

SAE and OITE Questions: Meta-Analysis

Johns Hopkins Orthopaedic Surgery
Review Course

The Johns Hopkins Medical Institutions
Department of Orthopaedic Surgery
Baltimore, Maryland



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Department of Orthopaedic Surgery



OITE Update: Adult Spine

- Regions of spine most commonly tested
 - Cervical spine: 31.3%
 - Lumbar spine: 17.1%
 - Lumbosacral junction: 8.2%
 - Thoracic spine: 5.2%
 - Thoracolumbar junction: 4.5%
 - Sacral spine: 2.2%
 - Miscellaneous (general spine knowledge): 32.8%

Meta-analysis OITE

OITE "Spine Questions"

- 2003	18 spine	7 peds	25 / 275 = 9.1%
- 2002	19	6	25 / 275 = 9.1%
- 2001	25	6	31 / 275 = 11.3%
- 2000	25	3	28 / 275 = 10.2%
- 1999	26	9	35 / 275 = 12.7%
- Total	113	31	144/1375 = 10.5%

Question Compilation

- The following is a compilation of repeat facts and questions from the OITE/SAE:

• OITE 1999-2003		133 Q
• SAE		
- Spine	2003, 2000	200 Q
- Anatomy	2002, 1999, 1996	34 Q
- Tumor/Ortho Dz	2002, 1999, 1996	16 Q
- Trauma	2000, 1997	18 Q
- Basic science	1997	9 Q

OITE Update: Adult Spine

- 2002-2006
- Mean Questions/Exam: 22.3 (8.12%)
- Range: 19 (2005) to 29 (2002)
- Mean Questions with Images/Exam: 7

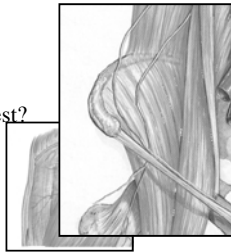
Anatomy

High Yield Facts



Structures at risk during graft harvest?

- Anterior
 - Lateral femoral cutaneous n.
 - Anterior thigh numbness
- Posterior
 - Cluneal n.
 - 8 cm lateral to PSIS
 - Buttock numbness
 - Superior gluteal artery



See Anatomy Lecture

High-Yield Vertebral Artery



- Relational Anatomy See Anatomy Lecture
 - Posterior to longus colli
 - Anterior to lateral mass
- Trauma: Bilateral C5/6 facet dislocations
 - Vertebral artery injury
 - Diplopia, vertigo, tinnitus
- C1-C2 anatomy
 - 1.5 cm lateral from posterior midline dissection
 - 1.0 cm lateral for superior midline dissection

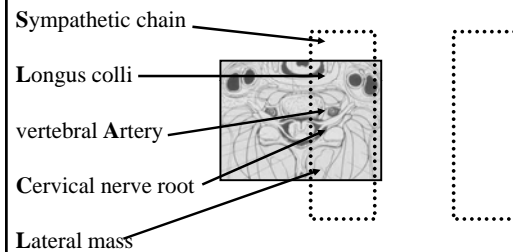
Pure Anatomy



- Artery of Adamkiewicz
- Left side
- Posterior intercostal artery
- T8-T12 (T9-11)
- Its relevance to iatrogenic spinal cord problems is still uncertain.

- Thoracic duct
- Left side
- Posterior to structures of carotid sheath

Relational Anatomy: Cervical Spine



High-Yield Facts



- Horner's
 - Preganglionic C8-T1
 - Ptosis (drooping eyelid)
 - Miosis (constricted pupil)
 - Anhidrosis (absence of sweat)
- Anterior cervical plate
 - Lies posterior to the trachea and esophagus

Greater Occipital Nerve



- Anatomy
 - C2 nerve root
 - Exits between C1 and C2
- Rheumatoid arthritis
 - Compression can cause base of the skull pain
- Trauma
 - At risk during C1-C2 transarticular screws placement

Retroperitoneal Lumbar Approach



- Structures at risk **See Anatomy Lecture**
 - Ureter lies in peritoneal cavity
 - Genitofemoral nerve and Sympathetic chain at risk
 - Superior Hypogastric plexus
- Vascular anatomy of the anterior lumbar spine
 - IVC to the right of descending Aorta in lumbar spine
 - Bifurcation of Great Vessels are at L4/5 disc space
 - Iliolumbar vein at level of L5
 - Segmental vessels at level of mid body

Degenerative Spine

C2-3 HNP



- Protect superior laryngeal nerve in Singers !!!!
- High phonation
- Superior laryngeal nerve a risk with standard approach
- A modified submandibular approach
- Anterior retropharyngeal exposure / McAfee

See Anatomy Lecture

Sexual Dysfunction after Anterior Lumbar Surgery



- Erectile dysfunction
 - Usually nonorganic.
 - Parasympathetics deep in the pelvis at S2-3 and S3-4
 - Erectile function not affected by sympathetic injury
- Retrograde ejaculation
 - Superior hypogastric sympathetic plexus injury
 - Anterior surface crossing at L4-5 and L5-S1 level

“Point and Shoot”

Degenerative Spinal Conditions

Speech / Swallowing difficulties after ACDF



- THINK:
 - Visceral
 - Vascular
 - Postoperative hematoma
 - Stroke
 - Neurologic
 - Recurrent laryngeal n.- Bitonal speech
 - Superior laryngeal n - High phonation
 - CN 12-Tongue deviation
 - Graft dislodgement

Degenerative Spine

Case Scenarios:

Finger clumsiness ...



- with weakness, dermatomal pain, hyporeflexia
 - Cervical radiculopathy
- without pain or numbness, hyperreflexia
 - Cervical myelopathy
- with positive jaw jerk
 - Pathology is above the level of the pons

Degenerative Spinal Conditions

Laryngeal Nerves in ACDF



Superior laryngeal nerve
traction in upper cervical surgery
high note phonation
no vocal cord paralysis

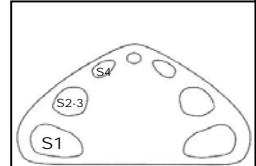
Recurrent laryngeal nerve
vocal cord paralysis on the side of injury
hoarseness
aspiration
can compensate partially for phonation

Word Association

Cauda Equina

- Abdominal bloating ☺☺☺
- Urinary retention
- Saddle anesthesia
- Bladder function = S2, S3, and S4 nerve roots.
- Decreased rectal tone and urinary retention
- Urgent surgical decompression

• Sacral root anatomy
See Degenerative Lecture



Herniated Disc

- Management HNP ☺☺☺☺☺
 - Conservative measures initially
 - Pain without significant motor deficit.
 - Painless Great Toe weakness
 - Surgery
 - Failed conservative > 3 mos
 - Progressive neurologic deficit
- Herniated C4-C5 disc See Degenerative Lecture
 - C5 nerve
- Herniated L4-L5 disc
 - Posterolateral L5 nerve root
 - Far lateral L4 nerve root
 - Foraminal stenosis L4 nerve root

High Yield Facts

Conus Medullaris vs. Cauda Equina Syndrome



- Conus medullaris syndrome
 - Conus ends at level of L1 typically
 - Typically injury at T12-L1 or T11-T12
 - Isolated loss of bowel and bladder function
 - Cauda equina syndrome
 - Injury at the lumbar levels
 - Large HNP, tumor, severe stenosis
 - Some degree of lower extremity motor loss
- See Thoracolumbar Lecture

Spinal Stenosis



- Neurogenic claudication without spondylolisthesis
 - Decompressive laminectomy
- Neurogenic claudication with degenerative slip
 - Laminectomy with posterolateral fusion +/- instrumentation
- Iatrogenic instability
 1. Iatrogenic removal of the pars
 2. Unilateral total facetectomy (1 x 100%=100%)
 3. Bilateral partial facetectomy >50% (2 x 50%=100%)

See Degenerative Lecture

Degenerative Spinal Conditions

Mechanical axial LBP

- Make sure there are no red flag questions
- Conservative measures if <4 wks
 - Imaging not indicated if <4 weeks of Sx
- Imaging -- start with plain films
- ☺ • Think rheumatologic stuff
 - esp if they give you ESR, titers, etc
- Discogram
 - Concordant pain at one level best indicator for success with surgical fusion

Dural Tears

- Management of intraoperative tear.
 - Primary repair whenever possible.
 - Water tight closure.
 - Bed rest 48 hours
 - No drain necessary
- Management of post-operative tear.
 - Subarachnoid drain, Abx, bed rest
 - If persists greater than 3-4 days then surgical re-exploration
- Post-op nausea on PCA after Lumbar disc surgery
 - Don't forget about dural tear as a possibility

Isthmic Spondylolisthesis



- Pars (interarticularis) defect
- Scotty dog
- 5% of the general population
- Progression uncommon
- Familial predisposition
- SPECT- Most sensitive test for isthmic spondy
- Repetitive Hyperextension
- Football player with low back pain
- Gymnast with low back pain
- Swimmer with low back pain
- L5-S1 isthmic spondylolisthesis– L5 nerve root
- TLSO with thigh extension

Spinal Deformity

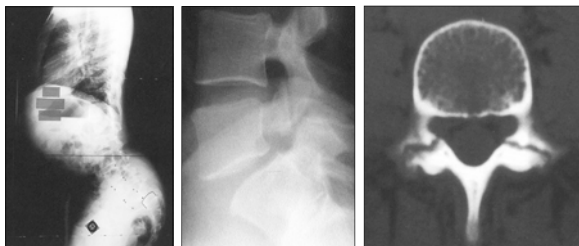
Harrington Instrumentation



- Flatback
- Lumbar distractive instrumentation
- Sagittal malalignment
- Loss of lumbar lordosis
- Positive sagittal balance

Basic Science

Classic Images: Spondylolisthesis and Spondylolysis



High Yield Facts



- Spinal fusions
 - NSAIDs decrease fusion rate
 - Ketoralac
 - Ibuprofen
 - Nicotine
 - Decreases
 - Smoking
 - Stop preoperatively and 6 months postoperatively

- Biomechanically the best construct for immobilizing C1-2



1. Gallie-type
2. Brooks-type
3. 2 bilateral posterior clamps (Halifax-type)
4. Anterior odontoid screw
5. Transarticular (Magerl) screw with midline wiring and grafting

Construct stability is enhanced with posterior spinous process wiring in presence of anterior cervical plating because:



1. Improved rotational stiffness
2. Improved lateral bending
3. Improved extension stiffness
4. Reconstitution of posterior tension band
5. Augmentation of axial load resistance

Preferred response: 4

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3. 2 bilateral posterior clamps (Halifax-type)
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Preferred response: 5

- When compared with cobalt-chromium and stainless steel implants, a titanium implant has what biomechanical properties?



- 1- Lower modulus of elasticity
- 2- Improved notch sensitivity
- 3- Increased hardness
- 4- Increased risk of corrosion
- 5- Decreased biocompatibility

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Preferred response: 1

High-Yield Facts

Short-form 36 (SF-36)

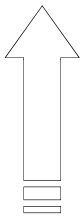


- Excellent for measuring patient's perception of treatment outcome
 - Patient-generated
 - Validated assessment
 - Physical, social, and role function
 - Emotional and mental health
 - Energy/fatigue, pain,
 - Health perception, and health change.

Traumatic Spine

High-Yield Facts

Intradiscal Pressure



Highest
Sitting leaning forward
Sitting
Standing
Supine
Lowest

See Degenerative Lecture

Traumatic Spinal Conditions

Spinal Cord Neuromonitoring



- Stagnara wake-up
 - Gold standard
 - Especially for motor fxn
- MEP
 - Motor evoke potentials
 - Anterior column
- SSEP
 - Sensory=dorsal column=may miss anterior/motor fxn

High-Yield Facts




- Characteristics during disc degeneration?
 - Begins gradually during third decade of life
 - Glycosaminoglycan (GAG) levels in nucleus decline.
 - Water content decreases in the sixth decade and beyond.
 - Corresponding increase in noncollagen glycoprotein.

↓ GAG & H₂O

↑ Noncollagen glycoprotein

Traumatic Spinal Conditions

Nerve Root Neuromonitoring

- Stagnara Wake-up 
 - Gold standard
 - Good for both spinal cord and nerve root
- EMG
 - Identifies nerve root irritation
- Dermatomal
 - Nerve root
- Pudendal nerve root monitoring
 - Monitors S2-S4 nerve roots
 - Sacral tumors
 - ? Maybe high grade spondy

Important Facts



- Trauma
 - Radiographs must include C7/T1 junction
 - Adhere to ABCs and primary survey
 - Spine precautions
 - If there are associated facial fractures
 - Consider cricothyroidotomy for airway

Traumatic Spinal Conditions

C-Spine Numbers



- Abnormal ADI values adult
 - > 3.5 mm
- Abnormal ADI values pediatrics
 - > 5 mm
- Lateral mass overhang
 - > 7 mm total (both sides added up)

See Anatomy Lecture

High-Yield Facts



- Dens fracture Type II
 - Risk of Nonunion
 - 50 y.o.
 - 5 mm posterior displacement
 - 10 degrees angulation
 - Frontal oblique
 - Treatment chronic nonunion
 - Defined as 3 months or greater
 - PSF C1-C2
- Dens fracture Type III
 - Halo

High-Yield Fact

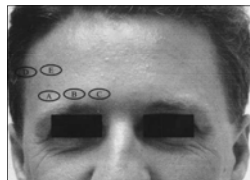


- Management of whiplash
 - Early mobilization and resumption of normal activities shown to improve functional outcome and decrease subjective symptoms as measured 6 months after injury.

High-Yield Facts



- Halo placement
 - Below equator of the head
 - Above supraorbital ridge
 - 4.5 cm lateral
 - Avoids supraorbital nerve
 - Avoids frontal sinus



See Anatomy Lecture

Traumatic Spinal Conditions

Word Association



- Mechanism Jumped facet
- Distractive flexion
- Mechanism Chance See Thoracolumbar Lecture
- Flexion distraction
- Mechanism Burst
- Axial compression

High Yield Facts

Jumped facet



- Mechanism:
 - Distractive Flexion
- Xrays:
 - Unilateral jumped facet 25% translation
 - Bilateral jumped facet 50% translation
- Management
 - Halo or G-WS tongs (Think MRI compatible)
 - SAFELY reduction ASAP



Traumatic Spinal Conditions

Fall from height



- Surgical Decision Making
 - Anterior decompression, fusion, and instrumentation
 - Neurologic deficit with retropulsion
 - Late treatment for deformity / post-traumatic kyphosis
 - Posterior procedure
 - LAMINA fracture → possible trapped nerve roots
 - Early treatment: 24-48 hours
 - Reduction through ligamento/annulotaxis with instrumented PSF
 - Laminectomy alone is not the answer!

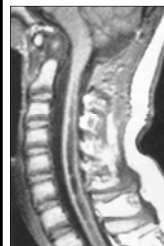
Traumatic Spinal Conditions

Jumped Facet



- Algorithm
 - Close reduction without MRI
 - Patient awake and cooperative
 - When to get an MRI
 - Patient confused, uncooperative, alcohol, etc.
 - Difficult closed reduction
 - When to go to surgery
 - Unable to perform closed
 - MRI or CT reveals extruded disc
 - Evolving neurologic during closed reduction

Classic MRI: Syring



Trauma:

- Late development after SCI
- Scoliosis in skeletally immature trauma patients
- Charcot joints: shoulder, hips
- Spasticity/new neuro changes in SCI patient

Deformity

- LEFT thoracic curve
- Rapidly progressive scoliotic curve

Traumatic Spinal Conditions

Fall from height



- Thoracolumbar burst fracture
 - Mechanism: axial load
- Surgical indications (?): See Thoracolumbar Lecture
 - Neurologic deficit
 - Kyphosis > 30 degrees
 - Anterior loss of height > 50%
 - Retropulsion > 50%
- Most burst fractures can be treated nonoperatively

Traumatic Spinal Conditions

Word Association



- HA, diaphoresis in SCI patient
- Autonomic dysreflexia
- What is autonomic dysreflexia?
- Sympathetic overdrive
- What should you look for in patients with autonomic dysreflexia?
- Orthopaedic issues, GU, GI

CTQ!

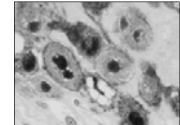


Anteriorly placed SI screws
place L5 nerve root at risk

Chordoma



- Midline
- Primitive notocord-midline structure
 - Sacral-coccygeal 50% (sacral mass)
 - Occipitocervical 30%
 - Remaining spine 20%
- Surgical
- Not sensitive to chemoTx or XRT
- Cure: en bloc resection
- Histology: Physaliphorous cell



Infections and Tumor


Classic CT: Osteoid osteoma



- Osteoblastic lesion
 - Osteoid osteoma < 2cm
 - Osteoblastoma > 2 cm
- 2nd and 3rd decade of life
- Pain
 - Unrelated to activity
 - Persistent
 - Noted mostly at night
- Response to aspirin is not universal



Tumor locations

- Posterior elements 
 - Osteoid osteoma
 - Osteoblastoma
 - Aneurysmal bone cyst
- Anterior body
 - Metastases
 - Giant cell tumor
 - Hemangiomas
 - Eosinophilic granuloma
 - Chondrosarcoma
 - Osteosarcoma

Classic X-ray: Winking Owl Sign



Think:

- Spine Tumor
- Pedicle missing
- Require 50% bony destruction to see lytic lesion on spine radiographic
- Obtain MRI with Gadolinium



Case Example:

Isolated Spinal Metastases



- Young female. Breast carcinoma. Isolated spinal metastases to vertebral body. Pain with neurologic deficits. Mgt?
- Considerations:
 - Young person
 - > 3-months life expectancy
 - Pain with neurologic compromise
- Answer: Surgery
 - Anterior
 - Corpectomy / Reconstruction
 - Instrumented fusion
 - PSF only as a supplement to anterior procedure

Inflammatory Arthritis

High-Yield Fact



- Best predictors of postoperative neurologic prognosis:
 - Pretreatment neurologic status.
 - 60 - 90% who are ambulatory at the time of diagnosis will retain this ability after treatment
- Location
 - Less space is available for the cord in the thoracic spine.
 - Lesions located in vascular watershed regions may disrupt the vascular supply of the cord.

Classic Imaging: Ankylosing Spondylitis



Compression Fracture Risk

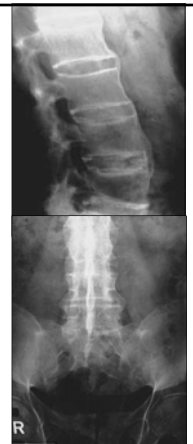


- 2 or more previous osteoporotic compression fractures
 - Future risk is increased by 12 fold
- A decrease of two standard deviations in BMD
 - Future risk is increased 4-6 fold
- Positive family history
 - Future risk increased by 2.7 fold
- Premature menopause
 - Future risk increased by 1.6 fold
- Smoking
 - Future risk increased by 1.2 fold.

Classic Imaging: Ankylosing Spondylitis



- SI joint sclerosis
- **Not diffuse idiopathic skeletal hyperostosis (DISH)**
 - DISH is a radiographic Dx
 - 3 consecutive nonmarginated osteophytes without disk degeneration.



High-Yield Facts

Ankylosing Spondylitis



- Features
 - Limitation of chest expansion to 1 inch or less
 - Bamboo spine
- Neck pain
 - Assume fracture
 - Spine precautions
 - Admit
 - CT scan with recon
 - Halo immobilization (+/- Surgery)

Recommended treatment of a patient with ankylosing spondylitis and acute non-displaced fracture of C-spine?



1. Halo vest
2. Halter traction
3. Skeletal traction
4. Two-poster brace
5. Soft cervical collar

Rheumatoid Neck



- Once neurologic symptoms → surgical intervention recommended
- AAS - atlantoaxial subluxation
 - Most common deformity
 - PADI more important
 - 10 mm and 14 mm
 - Fuse C1-C2
- AAI - atlantoaxial invagination
 - 4.5 mm above McGregor's line
 - Cervicomedullary angle (CMA) <135 degrees
 - Surgical intervention: Fuse to occiput
- SAS - subaxial subluxation
 - Fuse to the lowest level of sublux

Recommended treatment of a patient with ankylosing spondylitis and acute non-displaced fracture of C-spine?



1. Halo vest
2. Halter traction
3. Skeletal traction
4. Two-poster brace
5. Soft cervical collar

Preferred response: 1

28 y.o. LBP. Urethral discharge



- THINK: Reiter's Syndrome
- LBP
- Small joint polyarthralgia
- Nongonococcal urthritis
 - Urethral discharge!
- HLA-B27 in 88% cases
- Elevated ESR 72%

- 60-y.o. Hx of breast cancer has progressive paraparesis. The MRI scan shown to the right. What form of management is most likely to restore or maintain ambulation?

- 1- Radiation therapy and a thoracolumbosacral orthosis
- 2- Laminectomy alone
- 3- Laminectomy and radiation therapy
- 4- Laminectomy and posterior fusion
- 5- Anterior decompression and stabilization



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PREFERRED RESPONSE: 5

Rheumatoid Neck

R.A. patient. ADI = 6 mm on flex-ext for several years. Recent x-rays now fixed at 5 mm- no motion on flex-ext. Why?



1. Arthritis has stabilized
2. C1-2 joint has fused
3. Patient has been wearing a c-collar
4. Improved medical management
5. Atlantoaxial impaction has occurred

19-y.o. reports back pain after MVA. Xrays demonstrate a spondylolysis. Bone scan is normal. The patient should be informed that the condition was

- 1- Caused by the accident, exists in 5% of the population, no familial predisposition, unlikely to progress.
- 2- Caused by the accident, exists in 12% of the population, no familial predisposition, unlikely to progress.
- 3- Preexisting to accident, exists in 3% of the population, no familial predisposition, should be monitored for progression yearly until age 25 years.
- 4- Preexisting to accident, exists in 5% of the population, familial predisposition, and is unlikely to progress.
- 5- Preexisting to accident, exists in 12% of the population, familial predisposition, and is likely to progress throughout adulthood.

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PREFERRED RESPONSE: 4

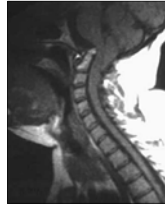
- 62-y.o. with a long history of rheumatoid arthritis requiring hospitalization. She was placed into skeletal traction and her symptoms improved and neurologic exam returned to normal. Repeat radiographs show a normal occiput and C1-C2 relationship. Treatment should now include



- 1- C1 laminectomy.
- 2- transoral removal of the odontoid.
- 3- occipitocervical stabilization.
- 4- cervical laminoplasty.
- 5- foramen magnum decompression.



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PREFERRED RESPONSE: 3

Which of the following are considered characteristic features of degeneration of a disk?

- 1- Reduced water and glycosaminoglycan content and increased noncollagen glycoprotein
- 2- Reduced water and glycosaminoglycan content and reduced noncollagen glycoprotein
- 3- Reduced water content, increased glycosaminoglycan content, and increased noncollagen glycoprotein
- 4- Increased water and glycosaminoglycan content and increased noncollagen glycoprotein
- 5- Increased water and glycosaminoglycan content and reduced noncollagen glycoprotein

Most common mxn of injury in adult SCI?

1. GSW
2. Falls
3. MVA
4. Sporting injuries
5. Suicide attempts

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- 5- Increased water and glycosaminoglycan content and reduced noncollagen glycoprotein

PREFERRED RESPONSE: 1

Most common mxn of injury in adult SCI?

1. GSW
2. Falls
3. MVA
4. Sporting injuries
5. Suicide attempts

Preferred response: 3

• 19-y.o. sustains a spinal cord injury in a MVA 3d ago. Motor 5/5 full strength in deltoids/biceps bilaterally, 4/5 strength in wrist extension bilaterally, 1/5 triceps function on the right side, and 2/5 triceps function on the left side. There is no lower extremity motor function. Based on the American Spinal Injury Association's classification the patient's functional level is?

- 1- C4
- 2- C5
- 3- C6
- 4- C7
- 5- C8

- 19-y.o.sustains a spinal cord injury in a MVA 3d ago. Motor 5/5 full strength in deltoids/biceps bilaterally, 4/5 strength in wrist extension bilaterally, 1/5 triceps function on the right side, and 2/5 triceps function on the left side. There is no lower extremity motor function. Based on the American Spinal Injury Association's classification the patient's functional level is?

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- 3- C6
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- 5- C8

PREFERRED RESPONSE: 3

Patient with ankylosing spondylitis. Sudden onset severe cervicothoracic pain radiating into bilat arms with any change of position. DENIES TRAUMA. Current radiographs show no change compared with previous studies. Dx?



1. Increased inflammation as result of long-standing inflammatory arthritis
2. Cervical HNP
3. Osteomyelitis
4. Spinal fracture
5. Referred pain from occipital cervical degenerative disease

Which technique reduces the risk of neurologic injury during transperitoneal approach to the L5-S1 interspace protecting the superior hypogastric plexus ?

- 1- Transverse incision across posterior peritoneum and disk space, reflect tissues toward the sacral promontory
- 2- Transverse incision across the posterior peritoneum and disk space, reflect tissues towards confluence of the iliac veins
- 3- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues begin margin of the lt iliac vein and extend towards right iliac vein
- 4- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues begin margin of the rt iliac vein extend towards left vein
- 5- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues bilaterally away from the midline

Patient with ankylosing spondylitis. Sudden onset severe cervicothoracic pain radiating into bilat arms with any change of position. DENIES TRAUMA. Current radiographs show no change compared with previous studies. Dx?



1. Increased inflammation as result of long-standing inflammatory arthritis
2. Cervical HNP
3. Osteomyelitis
4. Spinal fracture
5. Referred pain from occipital cervical degenerative disease

Preferred response: 4

Which technique reduces the risk of neurologic injury during transperitoneal approach to the L5-S1 interspace protecting the superior hypogastric plexus ?

- 1- Transverse incision across posterior peritoneum and disk space, reflect tissues toward the sacral promontory
- 2- Transverse incision across the posterior peritoneum and disk space, reflect tissues towards confluence of the iliac veins
- 3- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues begin margin of the lt iliac vein and extend towards right iliac vein
- 4- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues begin margin of the rt iliac vein extend towards left vein
- 5- Vertical midline incision of the posterior peritoneum, reflect prevertebral tissues bilaterally away from the midline

Preferred response: 3

- A patient with rheumatoid arthritis has an unstable pseudarthrosis after undergoing C1-2 posterior fusion. No neurologic deficits are noted, and repair with posterior transarticular fixation screws and a posterior wiring technique at C1-2 is planned. Which of the following preoperative studies offers the best visualization?

- 1- Lateral flex/ext radiographs centered over C1-2
- 2- Cervical MRI
- 3- Thin-cut CT through the C1-2 and C2-3 segments
- 4- Vertebral artery angiography
- 5- Electromyography of cervical roots and spinal cord

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PREFERRED RESPONSE: 3

19 y.o. develops new neurologic sx 1 hour after MVA. X-ray- bilat jumped facet. MRI reveals no disc herniation. Skeletal traction applied, but after 4 hrs no change in radiographic appearance or neurologic exam. Mgt?

1. Closed reduction under anesthesia
2. Open reduction and PSF C5-6 and spinous wiring
3. Lami C5-6 with lateral mass screws
4. Skeletal traction x 24 hrs, decadron.
5. ACDF C5-6 with ICBG, PSF C5-6 with interspinous wiring

- Subluxation caused by rheumatoid arthritis is most commonly seen at what level of the cervical spine?

- 1-Occiput-C1
- 2-C1-C2
- 3-C2-C3
- 4-C3-C4
- 5-C4-C5

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Preferred response: 2

Function of a C6 quadriplegic

1. Functional thumb pinch
2. Functional wrist flexion
3. Functional grip strength
4. Manual wheelchair locomotion
5. Independent transfers without aids

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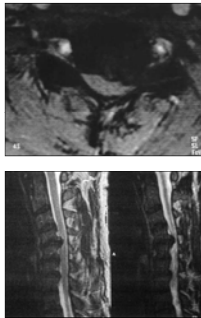
Preferred response: 4

Pt with spinal stenosis had difficulty ambulating. PE finding consistent with co-existing cervical myelopathy would be:

1. Gastroc weakness
2. Positive SLR
3. Plantar extensor responses
4. Diminished ankle reflexes
5. Intact bulbocavernosus reflex

A patient who has had neck pain radiating down the arm x 4 wks. Pain was excruciating during 1st wk. Mgnt NSAIDs and PT decreased neck and arm sx from 10/10 to 3/10. Remains neurologically intact. Best course of action

- 1-immediate hospital admission and surgery because of the risk of paralysis.
- 2-surgery within 24 hours.
- 3-surgery within the next several days.
- 4-elective surgery next available date.
- 5-additional nonsurgical management.



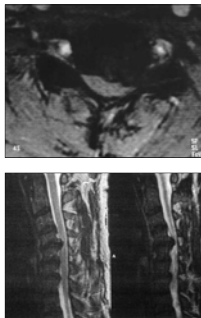
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Preferred response: 5

Most significant factor leading to a nonunion for halo vest for type 2 base of the odontoid fx is?

1. Diabetes
2. Osteoporosis
3. Extension injury
4. Age older than 65
5. Greater than 5 mm displacement

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- 33-y.o. sustains a C6 burst fracture diving into a pool, resulting in a complete spinal cord injury. Functional recovery would be maximized with

- 1- anterior corpectomy followed by strut grafting and instrumentation.
- 2- halo vest immobilization.
- 3- laminectomy and posterior wiring.
- 4- laminectomy followed by halo vest immobilization.
- 5- posterior lateral mass plating and fusion.



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Preferred response: 3

Most significant indication for surgery in adults with scoliosis?

1. Double major curve
2. Evidence of crankshaft phenomenon
3. Progression of deformity
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Preferred response: 3

21 y.o. neck, arm, shoulder pain after being hit by a car. Initial x-rays negative. Treated with a soft collar, but continues to have pain for last week. Next step?

1. Cervical myelogram
2. EMG
3. MRI c-spine
4. Philadelphia collar
5. Re-examine and repeat radiographs

45 y.o. male. 2 day neck and arm pain.

Relieved when he places hand on the top of head.

Examination= decreased sensation on dorsum of first web space, weak wrist extensor, absent BR reflex. Remaining exam nl. Dx?

1. Double crush
2. C6-7 HNP
3. C5-6 HNP with myelopathy
4. Acute C5-6 HNP
5. Shoulder impingement and C6-7 HNP

Shoulder adduction sign

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Preferred response: 4

Metastatic disease of the spine commonly originates where:

1. Disc
2. Epidural space
3. Pedicle
4. Spinous process
5. Vertebral body

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Preferred response: 5

40-yo back pain and intense burning pain in her perianal region after being shot twice in the back. Motor and sensory exam of LE reveals no deficit. She has present but decreased sensation in her perianal region, an intact anal wink, good rectal tone, and an intact bulbocavernosus reflex. Radiographs and CT scans are shown in next. What is the next most appropriate step in management?

- 1- Initiation of spinal cord injury steroid protocol
- 2- MRI of the lumbar spine
- 3- Immobilization in a thoracolumbosacral orthosis
- 4- Removal of the metallic fragments via laminectomy
- 5- Removal of the metallic fragments and posterior fusion with instrumentation

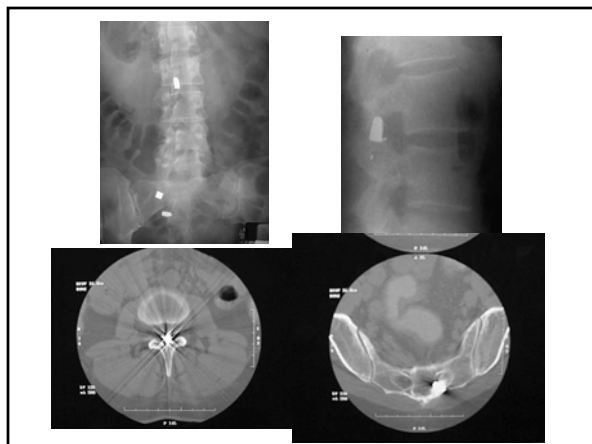
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- During anterior surgery on the cervical spine, at what level would the lateral dissection of the longus coli muscle most likely cause Horner's syndrome?

- 1- C3
- 2- C4
- 3- C5
- 4- C6
- 5- C7



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- 1- C3
- 2- C4
- 3- C5
- 4- C6
- 5- C7

Preferred response: 4

Treatment of patient with this x-ray.
Neurologically intact?

1. Halo brace
2. Rigid orthosis
3. ORIF with screw
4. Posterior wiring with halo brace
5. Posterior wiring with rigid orthosis



45 y.o. Asian man recent immigrant to U.S. with 3 month hx mid back pain. Conservative measures have not improved sx. Mgt:

1. Bx, culture and sensitivity
2. Broad spectrum Abx and bracing
3. Decompression and PMMA
4. Costotrasversectomy, decompression, and drug tx
5. Thoractomy, debridement, and reconstruction

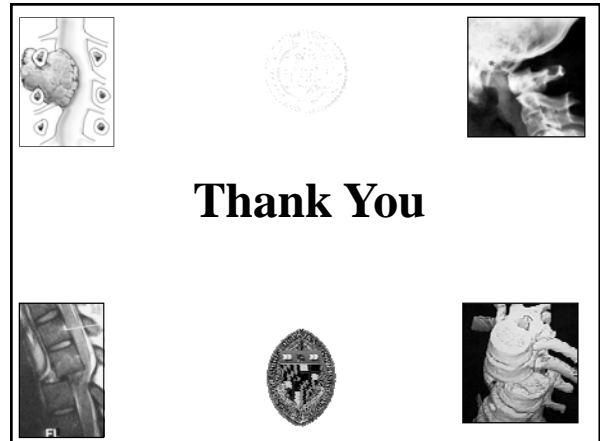
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