Physical Exam of the Spine

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Goals

• Systematic approach to performing a spine physical exam

• Improve understanding of physical exam findings

• Synthesize information from exam to help achieve diagnosis
Overview

• General Principles
  • Patient care setting
    • Priorities, setting up for success
    • Look, listen, feel....
  • Motor
  • Sensory
  • Special tests
• Examining more than the spine...
  • Hip-Spine Syndrome
General Principles

• Physical exam is exceptionally critical in identifying surgical vs. nonsurgical pathology in spine
  • Neurologic status often determines intervention

• Systematic approach to avoid mistakes

• When does your evaluation start?
  • Before you walk in the room!

• When does the physical exam start?
  • When you first “see” the patient!
General Principles

• Setting of evaluation
  • Special considerations depending on situation
    • Trauma bay
    • ER consult
    • Inpatient consult
    • Outpatient setting
  • Paying careful attention to physical exam decreases risk of missed injuries, delay to diagnosis, timely imaging, and improved accuracy of diagnosis
ER Patient Setting

• Trauma bay?
  • Greatest likelihood of missed injuries or delay in diagnosis
  • Heightened awareness when evaluating obtunded or intubated patients
  • Be aware of associated injuries
    • Do they have S1 weakness from a burst fracture or is there a missed talus/calcaneus fracture?
  • Be aware of distracting injuries!
    • Inability to detect sensory changes due to LE burns... etc.
ER Patient Setting

• Awake/alert patient in ER?

  • They are in the ER and not in your office for a reason!
  • Avoid the ER traps
    • ”Frequent flyer…” “just here for pain medicine…”
    • Are these patients misdiagnosed? Other missed pathology?
    • Victim of domestic abuse?
Other Patient Settings

• Inpatient consults
  • Why were they admitted?
  • History of infection? New onset back pain? → Osteodiscitis? Epidural abscess?
  • Recently extubated with weakness? Cervical Spondylosis on CT? → Central cord?
  • Always read the chart!

• Outpatient/ clinic setting
  • Patients may present in a much different fashion and certain tests may be able to be excluded (ex. rectal exam)
Spine Trauma Evaluation and Exam
Spine Trauma Evaluation and Exam

• Considerations before you step in the trauma bay
  • High energy?
    • MVC, fall of a ladder, etc..
  • Low energy?
    • Ground level fall? Step off a curb?
  • Age
    • Osteoporosis fracture risk?
    • Pathologic fracture risk?
• Awake and Alert?
• Intubated or obtunded?
Spine Trauma Evaluation and Exam

• Things to remember!
  • Always start with ABC’s
  • Be present for logroll (if possible)
    • If not, then repeat
  • “ER intern said the rectal was fine…”
    • Repeat when necessary

• Primary Survey
  • Airway
  • Breathing
  • Circulation
  • Disability
  • Exposure

• Secondary Survey
  • Typically, when you come in...
  • Not to interfere with ABC’s
Spine Trauma Evaluation and Exam

• Phases of spine trauma physical exam

  • 1) Inspection and palpation
    • Identify other injuries
    • Anterior
    • Posterior - log roll (can be part of primary or secondary survey)
  • 2) Neurologic
    • Motor
    • Sensory
    • Reflexes
Inspection- Anterior

• Start with head-to-toe visual inspection
• Remove all clothes
  • Head- Raccoon Eyes, bleeding from auditory meatus, etc
    • Basal Skull fracture
  • Neck- Cock-robin posture
    • Atlantoaxial rotatory subluxation, facet dislocation
• Chest
  • Chest contusions
  • Flail Chest
Inspection - Anterior

• Chest/ Abdomen
  • Seat belt sign

• Perineum/ Pelvis
  • Scrotal swelling
  • Vaginal bruising

• Extremities
  • Limb Deformities/ injury
    • ER position of hip, etc
  • Bruising/ Swelling
    • Palpate all large joints
    • If intubated, patient may withdraw from pain
  • Gross movement/ muscle tone
  • Every bruised, swollen or tender extremity gets an Xray!
Inspection- Posterior

- Log Roll
  - Inspect
    - Bruising
    - Open wounds
    - Probe if necessary
- Palpate
  - Spinous processes from skull to sacrum
  - Ribs, SI joints
- Be sure to have help to turn
- Maintain spine precautions
Neurologic Exam

• Motor

• Sensory

• Reflexes
Motor Exam- Cervical Spine

- Stick to ASIA classification for testing
- Isolate muscle group for exam

- **C5-**
  - Elbow Flexors
- **C6-**
  - Wrist extensors
- **C7-**
  - Elbow Extensor
- **C8-**
  - Finger flexor
- **T1-**
  - Finger abductors
Motor Exam - Lumbar Spine

• Stick to ASIA classification for testing

• Isolate muscle group for exam

• L2-
  • Hip Flexor

• L3-
  • Knee Extension

• L4-
  • Ankle Dorsiflexion

• L5-
  • Long toe extensor (EHL)

• S1-
  • Ankle Plantarflexion
Motor Exam - Pearls & Pitfalls

• Test muscle in contracted position

• Compare strength between sides

• Test one extremity at a time, write down the results
Motor Exam- Pearls & Pitfalls

• For L2-
  • isolate hip flexors by flexing knee and testing in 90 degrees of hip flexion
  • Weakness with straight leg raise may not necessarily indicate weak hip flexion
Motor Exam - Pearls & Pitfalls

• For C5-
  • May also isolate and test deltidoid function
  • Innervated by axillary nerve which is almost purely C5
  • Elbow flexion (biceps) has some contribution from C6

Brown et al. 2011
Motor Exam- Pearls & Pitfalls

• For S1-
  • Frequently taught to evaluate by plantarflexing ankle
  • However, given the high cross-sectional area of the GS complex, it can be difficult to detect subtle weakness

• Solution:
  • Isolate Peroneus Longus (S1) by placing your thumb on the plantar surface of the first metatarsal
  • Then, patient plantarflexes
Motor Exam - Motor Grade (ASIA)

- **5/5**
  - Active movement, full ROM against gravity, *sufficient* resistance
- **4/5**
  - Active movement, full ROM against gravity, *moderate* resistance
- **3/5**
  - Active movement, full ROM *against gravity*
- **2/5**
  - Active movement, full ROM *with gravity eliminated*
- **1/5**
  - Palpable or visible contraction
- **0**
  - Total paralysis
Neurologic Exam

• Motor

• Sensory

• Reflexes
Sensory Exam- Cervical Spine

• C5-
  • Anterior lateral shoulder

• C6-
  • Dorsal Thumb

• C7-
  • Dorsal MF

• C8-
  • Dorsal 4/5th digit

• T1-
  • Medial Forearm
Sensory Exam - Lumbar Spine

- L2-
  - Proximal medial thigh
- L3-
  - Distal medial thigh
- L4-
  - Medial ankle
- L5-
  - 1st web space
- S1-
  - Lateral ankle/ heel
Sensory Exam- Sensory Grading (ASIA)

- 0
  - Absent
- 1
  - Altered (decreased, impaired, or hypersensitivity)
- 2
  - Normal
Rectal Exam (ASIA)

• Extremely important
• Helps determine cord injury grade
• Dermatome is S4-5
Rectal Exam (ASIA)

• Exam consists of:
  • Sensation
    • Light touch (LT)/ pin prick (PP)
    • Deep anal pressure (DAP)
  • Voluntary Anal Contraction (VAC)

• Grading/ Scoring
  • If sensation (LT/ PP) or DAP or VAC are present = Sacral sparing = incomplete cord injury
Neurologic Exam

• Motor

• Sensory

• Reflexes
Reflexes

• Cervical
  • C5- Bicep
  • C6- Brachioradialis
  • C7- Tricep

• Lumbar
  • L4- Patella
  • S1- Achilles
Reflexes- Grading

- 0
  - Absent
- 1+
  - Hyporeflexic
- 2+
  - Normal
- 3+
  - Hyperreflexic
- 4+/ CL
  - Associated with Clonus
UMN Pathologic Reflexes

• Hoffman
• Clonus
  • >3 beats
• Babinski
• Inverted radial reflex
  • Finger flexion when test BR reflex
• Hyperreflexia
Other Patient Settings- Considerations

• Non-trauma evaluation
  • ER consult
  • Inpatient consults
  • Outpatient visits

• Gait analysis
  • Walking aids (walker, cane, walking stick, etc)
  • Trendelenburg gait- L5 palsy?
  • Wide based- myelopathy?
  • Flat back posture- claudication?
  • Pitch-forward posture- Sagittal imbalance? Adult spinal deformity?
Considerations: Hip-Spine Syndrome

• Anterior Hip Capsule
  • Branches of obturator and femoral nerve

• Posterior Hip Capsule
  • Branches from nerve to quadratus, superior gluteal, and sciatic nerve
Hip-Spine Syndrome - Referred Pain

HIP CAPSULE Innervation

- FEMORAL NERVE L2-4
- OBTURATOR NERVE - L2-L4
- SUPERIOR GLUTEAL NERVE L4-S1
- SCIATIC NERVE L4-S3

Extremity Cutaneous Nerve Innervation

- Genitofemoral L1-L2
- LFCN L2-3
- Anterior FCN L2-L3
- Saphenous/ Medial Crural Nerve L3-4
- Superficial Peroneal Nerve L4-S1
- Common Peroneal/ Lateral Sural Nerve L4-S2
Hip- Spine Syndrome: Exam

• Every spine exam needs a hip exam!
  • ROM
    • Contractures?
  • Pain with internal or external rotation?
  • Stinchfield positive?
    • Resisted active hip flexion at 30-45 deg
    • Painful response may indicate intraarticular hip pathology
• Positive findings? → GET HIP XRAYS!
  • Consider diagnostic and therapeutic intraarticular hip injection
Conclusion

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