Indications and Spine Surgery Adventures

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Disclosure

- Benevenue Medical - Consultant
- Crocker Spinal Technologies - SAB
- Diamicron – Consultant, Stock options
- GE Healthcare – Consultant
- Genesys Spine – Consultant, Royalties
- Innovasis – Consultant, Royalties
- Spineology - Data Safety Monitoring Board
- TrueMotion Spine – SAB, Stock options
Errors in Diagnosis

• Back pain > leg pain
  – Radicular and claudication pain may be unrelated to back pain
    • Minor radiculopathy with associated spondylolisthesis
    • Radiculitis with prominent central HNP
  – Pseudoradicular pain
    • Discogenic pain
    • Bertolotti’s Syndrome
    • SI Joint Dysfunction
Annular Tear

- Patient RC
Spondylolisthesis & HIZ

- Patient JB

3/97
Spondylolisthesis & HIZ

- Patient JB (cont’d)

12/97
Transitional Vertebra

- Sacralized L5
  - MRI
    - Vestigial disc space
    - Standard x-rays mandatory
- Variation in vertebral number
  - Four lumbar segments - 2.5%
  - Six lumbar segments - 5%
  - Roche & Rowe, JBJS 1952
Transitional Vertebra

- Timmi, Weiser, & Zinn: Rheumatol Rehabil 1977
Transitional Vertebra

- Patient GB
Transitional Vertebra

- Patient GB s/p fusion
Errors in Diagnosis

- Incongruent diagnostic studies
  - Piriformis syndrome
  - Peroneal nerve palsy
  - Occult instability
  - Non-dysraphic tethered cord

- Misinterpreted exam
  - Cauda equina syndrome
  - Conus syndrome
  - Thoracic outlet syndrome
Piriformis Syndrome

- Patient JMA
Piriformis Syndrome

- History of impact injury to the gluteal region
- Unilateral symptoms of radicular pain not gluteal or iliac pain
- Positive straight leg testing
- Piriformis stretch test
  - Need to test internal rotation maneuvers of the affected leg
- Reproduction of radiating pain or findings with palpation of the sciatic notch
Piriformis Syndrome

- Normal anatomy
  - Sciatic nerve exits below piriformis
- Variants
  - Tibial and/or peroneal components may independently pass through the muscle
  - Rarely passes over the piriformis
Occult Instability

- Patient AMC
  - Classic neurgenic claudication
Occult Instability

• Patient AMC
Non-Dysraphic Tethered Cord

- Abnormally low conus
  - Normal should be above the L1-2 disc
- Unexplained back and/or leg pain
  - Often with sacral discomfort
  - Patchy numbness in LE’s
- Subtle bladder dysfunction is common
  - Pt may not volunteer complaints without specific questioning
Patient PS

- 35 year old male correctional officer
- Buttocks pain radiating into the coccygeal region without trauma from 1999
- New right thigh pain 2° L3-4 HNP 2006
  - Microdiscectomy with resolution of thigh pain
- Persistent buttocks and posterior thigh pain
  - Left L4-5 & right L5-S1 microdiscectomies 12/07 with no change
Report indicates “the conus is normal at L2-3”
Non-Dysraphic Tethered Cord Syndrome

- 22 patients
  - 19/22 (86%) with significant improvement
    - 1 patient with significant 53° degenerative scoliosis with primary axial back pain
    - 2 patients without sacral pain or dysfunction
      - 1 found to have arachnoiditis with normal conus position
  - 1 complication
    - Delayed onset of sacral numbness and stress incontinence one week following surgery
Patient PS

- At 2 years
  - Resolution of coccygeal and posterior thigh pain
  - Residual lumbosacral & right gluteal pain but only rated at 1-2/10 VAS
  - Residual right anterior thigh numbness following 12/07 microdiscectomy
  - Stopped all narcotic pain medications
Conus Syndrome

• Patient PCK
  – Prior L5-S1 discectomy
  – Residual back & thigh pain
  – F/U scan w/o contrast missed the schwannoma
Patient RMK

- 65 year old retired nurse
- History of prior lumbar surgery and C4-6 ACDF
- Transported to UofU as trauma 2 after being thrown by car that crashed into a restaurant 5/2014.
- Paresthesias in the left thumb & index fingers
- Left biceps pain
- Normal wrist extension & triceps
Patient RMK

• Admission CT
Patient RMK

- MRI

T2 C6-7 STIR
Patient RMK

• Post Op X-rays

5/2014  12/2014
Patient RMK

- Post Op CT
  - Progressive forearm atrophy & hand weakness

12/2014
Patient RMK

- Symptoms involve left C6 and C8 distribution.
- EMG
  - Reported to show an active & chronic C7 radiculopathy

- U Neurosurgery advised left C6-7 laminectomy
Thoracic Outlet Syndrome

- Variations

Variations in the anatomy of the thoracic outlet:

- **81.4%**: Middle scalene
- **16.2%**: Anterior scalene
- **2.3%**: C8-T1

Key anatomical structures:

- Middle scalene muscle
- Anterior scalene muscle
- Smallest scalene muscle
- Subclavian artery
- Ant. scalene m., displaced
- Interscalene muscle

Diagrams illustrate the variations and their percentages.
Thoracic Outlet Syndrome

- **“Classic” neurogenic pattern**
  - Hand intrinsic weakness
  - Numbness of the 4th & 5th digits
  - Aggravated with arm elevation maneuvers
  - Increased symptoms with supraclavicular compression
  - Enlarged C7 transverse process or cervical rib

- **Upper plexus pattern**
  - Multiradicular

- **Careful positioning of arms for surgery**
Patient JG

• 53 year old female with a 6 month history of left shoulder pain and numbness
  – Numbness over the left deltoid
  – No weakness
  – No radicular complaints in the right arm

• Advised by a local surgeon that a 3 level anterior fusion was indicated.
Patient JG

- MRI

C4-5

C5-6
MA Review Case

- 56 year old female with unilateral left arm pain
- Felt to have significant kyphosis
- Reported to have myeloradiculopathy
  - H&P in hospital chart lacks neurologic examination
MA Review Case

- MRI

C4-5
C5-6
C6-7
MA Review Case

- X-rays
MA Review Case

- Post op

3/2012 7/2012
MA Review Case

- Hardware revision 8/2012
  - Continued neck pain
  - Right > left arm pain
- Hardware removal 3/2014
  - Continued neck and arm pain
  - Evidence of C4-5 pseudoarthrosis
- 2nd opinion: ACDF/posterior osteotomy suggested

6/2014
Patient MC

- MRI 2/15/12
  - 44 yo female with right leg pain
Patient MC

- Continued right leg pain & new back pain after L5-S1 PLIF
- Hardware removal with continued pain
Iatrogenic Cascade

- Patient MG - initial treatment for discogenic pain
  - T10-S1 fusion 2005 Alabama
  - Revision 2006
    - Posterior HWR w/ reinstrumentation L3-S1
    - L4-5/L5-S1 ALIF w/ PEEK spacers & anterior plates
  - Severe positional HA
  - Progressive kyphosis
    - Standing height decreased 12 inches to 5 ft 3 in
Iatrogenic Cascade

- Patient MG - CT myelogram 4/07
Iatrogenic Cascade

- Patient MG - intradural patch 11/07

4 days later
Iatrogenic Cascade

- Patient MG
  - Planned L3 PSO w/ L1-2 posterior osteotomy and T4-S1 instrumentation
Iatrogenic Cascade

- Patient MG
Spinal Surgery is Rocket Science

- Indications, Indications, Indications
- The “obvious” may not be the answer
- Time spent with the patient should never be short changed
  - Referring non-surgeons need to be skeptical patient advocates
  - Never trust radiology reports alone
- Technology will never replace:
  - Technical skills
    - BMP
  - Knowledge of biomechanics
Thank You

“Our lives begin to end the day we become silent about things that matter.”

Martin Luther King