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LUMBAR FACET SYNDROME (INCIDENCE, SYMPTOMOLOGY AND MANAGEMENT)

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INTRODUCTION

LBP (Low back pain) remains a common musculoskeletal complaint. Various structures have been incriminated as possible sources of chronic LBP, including posterior longitudinal ligament , dorsal root ganglia, dura , annular fibres, muscles of the lumbar spine and the facet joints.

In 1927, Putti attributed low back pain and sciatica to facet joint lesions of the inferior lumbar segments (essentially arthritic lesions) as well as to the assymmetry of the orientation of their articular process (2). Ghormley used the term facet syndrome to describe the compression of the sciatic nerve (lumbosacral nerve root) in the intervertebral foramen narrowed by facet joint arthrosis.

Maigne (1971) brought attention to the role of the facet joints in spinal pathology.(2). Facet joint pain can be due to inflammation, but most often it is the consequence of segmental dysfunction without any radiologic abnormality which the author calls “painful minor intervertebral dysfunction”.

FUNCTIONAL ANATOMY :

The facet joints are diarthrodial joints with a synovial lining, the surfaces of which are covered with hyaline cartilage, which is susceptible to arthritic changes and arthropathies. Repetitive stress and osteoarthritic changes to the facet joint can lead to facet hypertrophy. Like any synovial joint, degeneration, inflammation and injury can lead to pain with joint motion, causing restriction of motion secondary to pain, and thus deconditioning.

In addition, facet arthrosis, particularly trophic changes of the superior facet, can progress to narrowing of the neural foramen.(1). The neural foramen is bordered by the superior facet, pars interarticularis, and posterior portion of the vertebral body. Facet hypertrophy can contribute to lateral and central lumbar stenosis, which can lead to impingement on the exiting nerve root. Thus, facet pain can occasionally produce a pain referral pattern indistinguishable from disk herniation.

The facet joint has a richly innervated capsule with several types of nerve endings. Generally, each facet has dual innervation, one from the dorsal rami at the same level and one from the level above which may explain the diffuse pattern of pain associated with facet joint syndrome.(eg:L4-L5 lumbar facet joint is innervated by the medial branches of the dorsal rami from L3&L4).However note that the medial branch of the posterior rami also innervates other posterior structures ,such as the multifidus and interspinous muscles and interspinous ligament. (1).

The facet joints contain nociceptive nerve fibres, which can be activated by local pressure and capsular stretch, from nerves of the sympathetic and parasympathetic ganglia. Nociceptive type IV receptors have been identified in the fibrous capsule and represent a plexus of unmyelinated nerve fibres and type I and type II corpuscular mechanoreceptors.

RELEVANT ANATOMY :

The facet or zygapophyseal joints, are formed by the articulation of the superior articular processes of one vertebra with the inferior articular processes of the vertebra above.

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The lumbar facets are curved (or) biplanar in transverse section. They are flat in saggital section and approximately parallel to the posterior surface of the vertebral body. A lumbar inferior articular process projects downwards from the lower lateral part of the lamina on each side. Each inferior articular process presents a convex facet, directed forwards and medially to engage closely with the slightly larger concave facet on the superior articular process (SAP) of the vertebra below. The concave SAP projects backwards and upwards from the junction of the pedicle and lamina at the root of the transverse process on each side.

The facets from L1 to L5 progressively change their orientation at L1 to a more nearly coronal orientation at S1. (3)

The facet joint is considered a motion-restricting joint, able to resist stress and withstand both axial and shearing forces. In back extension, the facets, along with the intervertebral disks, absorp a compressive load. In addition, the transmission of the facet load occurs through contact of the tip of the inferior facet with the pars of the vertebra below. The overloaded facet joint then causes posterior rotation of the inferior facet, resulting in stretching of the joint capsule.

If one considers the disk and facet joints as an interdependent functional spinal unit, degenerative changes within this 3-joint complex can influence each of the segments. Thus, degeneration of the disks can lead to loss of disk height, resulting in a relative increase in facet load in compression and extension maneuvers.(1)

Nociceptive substance P immuno reactive nerve fibers and autonomic nerves have been identified in the lombar facet joint capsule and synovial folds in recent studies. The presence of nociceptive nerve fibres in the various tissue structures of the facet joints and the presence of autonomic fibres suggest that these structures may cause pain under increased or abnormal loads. Substance P is a well known inflammatory mediator that may sensitize nociceptors to them and other mediators, resulting in chronic pain.

MECHANICS:

The facet joint orientation in the lumbar spine is in the saggital plane hence side bending and rotation always occurs in the opposite directions. Hence, if one rotates to the left the lumbar spine also rotates to the left but side bends to the right. This minimizes the stress and shearing effect on the intervertebral disc and the facet / ligamentous structures,. However, in situations of a dysfunction , side bending and rotation can occur to the same side and this significantly increases the stress on the corresponding soft tissue structures. The vulnerability increases further if this occurs in flexion. Consider an individual bending forward to pick up an object and rotating to one side in a flexed position to place it to the side. If this is also accompanied by side bending of the lumbar segments to the same side, then the stress on the disc increases significantly. This is also the most common mechanism for back strains. In the presence of ERS and FRS dysfunctions in the lumbar spine, this type of faulty mechanics tends to occur at an arthrokinematic level and needs to be corrected to minimize stress on the supporting structures.

INCIDENCE OF LUMBAR FACET SYNDROME:

In the US: Prevalence of facet joint pain in the general population or in acute back pain has not been investigated. Reported prevalence of facet joint pain for patients with chronic LBP ranges from 8-75%(1). Reported incidence seems to be a function of the size of the sample studied and the conviction of the authors.

RACE: No studies specifically address co-relation between prevalence of facet-mediated chronic LBP and race.

SEX: No studies specifically address male-to-female differences in prevalence of facet-mediated chronic LBP.

AGE: Higher prevalence among the older population would be expected if the etiology of facet joint-mediated back pain were from degenerative changes of the joint, similar to damage in other osteoarthritic joints.

CAUSES OF LUMBAR FACET SYNDROME:

The cause of most lumbar facet pain is unknown. On occasion, the lumbar facet joints are affected by systematic inflammatory

arthritides, such as rheumatoid arthritis and ankylosing spondylitis.

- Microtrauma of the facet joints can produce pain. Small fractures, capsular tears, splits in the articular cartilage, and hemorrhage have been documented on post mortem studies of trauma victims who had normal X-rays. Whether these abnormalities were painful was not recorded.
- Osteoarthritis is another cause of lumbar facet joint pain, however not all facet arthritis, is painful, as radiographic changes of osteoarthritis are equally common in patients with and without LBP. Some studies report that severely degenerated joints are more likely to be symptomatic.
- Dorry attributed LBP from facet syndrome to distension and inflammation of the synovial capsule, with resultant stimulation of the nociceptive nerve endings(1). Expanded synovial recesses also may compress nerve roots in the spinal canal and neural foramina, which may explain the presence of radicular pain in patients with facet syndrome. Lipitt attributed pain in the facet syndrome to a combination of synovitis, segmental instability, and degenerative arthritis.
- Other theories include meniscoid entrapment, synovial impingement, joint subluxation, chondromalacia facette, capsular and synovial inflammation, mechanical injury to the joints capsule, and restriction to normal articular motion from soft (or) articular causes.

OTHER PROBLEMS TO BE CONSIDERED:

- Sacroiliac joint syndrome
- Internal disc disruption syndrome
- Lumbar spondylosis

CONGENITAL CAUSES:

- Spinal bifida
- Lumbar scoliosis
- Spondylosis
- Spondylolisthesis
- Transitional vertebra
- Facet tropism

TRAUMATIC CAUSES

- Sprain, Strain
- Vertebral fractures
- Prolapsed disc

INFLAMMATORY CAUSES

- Tuberculosis
- Ankylosing spondylytis
- Seronegative spond-arthritis

METABOLIC CAUSES

- Osteoporosis
- Osteomalacia

MISCELLANEOUS CAUSES

- Functional back pain
- Postural back pain
  - Protuberant abdomen
  - Occupational bad posture
  - Habitual bad posture

CLINICAL FEATURES AND SYMPTOMS:

- Facet joint pathology should be considered if the patient described non specific LBP with a deep and achy quality, usually localized to a unilateral or bilateral paravertebral area.
- This pain may radiate to the buttock and posterior thigh, but is not usually reported below the knee.
- The pain is often exacerbated by twisting the back, by stretching, by lateral bending, and in the presence of a torsional load.
- Some patients describe their pain as worse in the morning, aggravated by rest and hyperextension, and relieved by repeated motion.
- Often, this syndrome may occur after an acute injury (eg. Extension and rotation of the spine), or, it may be chronic in nature.

ASSESSMENT AND DIAGNOSIS OF LUMBAR FACET SYNDROME.

Medical Assesment :

1. The basic history should includes temporal account of the symptoms, a complete description of the associated activities that cause or alleviate the pain.

- The patient should describe the location of pain; state whether it is isolated or radiating; and relate its intensity , character ,and frequency.
- Red flags (ie ,symptoms or signs that stand out as highly suggestive) to be seriously scrutinized include the presence of unexplained weight loss ,fever, and chills.
- The clinician should also obtain a history of prior treatments (e g, injections, medications, therapy) and their success.

2. Physical Examination :

3. Inspection:

- Inspection should include an evaluation of paraspinal muscle fullness or asymmetry, increase or decrease in lumbar lordosis, muscle atrophy, or posture asymmetry.
- In chronic face syndrome, one may see a flattening of lumbar lordosis and rotation or lateral bending at the sacroiliac joint or thoracolumbar area.

4. Palpation

- The examiner should palpate along the paravertebral regions and directly over the transverse processes because the facets are not truly palpable. This is performed in an attempt to localize and reproduce any point tenderness, which is usually present with facet-mediated pain.
- In some cases, facet-mediated pain may radiate to the gluteal or posterior thigh regions.

5. Range of motion

6. **Flexibility Sensory examination:**

7. **Muscle stretch reflexes**

8. Muscle strength

9. **Straight leg raise test:** If facet hypertrophy narrows the neural foramen, causing nerve root impingement, this maneuver may elicit a positive response of facet -mediated LBP. However, usually this maneuver is normal.

Differential Diagnosis :

Lumbosacral Disc injuries
Lumbosacral Discogenic Pain Syndrome
Lumbosacral Facet Syndrome
Lumbosacral Radiculopathy
Lumbosacral Spine Acute Bony Injuries
Lumbosacral Spine Sprain/ Strain injuries
Lumbosacral Spondylolisthesis
Lumbosacral Spondylolysis
Piriformis Syndrome
Sacroiliac Joint Injury

Other problems to be considered:

Disorders not involving the spine (eg, gynecologic, genitourinary, GI, and metastatic cancers)

Lab Studies:

Imaging Studies:

- Plain radiographs
- Bone scan
- CT scan
- MRI

Other tests:

- **Electrodiagnosis**

Procedures

- **Medial branch block**
  - Given that no historical or physical examination maneuver is unique or specific to facet-mediated LBP, fluoroscopically guided medial branch nerve injections are now used for diagnostic purposes to determine whether the facet joint in question is responsible for the LBP. A facet injection also may be used for diagnostic purposes, but many consider this procedure more challenging to perform.

Somatic Assesement and Diagnosis :

The movements of the vertebral column occur in diagonal pattens and two possibilities can exist as far as dysfunctions are concerned, and are as follows:

Extension, Rotation, Sidebending (ERS)

Flexion, Rotation, Sidebending (FRS)

ERS:

On reviewing spinal joint motion we inferred that during flexion the facets slide equally forward and the exact opposite during extension. Let us consider two segments, L4 and L5. Assume the left facet of L4 is restricted, or stuck in extension. In the neutral position, the transverse processes are neutral and hence will appear neutral

In backward bending, the left facet is already stuck in extension and hence will appear posterior. The right facet also moves posteriorly as it is not stuck and is moving freely. Since both are posterior they will technically appear neutral in backward bending.

However, in forward bending, since the right facet is moving freely it slides forward but since the left facet is stuck in extension it remains where it is (in extension) This will appear as a prominence of the L4 transverse process on the left. Hence your diagnosis will be an **ERS left of L4**, as the segment is stuck in extension and the rotation and sidebending to the left go with it.

FRS:

Assume that the left L4 facet is stuck in flexion. In neutral they invariably appear neutral. During forward bending, the left facet is already stuck in flexion and hence has slid forward. The right facet is freely moving and will also slide forward. On palpation of the transverse processes in forward bending there will be no evidence of a posteriority as both facets have slid forward and are neutral.

However, during backward bending the right facet moves freely and hence slides backward. The left facet however is stuck in flexion. Hence, it stays in that position of flexion and does not slide backward. Here, since the right facet has slid backward the transverse process on that side appears posterior but the left does not as it is in flexion.

The restriction is on the left as it is the left facet that is stuck in flexion, but the posteriority is on the right as the freely moving right facet has slid backward. Hence the diagnosis will be **FRS right of L4** as the diagnosis is always by the side of the posteriority and not by side of the restriction.

LUMBAR SPINE SOMATIC DIAGNOSIS:

ERS (L1-L5):

The patient is sitting on a stool and the clinician faces the patient from behind. The clinician then palpates the PSIS on both sides and then moves about 30 degrees upwards and medial towards the midline. The first bony landmark is the spinous process of L5. The clinician then moves about an inch lateral and slightly upwards to palpate the corresponding transverse process. The patient is then asked to bend forwards by taking both arms towards the floor and between the legs.

Assume that the clinician is palpating the transverse processes of L4. When the patient is asked to bend forward and if the transverse process in the right appears more posterior in this position then it can be assumed that the facet in the right is not sliding forward and is stuck in extension. To confirm, the same segment is checked in neutral (sitting, or prone lying with a pillow under the abdomen) and backward bending (sphinx) positions to see if the transverse process returns to neutral. If they appear neutral then the diagnosis will be an **ERS right of L4.**

FRS (L1-5):

The patient is lying prone in the prop up position (sphinx).The clinician faces the patient diagonally from the side in the direction of the patient's head . Assume the clinician is palpating the transverse processes of L3. In the prone prop up position the lumbar spine is technically in backward bending. In this position if the transverse process of L3 appears more posterior on the right then it can be assumed that the facet on the right is sliding backward and the facet on the left is not as it is stuck in flexion. To confirm , the same segment checked in neutral (prone lying) and forward bending (as above in sitting) to see if the transverse processes return to neutral. If it does then the diagnosis will be an FRS right of L3 as the diagnosis is always by the side of the posteriority.

MEDICAL Treatment:

Drugs:

1. Non-steroidal anti-inflammatory drugs
2. Opiod analgesics
3. Intra-articular injections with corticosteroid and a local anaesthetic.
4. Antidepressants: Used as an adjunctive treatment for pain and sleep if taken at bed time

SOMATIC TREATMENT:

Soft tissue inhibition:

The patient is in prone lying and the clinician faces the patient from the side. The thenar eminence and the palmar surface of the thumb is used for this technique. The thumb is placed on the long axis of the muscle just adjacent and lateral to the spinous process on the opposite side of the clinician. Now the thumb is reinforced by the palmar surface of the other hand and a gentle laterally directed pressure is applied over the erector spinae which is gradually increased based on patient tolerance. The pressure is held for about 10 to 20 seconds and repeated along the length of the thoracic spine. Care should be taken to direct the pressure away from the spinous process and not toward.

Long axis tissue stretch:

This is yet another technique that is effective for soft tissue inhibition in the lumbar area prior to manipulative treatment.

TECHNIQUE:

The patient is in prone lying and the clinician faces the patient from the side. The clinician uses the palmar surfaces of both hands in a crisscross fashion and one hand is placed on the base of the sacrum and the other over the thoraco lumbar junction, or the lower thoracic area. A long axis stretch is imparted by the clinician moving both palmar surfaces away from each other with a gentle compression.

ERS dysfunction:

The patient is in side lying and the clinician faces the patient from the side. **Remember the rule: The patient always lies in the side of the posteriority for an ERS in the lumbar spine.**

If it is an ERS right, then the patient lies on the right.

Assume the dysfunction is an ERS right of L4. Then the patient lies on the right side and the clinician face the patient from the side. Since it is an ERS right the segment is technically in right rotation and extended. Hence the treatment is to free the right facet of L4 into flexion and left rotation.

TECHNIQUE:

Patient in right side lying.

The upper torso of the patient is rotated to the left by gently pulling the upper arm until L4 is felt to move.

The left leg is flexed at the hip and knee with the foot resting on the right knee.

The right leg is gently moved forwards to induce flexion until L5 is felt to move.

The left hand of the clinician is taken under the left arm of the patient and the forearm of the clinician rests on the patients left arm pit.

Now the left hand of the clinician is used to block the spinous process of L4 on the superior aspect.

The right forearm of the clinician is placed on the left hip of the patient and the middle finger is used to block the spinous process of L5 on the inferior aspect.

The clinician then takes up the slack and asks the patient to breathe in and as the patient breathes out the slack is taken further and the clinician imparts a stretch by exerting a downward pressure using the left forearm to rotate L4 towards the left, in flexion. This will free the right facet of L4 into flexion and rotation to the left as it is stuck in extension on the right.

FRS dysfunction(L1-L5):

The patient is in prone lying and the clinician faces the patient from the side. Assume the patient has an FRS right of L3.

Then technically the L4 segment is in right rotation and stuck in flexion on the left.

Treatment should hence free the left facet into extension and left rotation.

TECHNIQUE:

Patient is in prone lying.

Clinician faces the patient from the left.

The legs are side bent to the left until L3.

The right pisiform of the clinician is placed on the right transverse process of L3.

The left hypothenar eminence/ pisiform of the clinician is placed in the left transverse process of L4.

The patient is asked to take a deep breath and as he exhales the clinician takes up the slack and imparts a spring on the right transverse process of L3, while maintaining a counter pressure on the left transverse process of L4.

This will free the left facet of L3 into extension and left rotation.

OTHER PHYSICAL THERAPY INTERVENTIONS:

1. Superficial and deep thermotherapy modalities.
2. Cryotherapy -> Acute stage.
3. Lumbar extension exercises.
4. Static abdominal and gluteal exercises.
5. Patient education includes:
   a) Instructions on proper posture and body mechanics in activities of daily living.
   b) Avoiding stressful postures and activities.
   c) Proper ergonomics taught in various daily activities.

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