CRACKCast E223 - Back Pain

EPISODE CONTENT BASED ON ROSEN'S EMERGENCY MEDICINE (9TH ED.)

Italicized text is quoted directly from Rosen's.

Key Concepts:

1. *Acute low back pain is a common, costly, recurring and painful condition that often has no recognizable or dangerous cause. Most low back pain is nonspecific and improves without laboratory evaluation or imaging.*
2. *The vast majority of patients can be properly managed by their PCP and do not require ED consultation or specialty referral.*
3. *A focused history should be elicited from patients with lower back pain, with the goal of uncovering high risk features that would predispose the patient to an emergent or life-threatening situation. The physical exam should focus on the lower extremity neurologic examination, including testing of strength, sensation and reflexes.*
4. *Imaging and laboratory studies are rarely indicated following the history and physical examination and are only indicated when there is evidence of neurologic deficit or multiple key clinical findings suggesting a dangerous or systemic pathologic cause.*
5. *Adherence to published guidelines will decrease the use of improper laboratory studies and imaging, thereby lowering costs, increasing ED throughput, and improving overall patient care*
6. *MRI in the ED should only be ordered when there is strong consideration of a serious or progressive neurologic lesion or spinal infection. When a critical or emergent diagnosis is strongly suspected, MRI and spine surgery consultation should be undertaken emergently.*
7. *Patients who have low back pain emergencies are generally classified into 5 groups:*
   1) Past medical history of malignancy and new back pain, with neurologic findings;
   2) Back pain and symptoms of epidural compression syndrome;
   3) Back pain with symptoms suggesting an infectious cause;
   4) Back pain with gross muscle weakness or paralysis; and
   5) Back pain and bilateral or multiple nerve root involvement.

Core Questions

1. List key historical red flags in a patient presenting with back pain.
2. List red flags on physical examination of a patient with back pain.
3. List key critical differential diagnoses for a patient presenting with acute back pain
4. Describe an approach to the rapid assessment of a patient with acute lower back pain
5. Describe an approach to ancillary testing and imaging for critical causes of acute back pain
6. List the sensory, motor, and screening tests for the lumbar nerve roots L3-S1
7. Describe an overview of the management of acute low back pain

Wisecracks

1. What are 4 variables associated with serious outcomes in patients with back pain
2. Differentiate between conus medullaris syndrome and cauda equina syndrome.
3. What physical exam/ancillary findings are most predictive of cauda equina?
4. How does Rosen's differentiate between disc herniation and radiculopathy?

Rosen's in Perspective:

Back pain is the most common MSK complaint that we see in the ED. 85% of patients with acute low back pain (<6 weeks) are diagnosed with mechanical/nonspecific back pain, where no acute alternate diagnosis is found. Approximately 2% of patients will have an emergent diagnosis, such as AAA, cauda equina, SEA, cancer etc. The WHO defines nonspecific back pain as "back pain having no known underlying identifiable pathology and no apparent relative tissue damage."

There are a multitude of causes of back pain. These can include vascular, visceral, infectious, mechanical and rheumatologic conditions. Pain may come from the spinal cord, nerve root, vertebral column, muscles, or have extraspinal/visceral origins. Low back pain often has no identifiable cause; possible explanations can include ligament/muscle injuries, degenerative disc disease and OA, and disc herniation.

So what is an emergency clinician supposed to do? The good news is that a thorough history and physical examination (and possible PVR) is all that is needed for the majority of low back pain patients. Labs and imaging are only indicated in a small subset of patients. We will give you an approach to acute back pain that will have you looking like a rock star next time you pick up one of these challenging patients on shift.

Core Questions:

[1] List key historical red flags in a patient presenting with back pain.

1. Recent Trauma
2. History of cancer
3. Anticoagulant use
4. IVDU
5. History of prolonged steroid use
6. History of osteoporosis
7. History of AAA
8. Patient >50y
9. Unrelenting night or rest pain
10. Unexplained weight loss
11. Recent bacterial infection
12. Immunocompromised status
13. Failure to improve after 6 weeks of conservative therapy

Mnemonic: TUNA FISH

This list was informed by Table 32.1 in Rosen's 9th Edition. Refer to the text for further information.

[2] List red flags on physical examination of a patient with back pain.

1. Abnormal vital signs (esp fever, hypotension)
2. Unequal blood pressure readings in upper extremity
3. Murmur of AI
4. Pulse deficit or circulatory compromise of the lower extremities
5. Pulsatile abdominal mass
6. Urinary retention
7. Urinary or stool incontinence
8. Loss of rectal sphincter tone
9. Severe or progressive neurologic deficit
10. Focal lower extremity weakness
11. New ataxia or difficulty walking

This list was informed by Table 32.1 in Rosen's 9th Edition. Refer to the text for further information

[3] List key critical differential diagnoses for a patient presenting with acute back pain.

Extraspinal	
Chest	1. Aortic dissection 2. Bacterial endocarditis 3. Pulmonary Embolism 4. Pneumonia 5. Pleural Effusion
Abdominal	1. Ruptured or Expanding Aortic Aneurysm 2. Esophageal disease 3. Penetrating peptic ulcer disease 4. Pancreatitis 5. Pancreatic cancer 6. Biliary colic 7. Cholecystitis 8. Cholangitis
Genitourinary	1. Renal colic 2. Prostatitis 3. Perinephric abscess 4. Pyelonephritis 5. Ovarian torsion or tumour 6. Pelvic Inflammatory Disease 7. Endometriosis
Musculoskeletal	1. Acute muscle strain 2. Acute ligamentous injury
Other	1. Herpes zoster 2. Retroperitoneal hemorrhage 3. Psoas abscess
Spinal	1. Cauda Equina Syndrome 2. Epidural abscess or hematoma 3. Transverse myelitis 4. Vertebral fracture 5. Osteomyelitis 6. Infectious diskitis 7. Ankylosing spondylitis 8. Disc herniation 9. Isolated sciatica 10. Spinal stenosis

This table was informed by Figure 32.2 in Rosen's 9th Edition. Refer to the text for further information

[4] Describe an ER diagnostic approach to the rapid assessment of a patient with acute lower back pain.

Vital Signs and Exam:		Differential Diagnosis:
Abnormal Vital Signs:	Shock or Syncope?	Aortic Dissection AAA Sepsis Pulmonary Embolus
	Hypertension, unequal BP readings, or murmur?	Aortic Dissection
	Fever?	Pneumonia Pericarditis Pyelonephritis Cholecystitis
	Fever and abnormal neuro exam?	Epidural abscess Osteomyelitis Meningitis
Stable Vital Signs:	Abnormal neurologic exam	Tumour Fracture Herniated disc Spinal stenosis
	Normal neurologic exam	Lumbosacral strain Paraspinal muscle strain Fracture Herniated disc Tumour Pulmonary Embolus Renal colic Biliary colic Peptic ulcer disease Pancreatitis Prostatitis Pelvic Inflammatory Disease

This table was informed by Figure 32.1 in Rosen's 9th Edition. Refer to the text for further information

[5] Describe an approach to diagnosis and ancillary testing and imaging for critical causes of acute back pain.

Critical			
Diagnosis	**History**	**Physical Exam**	**Testing**
Aortic Dissection	Sudden, tearing pain	Unstable vital signs, sometimes unequal blood pressure in arms	- CT, MRI - TEE
Abdominal Aortic Aneurysm	Radiation to flank, testicles	Pulsatile abdominal mass	- Bedside US - CT if stable
Spinal Epidural Abscess	At-risk patients include DM, CKD, IV drug use, cancer, recent spinal surgery	Fever is common	- CBC, ESR/CRP - MRI is imaging mode of choice
Epidural Compression (Cauda Equina, etc)	Symptoms may develop over hours, sciatica very common, fecal incontinence	Urinary retention, saddle anesthesia	- Elevated PVR. - MRI > CT
Fracture w Impingement	Acute, localized pain	Tenderness to palpation	- X-rays first - Then CT or MRI
Epidural Hematoma	Coagulation disorders common	Radicular findings similar to abscess	- MRI or CT - Myelography
Emergent			
Diagnosis	**History**	**Physical Exam**	**Testing**
Vertebral Osteomyelitis	At-risk patients: DM, CKD, IV drug use, cancer, recent spinal surgery	Fever, localized body tenderness of adjacent vertebrae	- CBC, blood cultures low yield - X-rays diagnostic in most cases, MRI more detailed
Transverse Myelitis	Neurologic deficits, 50% of patients worsen maximally in 24 hours	Partial or total loss of sensory, motor, autonomic below lesion	- MRI>CT - Goal is to rule out mass lesion
Mechanical causes (herniation, stenosis, fracture, etc)	Usually patient recalls atraumatic event (twisting, lifting, etc), stiffness, decreased ROM	Positive straight leg raise, muscular weakness, decreased reflexes	-X-rays not indicated -CT or MRI if CES, osteomyelitis, or cord compression suspected

This table was informed by Table 32.1 in Rosen's 9th Edition. Refer to the text for further information

[6] List the sensory, motor, and screening tests for the lumbar nerve roots L3-S1.

Disc space	Nerve root	Sensory testing	Reflex and motor testing
L3-4	L4	Medial lower leg and foot to medial great toe (excluding 1st web space)	- Patellar reflex - Knee extension - Ankle inversion and dorsiflexion - Squat and rise movement
L4-5	L5	Lateral lower leg, dorsum of foot, and 1st web space	- Great toe dorsiflexion - Heel walking
L5-S1	S1	Lateral foot and ankle	- Achilles' reflex - Plantar flexion - Toe walking

This table was informed by Table 32.2 in Rosen's 9th Edition. Refer to the text for further information

[7] Describe an overview of the management of acute low back pain.

No red flags: Reassuring H&P, benign exam	No imaging required
Chest, abdominal or flank pain: Lack of neuro findings of exam	Consider US or CT for emergent extraspinal etiologies
Suspected fracture: Trauma, prolonged steroid use, older age, osteoporosis	X-rays then consider CT
New, progressive neuro abnormalities: Bowel/bladder incontinence, saddle anesthesia, multi-nerve root involvement	Emergent MRI and consultation
Cancer risk, moderate to high suspicion: History of cancer or multiple risk factors	MRI
Cancer risk, low suspicion:	Risk stratify with ESR, CRP and plain film, then MRI if abnormal
Infection risk, moderate to high suspicion: Fever, abnormal neuro exam, immunocompromised, recent spinal instrumentation or indwelling devices, IVDU	MRI
Infection risk, low suspicion:	Risk stratify with ESR, CRP and plain film, then MRI if abnormal

This chart was informed by Figure 32.2 in Rosen's 9th Edition. Refer to the text for further information

Wisecracks:

[1] What are 4 variables associated with serious outcomes in patients with back pain

1. Pain worse at night
2. Decreased lower extremity sensation
3. Use of anticoagulants
4. Pain persisting despite appropriate treatment, appropriate disposition for these patients can often be a challenge.

[2] Differentiate between conus medullaris syndrome and cauda equina syndrome.

Conus Medullaris Syndrome

- Definition: compression of the distal aspect of the spinal cord from T12 to L2.
- Typical site of lesion: L2 vertebral level (Differential diagnosis - disc herniation, spinal fracture, tumor)
- Symptoms: back pain radiating to the legs, early and prominent sphincter dysfunction, flaccid paralysis of bladder and rectum, saddle anesthesia. May spare leg muscles and lumbar nerve roots

Cauda Equina Syndrome

- Definition: compression of the nerves and nerve roots stemming from the distal end of the spinal cord.
- Typical site of lesion: L3-L5 nerve roots (L4/5 and L5/S1 disc herniation in 50% of cases)
- Symptoms: **bilateral radiculopathy**, back pain radiating to legs, urinary retention (may present with overflow incontinence), fecal incontinence (with absent rectal tone), saddle anesthesia, lower extremity weakness.

Epidural compression syndromes table[2]

Syndrome	Spinal cord compression	Conus medullaris syndrome	Cauda equina syndrome
Location of lesion		Lesions at vertebral level L2	
Spontaneous pain		Unusual and not severe; bilateral and symmetrical in perineum or thighs	Often very prominent and severe, asymmetrical, radicular
Motor findings	Deficits usually affect both legs but are often asymmetric	Not severe, symmetrical; rarely twitches	May be severe, asymmetrical, fibrillary twitches of paralyzed muscles are common
Sensory findings	Weakness in lower extremities, paresthesias/sensory deficits, gait difficulty	Saddle distribution, bilateral, symmetrical, disassociated sensory loss (impaired pain and temperature with sparing of tactile)	Saddle distribution (75% pts), may be asymmetrical, no dissociation of sensory loss
Reflex changes		Achilles reflex may be absent	Patellar and Achilles reflexes may be absent
Sphincter disturbance	Bladder and rectal sphincter paralysis usually reflect involvement of S3-S5 nerve roots	Early and marked (both urinary and fecal)	Late and less severe (60-80% pts)
Male sexual function		Impaired early	Impairment less severe
Onset		Sudden and bilateral	Gradual and unilateral
Other			Urinary retention with or without overflow incontinence (Sn 90%, Sp 95%)

Source: https://wikem.org/wiki/Conus_medullaris_syndrome

[3] What physical exam or ancillary findings are most predictive of cauda equina?

a. No clinical signs or symptoms are individually sensitive or specific enough to diagnose Cauda Equina Syndrome (or definitively exclude the diagnosis).

b. **Using a post void residual of 200mL or more** to risk stratify patients with CES has a sensitivity of 94% and an NPV of 98%. Normal PVRs are <50mL in young healthy patients, and <100mL in elderly patients.

c. If the diagnosis is suspected, pursue early consultation with spine surgery and MRI (gold standard) or CT myelogram if MRI unavailable. **This is a time sensitive (potentially litigious) ER diagnosis.**

Source: CJEM 2020;22(5):652–654

[4] How does Rosen's differentiate between disc herniation and radiculopathy?

- Disc herniation is usually asymptomatic, and only occasionally causes symptoms.
- Radiculopathy is a **clinical diagnosis** of nerve root irritation and compression, with symptoms in the affected nerve root (numbness, weakness, and paresthesias). The most common causes of radiculopathy are disc herniation and degenerative foraminal stenosis.

This posed was edited and uploaded by Tim Clark. www.timclarkmd.com