SPINE SURGERY: WHERE WE ARE TODAY

SINA RAJAMAND, D.O.

NEUROSURGEON

ADVANCED NEUROSURGERY

RENO, NV
WHEN DO WE OPERATE?

• **SURGERY IS THE LAST RESORT**

  • Good spine surgeons exhaust all other necessary options
  • The act of operating is wrought with risks
  • Want to be sure to have good outcomes, the indications and outcome shouldn’t be the risk laden part
  • Must have right indications for operating
ADVANCEMENTS IN TREATMENT

• **Herniated discs** ⇒ if fail conservative pain management, have minimally invasive outpatient procedures to perform microdiscectomies.

• **Axial back pain** ⇒ If fail conservative pain management, we have minimally invasive techniques for facet arthropathy and degenerative disc disease including disc replacement and not fusion.

• **Debilitating compression fractures** ⇒ if fail conservative management have MIS outpatient kyphoplasty treatments.

• **SI joint pain** ⇒ If fail conservative management. Have outpatient MIS treatments.
PROBLEMS THAT WE HAVEN’T RESOLVED

• Adjacent level disease
  • How do you stress shield the disc above or below a treated spinal level, so it does not fail sooner?

• Medical treatment for the prevention of degenerative spine changes

• Restorative treatments for degenerative spine changes
ALGORITHM OF TREATMENT

• Common algorithm of spine related conditions

• Neck/back or extremity pain → active treatment by the patient (OTC pain meds, patches, creams) → Resolved

• See family/primary care provider → Treat conservatively (OMT, Pain meds) → Resolved

• Imaging (XR, CT, MRI) → Continue non-operative management or Pain management → Spine surgeon
COMMON AILMENTS AND TODAY’S SURGICAL TREATMENTS

• Radiculopathy
• Neurogenic Claudication
• Axial Back Pain
• Compression Fractures
• SI Joint pain
Radiculopathy / Sciatica / Herniated Disc

- Usually from nerve root compression
- Can be from disc herniation or foraminal stenosis
- Dermatomal in nature
- Usually dermatomal sharp shooting pain in acute phase.
  - Can be dull achy pain usually in chronic phase
• Classically a paracentral disk herniation
• Can also be from foraminal collapse, facet joint overgrowth, or a far lateral disk herniation
• Diagnostic testing would include MRI, CT scan (looking for osseous pathology), or a CT myelogram if can’t have an MRI
SURGICAL TREATMENT

Goal of surgery
ENDOSCOPICALLY
NEUROGENIC CLAUDICATION/LUMBAR STENOSIS

- Unilateral or bilateral leg pain, numbness, or weakness usually while standing or walking
- Physical exam can be normal
- Usually symptom improvement with flexion of spine
- Distinguish from vascular claudication
  - Improve with rest and not flexing forward.
WORK-UP

• MRI, CT, myelogram

• Can be caused by:
  • congenital canal stenosis
  • Disk bulge
  • Ligamentum flavum hypertrophy
  • Facet joint overgrowth
  • spondylolisthesis
TREATMENT

• Conservative treatment:
  • OMT
  • Epidural injections
  • Physical therapy
SURGICAL THERAPY

• Standard therapy involves a midline laminectomy and foraminotomy

• New therapies include indirect decompression with an interspinous spacer device, causes focal flexion and stretching of the ligamentum flavum and facet joint
  • I recommend with caution - The focal flexion can cause other issues including DDD, and kyphosis with loss of sagittal balance

• Minimally invasive hemilaminectomy with bilateral ligamentum flavum resection and decompression
Goal of Surgery
Minimally invasive
tubular retractor
Interspinous spacer prevents extension and narrowing of the spinal canal with nerve impingement.
AXIAL BACK PAIN (DEGENERATIVE DISEASE)

- Pain that worsens with activity and lessens with rest.
- Anterior thigh pain can be associated with low back pathology due to somatotopic pattern.
SOMATOTOPIC
WORK UP

MRI to examine disk and neighboring structures

CT myelogram when MRI not possible

Flexion-Extension XR to R/O spondylolistheses
NEUROIMAGING

• Develop black disc due to loss of disc water content
• Loss of disc height
• Modic end plate changes (high T2 signal) in the sandwiching boney endplates
DEGENERATIVE DISC CHANGES

- Fatty marrow
- Acute edema
- Sclerosis

Modic changes

- Modic 1
- Modic 2
- Modic 3
TREATMENT

• Conservative Treatments:
  • OMT
  • Physical therapy – core strengthening exercises
  • ESI
  • Surgery if all else fails
• Theory of surgical intervention rests on notion that movement and motion of that spinal segment causes pain.
• Aims to eliminate motion in that disc level known as fusion.
• Many ways to perform
APPROACHES TO THE SPINE

- ALIF - Good for restoring height and lordosis
- OLIF – Less risk of vascular injury, restore height
- XLIF- less risk of vascular injury, restore disk height
- PLIF- single stage/position surgery, address posterior pathology
- TLIF– single stage/position surgery, address posterior pathology, less retraction than PLIF
OPEN VERSUS MINIMALLY INVASIVE

“Open” TLIF

Minimally Invasive TLIF
FINAL PRODUCT
COMPRESSION FRACTURES

• Can be pathological or traumatic or insufficiency

• Common in aging population

• Pathologic usually from tumor – Find source (Primary vs. Mets)
  • Treatment is decompressive spine surgery if necessary or radiofrequency ablation and cement kyphoplasty along with systemic treatments of chemo and radiation

• Traumatic or insufficiency fracture – Treat with conservative pain management and bracing
WORK UP

• Imaging to determine acuity of fracture
• Percutaneous Vertebral Augmentation (kyphoplasty) good option in acute and subacute fractures
• Best indicator of acuity is MRI → Hypointense T1, Hyperintense T2 and positive STIR.
• Can have 80-90% improvement in pain.
PERCUTANEOUS VERTEBRAL AUGMENTATION (KYPHOPLASTY)

- Can be performed outpatient
- Can be performed with general anesthesia, light sedation or local anesthesia
- Objective is pain relief and stabilization
  - Increased activity level and decreased dependence on opioids.
IF CONSERVATIVE PAIN TECHNIQUES FAIL → BALLOON KYPHOPLASTY
SACROILIAC (SI) JOINT PAIN

• 15-20% of axial low back pain patients have SI joint pathology.

• Characterized by upper buttock pain just below the level of the posterior superior iliac spine (PSIS), especially with positional changes.
  • From sitting going to standing.
  • Climbing or descending stairs
  • Single-leg stance

• Provocative tests can be performed
SI JOINT
PROVOCATIVE TESTS

• FABER = Flexion, Abduction, External Rotation

• 2 - 3 positive tests indicative of SI Joint Pain → OMT and physical therapy +/- SI Joint injection/block
SI JOINT TREATMENT

• If conservative management including OMT, SI Joint strengthening exercises fail and the patient has at least 70% relief from two separate SI Joint blocks then they are a good candidate for SI Joint Fusion

SI Bone iFuse implant system

Medtronic Rialto implant system
CUTTING EDGE

ROBOTIC ASSISTED SPINE SURGERY
CUTTING EDGE

• Endoscope assisted surgery

• Use an endoscope to perform disc work and placement of spacer
REFERENCES

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