised.

<table>
<thead>
<tr>
<th>Symptoms During Testing</th>
<th>Symptoms After Testing</th>
<th>Mechanical Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRETEST SYMPTOMS SITTING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep PRO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRETEST SYMPTOMS LYING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET</td>
<td></td>
<td></td>
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<tr>
<td>RET EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep RET EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF REQUIRED PRETEST PAIN SITTING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF - R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep LF - R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF - L</td>
<td></td>
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</tr>
<tr>
<td>Rep LF - L</td>
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</tr>
<tr>
<td>ROT - R</td>
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<td></td>
</tr>
<tr>
<td>Rep ROT - R</td>
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<td></td>
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<tr>
<td>ROT - L</td>
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<tr>
<td>Rep ROT - L</td>
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<td></td>
</tr>
<tr>
<td>FLEX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep FLEX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STATIC TESTS**
- Protrusion: Flexion
- Retraction: Extension: sitting / prone / supine

**OTHER TESTS**

**PROVISIONAL CLASSIFICATION**

<table>
<thead>
<tr>
<th>Derangement</th>
<th>Dysfunction</th>
<th>Postural</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central or Symmetrical</td>
<td>Unilateral or Asymmetrical above elbow</td>
<td>Unilateral or Asymmetrical below elbow</td>
<td></td>
</tr>
</tbody>
</table>

**PRINCIPLE OF MANAGEMENT**

- Education
- Extension Principle: Lateral Principle
- Flexion Principle: Other
- Barriers to Recovery
- Treatment goals

---

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**THE McKENZIE INSTITUTE**
**THORACIC SPINE ASSESSMENT**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Sex</th>
<th>M / F</th>
<th>Address</th>
<th>Telephone</th>
<th>Date of Birth</th>
<th>Age</th>
<th>Referral: GP / Orth / Self / Other</th>
<th>Work: Mechanical stresses</th>
<th>Leisure: Mechanical stresses</th>
<th>Functional disability from present episode</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

**FUNCTIONAL DISABILITY SCORE**

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<th>VAS Score (0-10)</th>
<th>HISTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present symptoms: improving / unchanging / worsening</td>
</tr>
<tr>
<td></td>
<td>Present since: or no apparent reason</td>
</tr>
<tr>
<td></td>
<td>Commenced as a result of:</td>
</tr>
<tr>
<td></td>
<td>Symptoms at onset:</td>
</tr>
<tr>
<td></td>
<td>Constant symptoms: Intermittent symptoms</td>
</tr>
<tr>
<td></td>
<td>Worse: bending / sitting / rising / turning neck / trunk / standing / lying</td>
</tr>
<tr>
<td></td>
<td>as the day progresses / pm / when still / on the move</td>
</tr>
<tr>
<td></td>
<td>Better: bending / sitting / rising / turning neck / trunk / standing / lying</td>
</tr>
<tr>
<td></td>
<td>as the day progresses / pm / when still / on the move</td>
</tr>
<tr>
<td></td>
<td>other</td>
</tr>
<tr>
<td></td>
<td>Disturbed sleep: yes / no</td>
</tr>
<tr>
<td></td>
<td>Pillows</td>
</tr>
<tr>
<td></td>
<td>Sleeping postures: prone / sup / side R / L</td>
</tr>
<tr>
<td></td>
<td>Surface: firm / soft / sag</td>
</tr>
<tr>
<td></td>
<td>Previous episodes: Year of first episode</td>
</tr>
<tr>
<td></td>
<td>Previous history:</td>
</tr>
<tr>
<td></td>
<td>Previous treatments:</td>
</tr>
</tbody>
</table>

**SPECIFIC QUESTIONS**

<table>
<thead>
<tr>
<th>Cough / sneeze / deep breath / +ve / -ve</th>
<th>Gait: normal / abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medications: Nil / NSAIDS / Analg / Steroids / Anticoag / Other</td>
<td></td>
</tr>
<tr>
<td>General health: good / fair / poor</td>
<td></td>
</tr>
<tr>
<td>Imaging: yes / no</td>
<td></td>
</tr>
<tr>
<td>Recent or major surgery: yes / no</td>
<td></td>
</tr>
<tr>
<td>Night pain: yes / no</td>
<td></td>
</tr>
<tr>
<td>Accidents: yes / no</td>
<td></td>
</tr>
<tr>
<td>Unexplained weight loss: yes / no</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

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### EXAMINATION

**POSTURAL OBSERVATION**
- Sitting: good / fair / poor
- Standing: good / fair / poor
- Protruded head: yes / no
- Kyphosis: red / acc / normal
- Correction of posture: better / worse / no effect
- Other observations:

**NEUROLOGICAL** (upper and lower limb)
- Motor deficit
- Reflexes
- Sensory deficit
- Dural signs

**MOVEMENT LOSS**
- Flexion
- Extension
- Rotation R
- Rotation L
- Other

### CERVICAL SPINE REPEATED MOVEMENT TESTING

<table>
<thead>
<tr>
<th></th>
<th>Maj</th>
<th>Mod</th>
<th>Min</th>
<th>Nil</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep Pro</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep Ret</td>
<td></td>
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</tr>
<tr>
<td>Rep Ret Ext</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rep LF - R</td>
<td></td>
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</tr>
<tr>
<td>Rep LF - L</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep Flex</td>
<td></td>
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</tbody>
</table>

**TEST MOVEMENTS**
- Describe effect on present pain – During: produces, abolishes, increases, decreases, no effect, centralising, peripheralising. After: better, worse, no better, no worse, no effect, centralised, peripheralised.

<table>
<thead>
<tr>
<th>Symptoms during testing</th>
<th>Symptoms after testing</th>
<th>Mechanical response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest symptoms sitting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLEX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep FLEX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep EXT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest symptoms lying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIL (prone)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep EIL (prone)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIL (supine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep EIL (supine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest symptoms sitting</td>
<td></td>
<td></td>
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<tr>
<td>ROT - R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROT - L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rep ROT - L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STATIC TESTS**
- Flexion
- Extension / prone / supine
- Rotation R
- Rotation L

**OTHER TESTS**

**PROVISIONAL CLASSIFICATION**
- Derangement
- Dysfunction
- Postural
- Central or Symmetrical
- Unilateral or Asymmetrical
- OTHER

**PRINCIPLE OF MANAGEMENT**
- Education
- Extension principle
- Flexion principle
- Barriers to recovery
- Treatment goals

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