Low Back Pain

- 70-80% of adults experience at least 1 episode of LBP
- 40% experience a second episode within 6 months
- Patients suffering from LBP consume more than $90 billion annually

Paraspinal Muscles in Patients with LBP

Several studies have emphasized the important role of paraspinal muscle morphology on the etiology, prognosis and management
Theories on the role of these muscles arose from imaging studies suggesting:
- smaller multifidus cross-sectional area (CSA)
- more fatty infiltration as compared with healthy asymptomatic controls.

- The lumbar multifidus is considered to be a vital stabilizer of lumbar spine
- Multifidus alone is responsible for more than two thirds of the muscular stiffness in the sagittal plane
- Control the intersegment motion of the individual vertebrae
- Any atrophy or injury to the multifidus muscle is expected to compromise spinal function
Multifidus Muscle

- Chronic denervated muscle is best seen on magnetic resonance images (MRI) as loss of muscle bulk and widespread areas of increased signal intensity resulting from fatty infiltration.

Multifidus and paraspinal muscle group are smaller in patients with chronic LBP than healthy controls.

Fatty Infiltration in the lumbar extensors is a common finding in patients with CLBP which correlates with poor physical performance, and disability.

It is difficult to measure cross sectional area with diffuse fatty infiltration.
MRI IDEAL Images

Average % fat deposition (1.97 – 2.4%) in paraspinal muscles in a healthy subject

Multifidus Muscle

- Patients with chronic LBP appear to have more multifidus atrophy at L5 than L4
- Patients with chronic unilateral LBP have smaller muscles on the symptomatic side as compared with the asymptomatic side.

Multifidus Muscle

- Multifidus atrophy is associated with poor functional outcomes after disc surgery
- Muscle fatigue leads to changes in muscle recruitment patterns, increases in spinal force, and decreases in spinal stability

Paraspinal Muscles and LBP

- Possible mechanisms for muscle atrophy
  - Disuse
  - Muscle denervation
  - Reflex inhibition
  - Iatrogenic
Innervation of Multifidus Muscle

- Multifidus muscles have monosegmental innervation
- L1 multifidus is innervated by L1 medial branch nerve
- L5 MM by L5 medial branch nerve

Medial branch nerve

- Multifidus muscle
- Facet joint
- Pars interarticularis

Radiofrequency ablation of medial branch nerve for facetogenic pain

- For L5-S1 facet joint, we ablate L4 and L5 medial branch nerves
- For L4-5 facet joint, we ablate L3 and L4 MBNs
- For L3-4 facet joint, we ablate L2 and L3 MBNs

Radiofrequency ablation of medial branch nerve for facetogenic pain

- On the purpose of helping patients for 6-12 months
- Iatrogenic multifidus atrophy
- We don’t know the long term effects
Biomechanic Studies at UCSF

- Multifidus activation increased lordosis in the unweighted spine
- Reduction in multifidus force decreased lordosis in the weighted spine

This extent of lordosis loss is consistent with that observed in human subjects with multifidus atrophy.

This caused an increase in overall spine compression of 28% percent.

NIH Grant 1R01AR060729-01
Biomechanic Studies at UCSF

- These data demonstrate two potential mechanisms by which multifidus atrophy may trigger back pain
  - By loss of lumbar lordosis
  - By increase in spine compression that may result in disc and endplate overloading.

Clinical Implication

Before recommend or perform RFA of MBN

- Please look at the paraspinal muscles on lumbar spine MRI
- RFA of MBNs cause iatrogenic atrophy of multifidus muscles
- If the multifidus muscle is intact, please avoid RFA of MBN especially for L4-5 and L5-S1 facet joints.
There is a need to change the location of RFA of MBN

- Articular branches of MBN run cranially to caudal parts and caudally to cranial parts of each facet joint capsule.
- Selective RFA of articular branches

Lumbar degenerative flat back

- Multifidus and paraspinal muscle group are smaller in patients with flat back than healthy controls
- Fatty Infiltration within the paraspinal muscles are significantly increased

Lumbar degenerative flat back

- 64 years old
- Laminectomy at L1-5 in 2009
- Flatback in 2012
- Developed proximal junctional kyphosis
Paraspinal Muscles and LBP

- More studies are needed to better understand the role of the multifidus and paraspinal muscle group
  - in the etiology and management of common spinal disorders
    - Deformity
    - Degenerative flat back
    - PJK

Is Discogenic Low Back Pain a Subclinical Disc Infection? The BackBug Study

- 162 patients with chronic LBP and Modic I DDD
- Randomized in to placebo and amoxicillin-clavulanate for 100 days

- 61 patients underwent disc biopsy
- Cultures were positive in 46%
- 80% of positive cultures developed new Modic I DDD at the adjacent vertebrae
Is Discogenic Low Back Pain a Subclinical Disc Infection? The BackBug Study


Modic I DDD
Thank you