

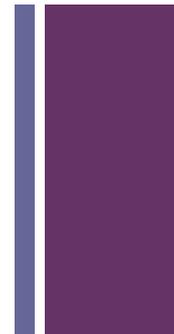


# Neurosurgery and Low Back Care

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# Low Back Pain



- Half of working Americans admit to having back pain every year
- At any given time, 31 million adults in active back pain
- 2<sup>nd</sup> most common cause of visits to the doctor
- 149 million days of work missed per year; over 100 billion in costs yearly
- Second leading cause of disability in US
- Prevalence rose from 3.9% to 10.2% from 1992 to 2006





# Low Back Pain



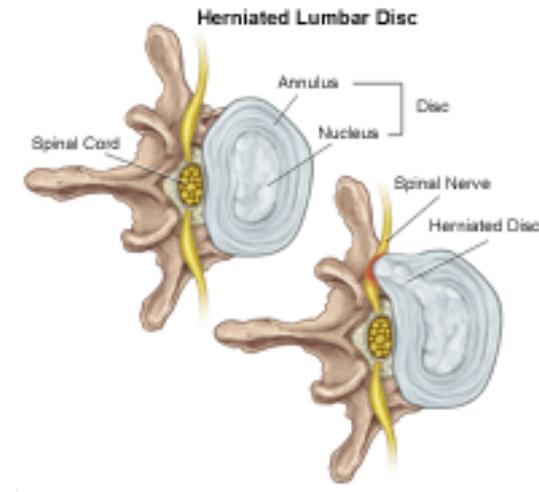
- 95% of patients have functional recovery within 6 months of developing symptoms
- However, 31% report continued symptoms
- In acute back pain, outcomes are comparable whether patient managed by primary care physician, chiropractor, or specialist
- Chronic back pain defined by duration of symptoms greater than 3 months



# Lumbar Disc Disease



- Annulus fibrosus/Nucleus pulposus
- Discogenic back pain
- Classically worse with sneezing/coughing, standing, axial loading
- Disc herniation, Radiculopathy
- Annular tears generate local inflammatory cascade contributing to back and leg pain

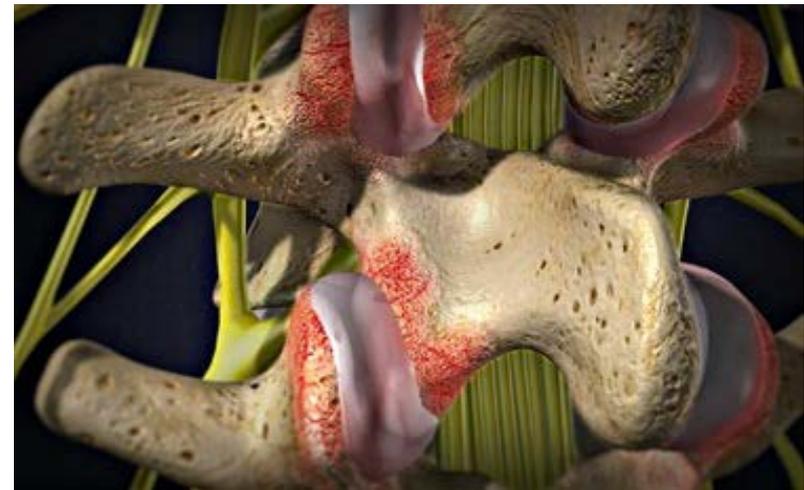




# Facet disease



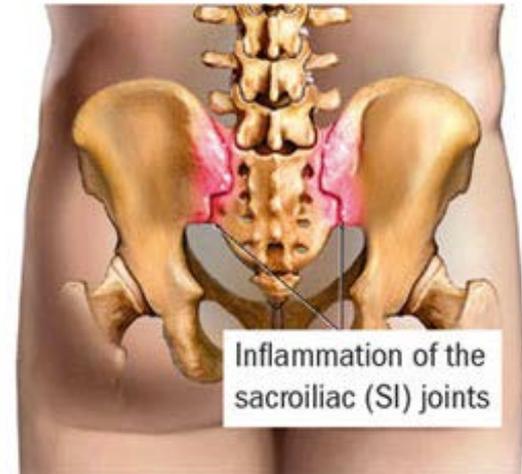
- Inflammation, Hypertrophy, Degeneration, Edema
- Back pain and radiculopathy
- Lateral referred back pain



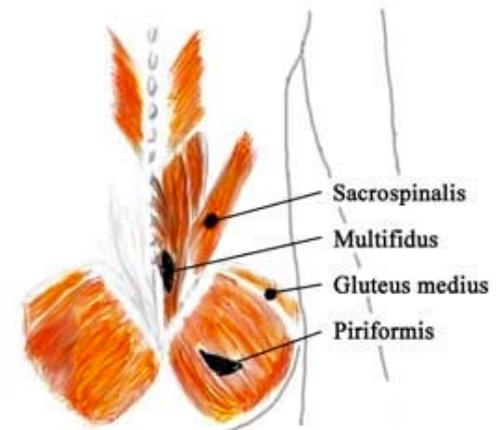


# Other causes

- SI Joint pain
- Trigger point/Muscular/Ligamentous injury
- Hip Pain
- Bone: Osteomyelitis/Discitis, Traumatic fracture, Compression fracture
- Other causes: Abdominal, Vascular, Urologic



Common Trigger Points in Myofascial Pain Syndrome





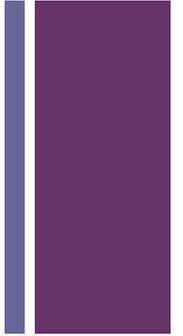
# Multifactorial/Instability

- Spondylolisthesis
- Scoliosis
- History of prior surgery/decompression
- Severe lumbar degeneration
- Foraminal stenosis
- Synovial Cyst





# Multifactorial/Instability



- XRs are a good screening tool, can usually identify significant structural pathology and instability that is less likely to be managed successfully long-term with conservative therapy





# Hyperalgesia

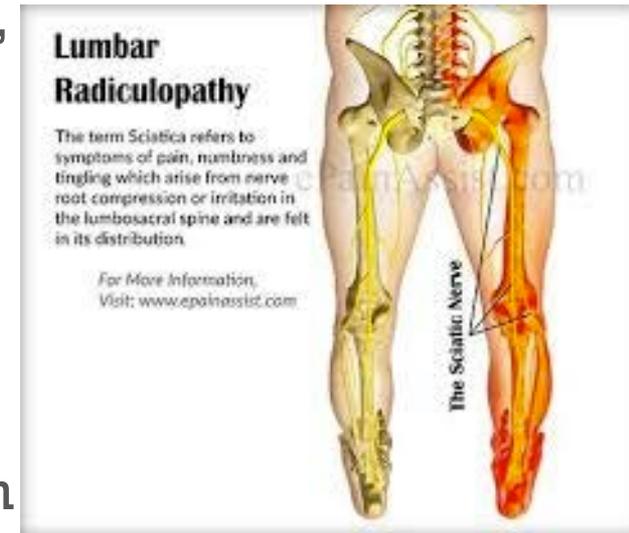


- Increasing prevalence of fibromyalgia, depression, and pain out of proportion to pathology
- Dysfunction in pathways of nociception and central processing of pain
- Increasing literature suggestive that chronic opioid use induces hyperalgesia in addition to psychiatric disorders
- Treatment must focus on modulation of nociception, pain psychology, and factors contributing to hyperalgesia



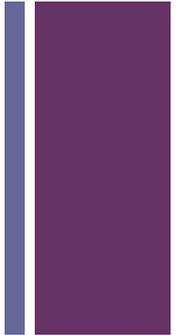
# Radiculopathy

- Compression of radicular nerves, radiation to legs
- Multiple roots contribute to sciatic nerve, can give patients a “sciatica” sensation
- More amenable to surgery
- Distribution of pain most important diagnostic factor
- Physical exam can be useful, but focus on motor symptoms, foot drop most likely finding
- Patient’s can usually verbalize weakness

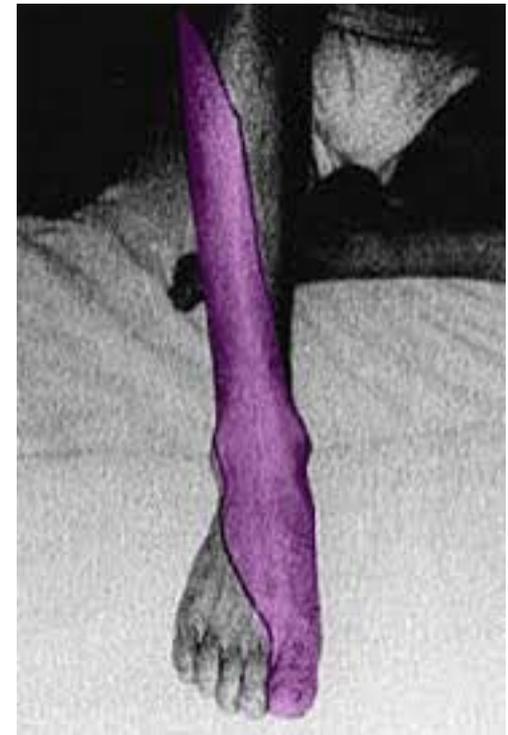




# Radiculopathy

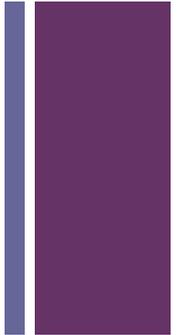


- L5 radiculopathy: Anecdotally the most common
- Early branch supplies the hip
- Radiation to posterolateral thigh, wraps around lateral calf and ankle
- Comes to dorsal foot and great toe
- Foot drop, dragging foot while walking, increased wear in sole of shoes

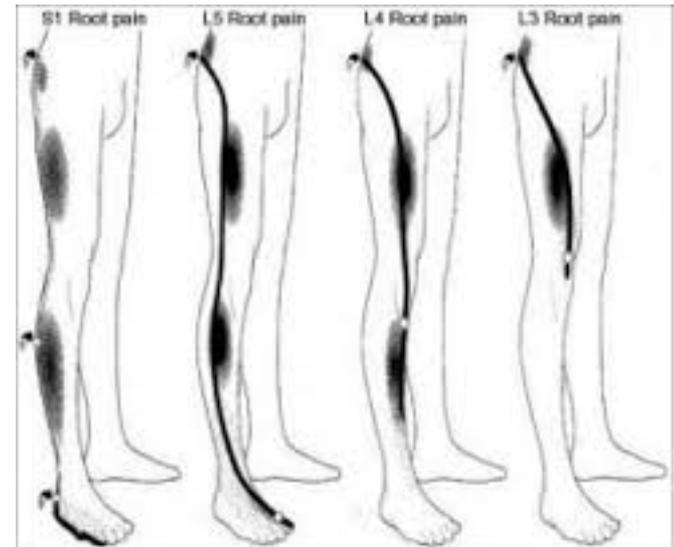




# Radiculopathy

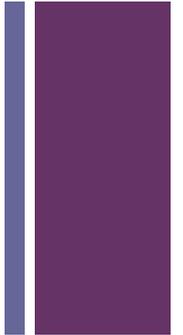


- Above L2 doesn't radiate to the legs, rarely clinically significant
- L2 radiculopathy: **Groin** and medial thigh pain
- L3 radiculopathy: Anterior thigh pain
- L4 radiculopathy: Lateral thigh, **knee pain**, shin and medial ankle
- S1 radiculopathy: Buttocks, posterior thigh/gastroc, plantar foot and 5<sup>th</sup> toe





# Radiculopathy

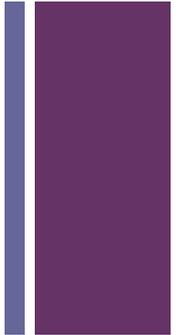


- Lateral recess stenosis
- Affects the traversing nerve root: Nerve root below the level of pathology (L4-5 disk herniation causing L5 radiculopathy)
- Usually caused by disk herniation or facet hypertrophy
- Central or paramedian disk herniation





# Radiculopathy



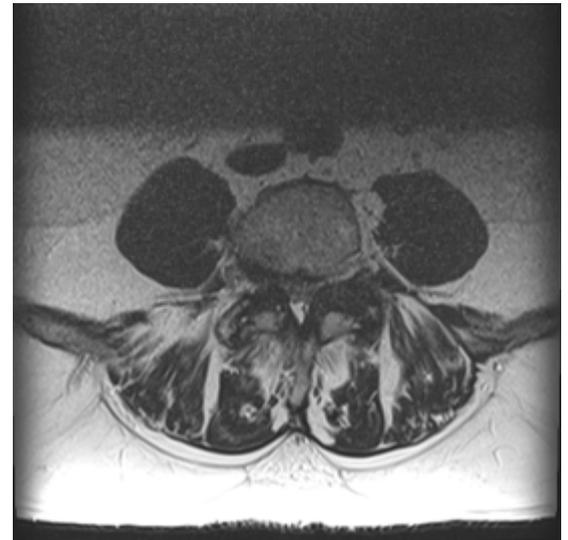
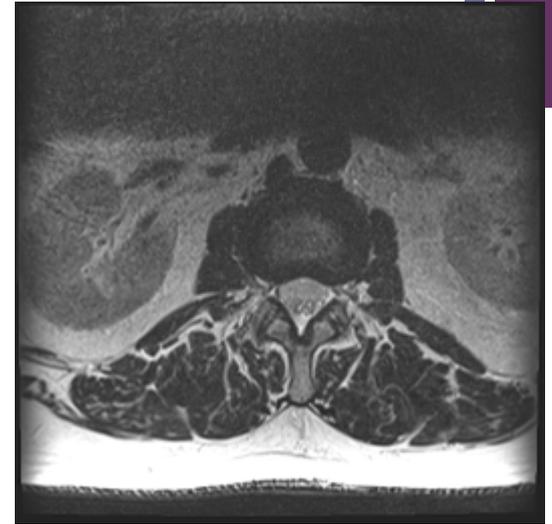
- Foraminal stenosis
- Affects the exiting nerve root: Nerve root at the level of pathology (L5-S1 degenerated disk causing L5 foraminal stenosis)
- Loss of disk height, scoliosis, lateral/foraminal disk herniations, facet hypertrophy/osteophyte





# Neurogenic claudications

- Caused by lumbar central stenosis, with compression of central cauda equinae roots
- Sensation of bilateral numbness/weakness/pain, diffusely in lower extremities with walking or back extension
- Relieved by sitting down or flexing the back
- Description of needing to lean forward on a shopping cart to walk





# Imaging

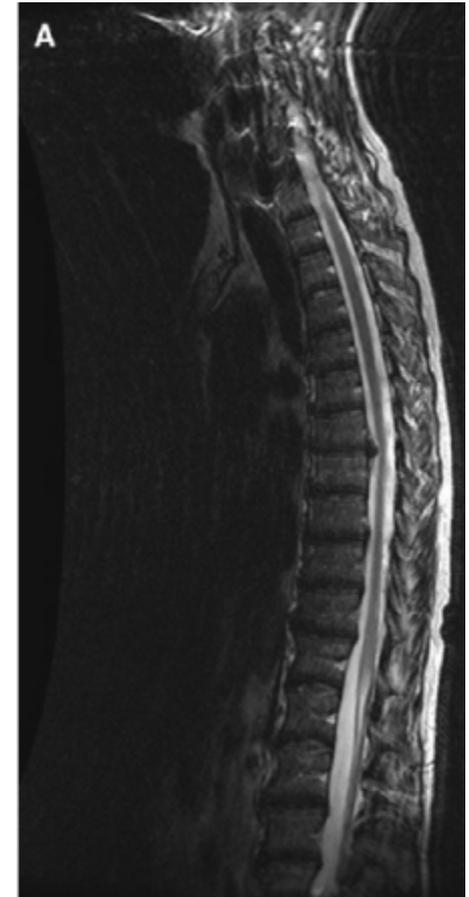
- XRs valuable in back pain, trauma: to rule out fractures, scoliosis, spondylolisthesis
- Appropriate in acute and chronic pain
- MRI indicated for radicular symptoms of significant duration (4 weeks), or severe pain with motor findings
- CT most useful for evaluating bony anatomy, helpful for surgical planning or in evaluating fractures; For general diagnostic purposes, XRs likely just as good





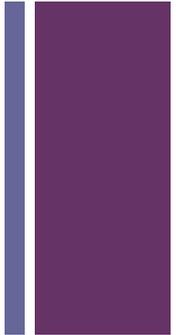
# Imaging

- Cervical stenosis can cause referred low back pain with neck flexion, but will also involve symptoms of upper extremities
- Thoracic pathology will likely present with leg symptoms without arm symptoms
- More commonly, patients will describe proximal leg weakness, and numbness involving the entire leg
- May also describe wrap around chest pain, but thoracic stenosis is very often painless
- For concern about thoracic and cervical stenosis, MRI most valuable





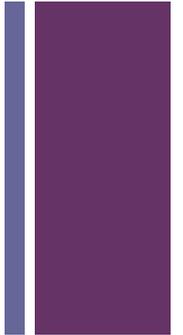
# Red flags/Referral to specialists



- Motor findings and weakness most concerning, urgent
- Longer duration of motor weakness requires longer recovery, less likely to recover
- Severity of pain less likely a surgical indication relative to duration
- Most patients will need to complete and fail a course of physical therapy prior to any surgical intervention, barring significant motor weakness
- In radiculopathy, will also likely undergo injections prior to any surgical intervention



# Red flags/Referral to specialists

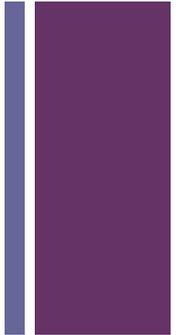


- Urinary dysfunction very rarely spinal in origin, can occur in very severe stenosis, will almost certainly also have motor findings
- Bowel dysfunction almost never caused by degenerative spine pathology, only caused by rapid pathology such as tumor, epidural abscess, or epidural hematoma; presents with loss of rectal tone





# Non-surgical interventions

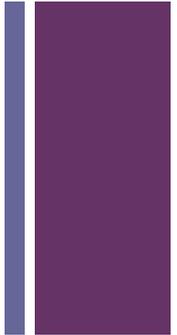


- Punch line: Level of evidence low across the board for efficacy
- However, most are also low risk, and provide general positive health benefits
- Also, some recommendation/intervention required for patients
- Preferable to target certain interventions to certain types of pain: weight loss/spinal manipulation/physical therapy for back pain; injections/pain psychology for radicular or extremity pain



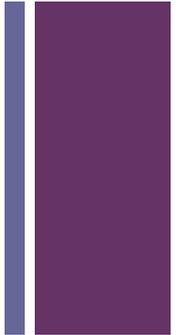
# Weight loss/Exercise

- Frequently recommended; infrequently utilized
- Intuitively related to less structural loading of spine
- Studies show higher than population rates of obesity in patients being treated for back pain
- No studies demonstrating successful reduction in pain level in patients attempting non-clinical weight reduction
- Trends towards lower levels of back pain and higher functional levels in patients undergoing bariatric surgery
- A Cochrane review of 381 studies examining low back pain and exercise found a low level of evidence suggesting efficacy, more likely to have improvement in functional levels than in pain levels





# Accupuncture/Yoga

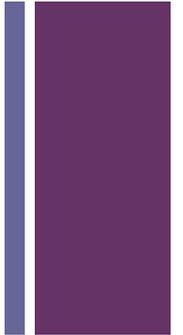


- Yoga: 12 trials showing moderate evidence of superiority to no intervention, but no clear evidence of superiority versus exercise
- Accupuncture: Better results in treatment of acute back pain, equivocal in chronic pain
- Both may have additional benefits in stress relief and depression





# Spinal manipulation/Chiropractor

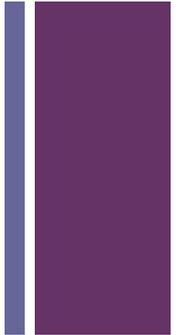


- 4 studies show a trend towards efficacy versus sham intervention
- Small studies show possibly less EMG irritability after manipulation
- Direct comparison fails to show superior efficacy compared to exercise and other non-pharmacologic interventions
- 40% of patients report adverse events correlated with spinal manipulation, but the majority last less than 24 hours





# Physical Therapy



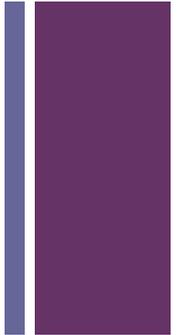
- Focus on balance training and core strengthening
- Moderate evidence
- Better functional results than change in pain levels
- Likely more successful when combined with psychological therapy such as cognitive behavioral therapy or mindfulness based stress reduction



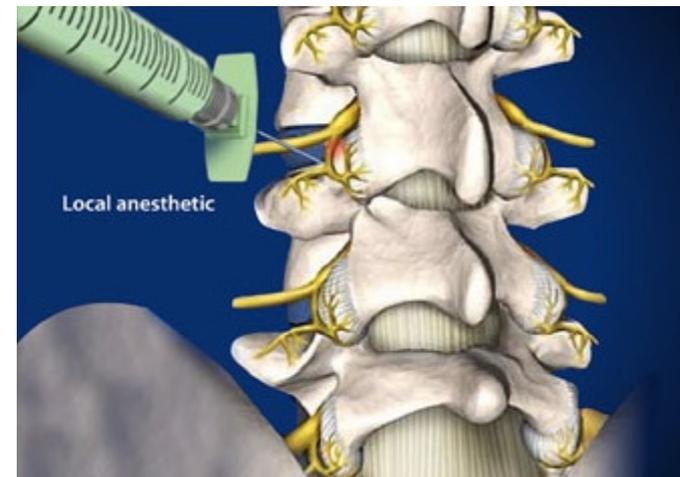




# Facet rhizotomy/Trigger point injections

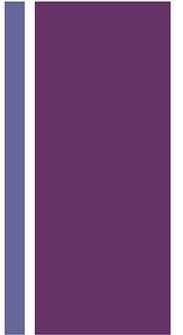


- Medial branch from DRG supplies facet
- Initial medial bundle branch block followed by second stage thermal ablation if successful
- Good outcomes in patients with radiographic facet abnormality, positive response to MBBB
- Myofascial pain/Trigger points: Low level trends for improvement, but no consensus on intervention, including: dry needle, lidocaine, ultrasound, thermal





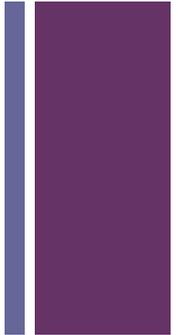
# Pain psychology



- Include cognitive behavioral therapy, progressive relaxation, mindfulness based stress reduction, operant therapy, EMG biofeedback
- Lower levels of reported pain post-treatment, but less functional improvements
- Best utilized to complete a multi-disciplinary program, including physical therapy and activity modification
- Co-morbid anxiety, depression, sleep dysfunction, substance abuse



# Spinal Cord Stimulation

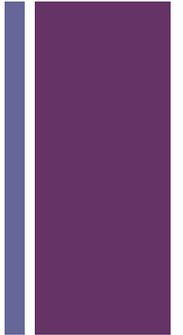


- Gated theory of pain
- Utilizes higher magnitude proprioceptive neurons to block access of smaller nociceptive fibers
- Focus on neuropathic, non-structural pain
- Percutaneous trial first, determines good candidates for permanent implantation
- Good long term outcomes for VAS and functional disability





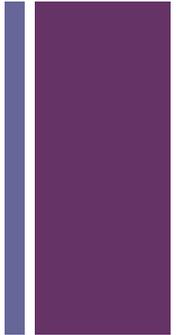
# Medical management



- Recommendations clearly support initial non-pharmacologic management of both acute and chronic low back pain
- Tylenol demonstrated to be ineffective, no better than placebo
- If medical management required NSAIDs first line treatment
- Inconsistent evidence regarding muscle relaxants, benzodiazepenes ineffective



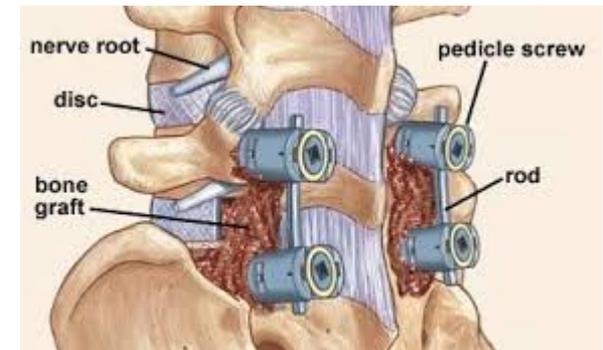
# Medical management



- Opioids can provide short term successful analgesia, but no evidence for long term success
- Increasing literature suggests long term opioid use can induce hyperalgesia
- Increasing number of articles recommending completely against the use of opioids in low back pain
- Higher levels of opioid usage also correlate with worse outcomes with surgery and non-pharmacologic therapy

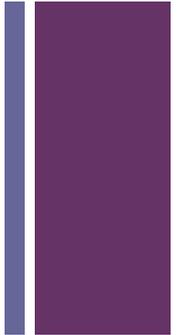
# + Surgery

- Selection of patients and pathology is critical
- Can range from decompression to dynamic stabilization to fusion
- Many prior indications, such as lumbar fusion for disk dehydration and back pain clearly shown to be ineffective
- Recovery window can be challenging for patients; outcomes studies rarely even look at the window prior to 3 months
- Most patients have lower pain levels and higher functional level 6 months post-op

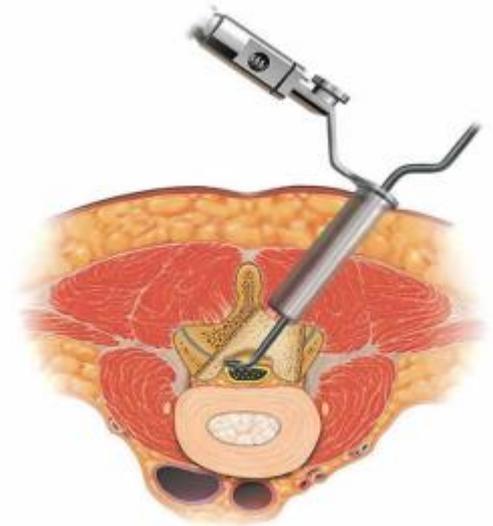




# Minimally invasive spine surgery

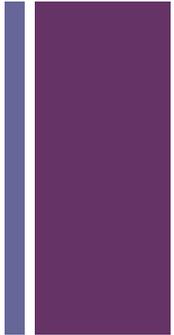


- No actual literature supporting any use of “lasers”
- Tubular dilation, Small incisions
- Endoscopic and microscopic visualization
- Less bleeding, muscle dissection, infection rates, complications related to CSF leak
- In order to perform adequate decompression, drilling still needs to be performed, early back pain still the norm





# Motion preserving reconstruction

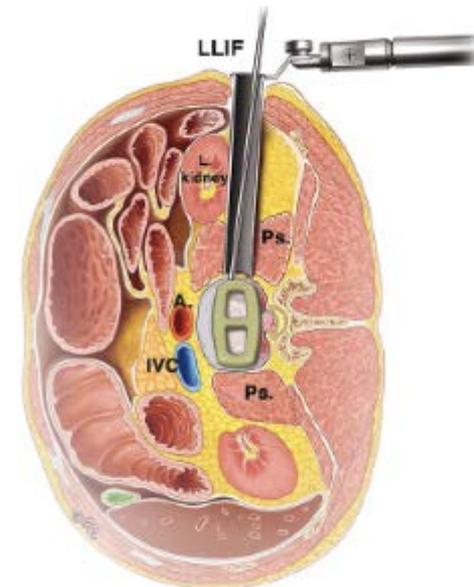
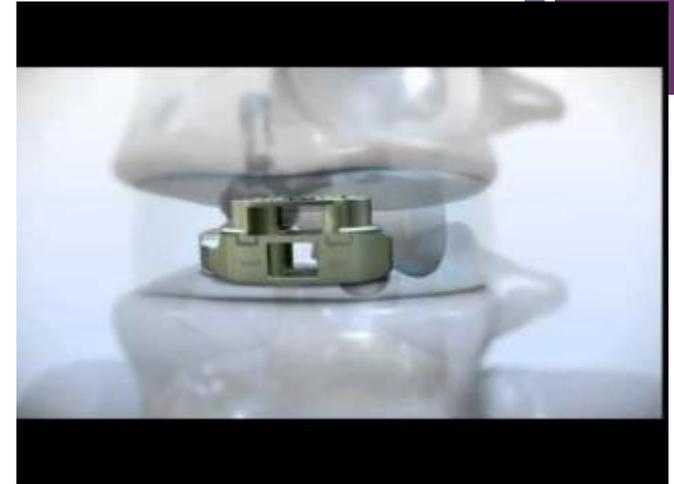


- Lumbar artificial disks still not shown to have efficacy, certainly less effective than cervical artificial disks
- Dynamic interspinous devices showing lower levels of post-op back pain, without loss of range of motion
- Stabilization still may allow for more aggressive decompression in radiculopathy



# + Interbody techniques/Indirect decompression

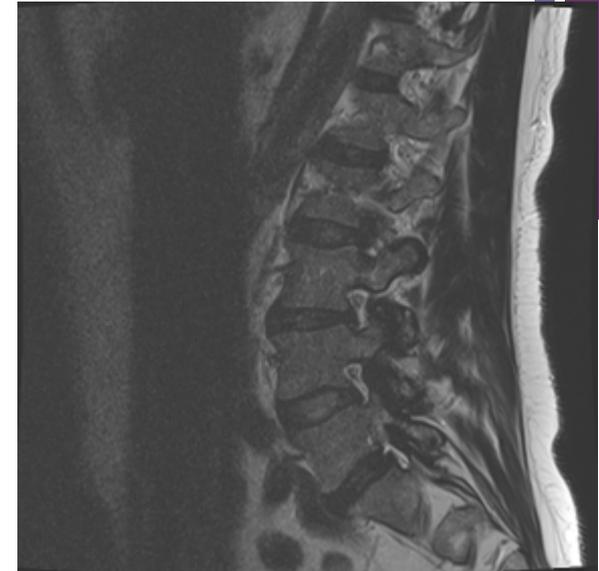
- Interbody placement improved fusion rates and can provide indirect decompression by restoring disk height and foraminal height
- Can be performed from an anterior approach, lateral approach, or posterior (transforaminal)
- Expandable interbody grafts gaining popularity





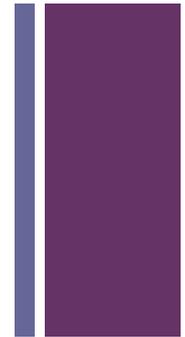
# Cases

- 60M with 3 months of 9/10, sharp left groin and anterior thigh pain
- Attempted medical management with NSAIDs, opioids, and gabapentin
- Failed physical therapy and steroid injection
- Underwent Left L2-3 far lateral diskectomy
- Resolution of leg pain post-op, incisional back pain early, improved over several weeks

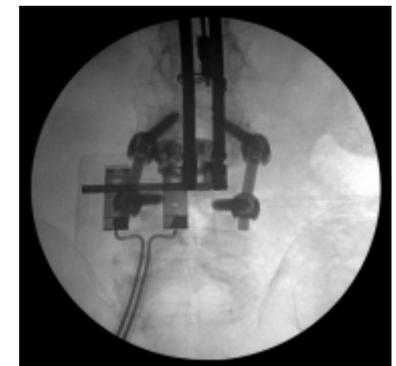
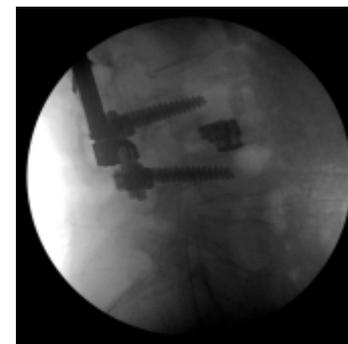




# Cases



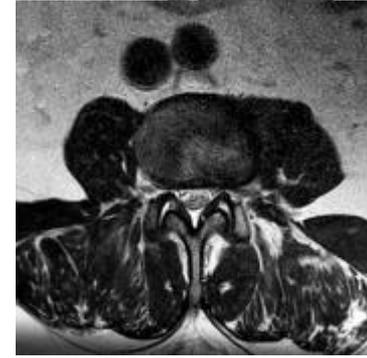
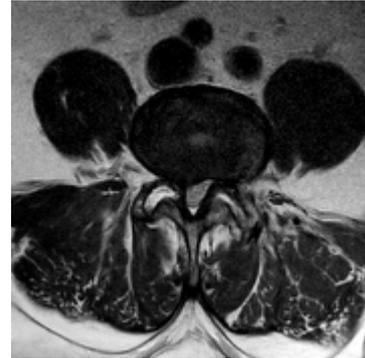
- 57M with MVC 25 years ago, thoracolumbar fusion with Harrington rods
- Presented with 6 months of progressive midline back pain, with thigh pain and knee pain
- Underwent physical therapy and multiple ESI without improvement
- L3-4 transforaminal interbody fusion with expandable cage
- Complete resolution of leg pain post-op, marked improvement in back pain





# Cases

- 69M with 1 year progressive back pain and neurogenic claudications
- Only able to walk ~25 feet prior to sensation that his legs were about to give out on him
- Also Right lateral thigh radicular pain
- On moderate doses of opioids, NSAIDs and lyrica
- Underwent physical therapy, epidural steroid injection, and facet rhizotomy





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