Low Back Pain

Etiology, Diagnosis, and Evidence-Based Management

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2025

Why Focus on LBP?

- Up to 80% of people will experience low back pain at some point during their lifetimes.
- LBP is the leading global cause of disability.
- More than 85% of case of LBP are nonspecific LBP.

Specific LBP VS Non-specific LBP

Specific LBP can be explained by an underlying disease (e.g., cancer), tissue damage (e.g., fracture), or may be referred from other organs (e.g., from kidney or aortic aneurysm).

Non-specific IBP pain lacks a definitively identifiable cause rooted in a specific pathology. Risk factors for non-specific LBP include low physical activity levels, smoking, obesity and high physical stress at work.

Etiology of Specific LBP

- **Traumatic:** Back pain commonly results from direct or indirect contact with an external force. Examples are whiplash injury, strain, and traumatic fractures.
- **Degenerative:** Musculoskeletal structures can weaken over time due to aging, overuse, or pre-existing pathology. Conditions like intervertebral disk herniation and degenerative disk disease fall into this class.
- **Referred pain:** Visceral organ inflammation can cause referred back pain. Examples are biliary colic, lung disease, and aortic or vertebral artery pathology.
- **Congenital:** Inborn conditions of the axial skeleton can cause the symptoms like kyphoscoliosis.
- **Psychiatric:** Back pain may also present in patients with chronic pain syndromes and other mental health conditions. Malingering individuals may also claim to have back pain.

Etiology of LBP

- **Oncologic:** Anatomic structures of the back can develop primary or secondary malignant lesions. Pathologic fractures of the axial skeleton can arise as a complication.
- **Infectious:** Infections of the musculoskeletal structures in this region can arise from direct inoculation or spread from another source.
- **Inflammatory:** This category includes inflammatory conditions not caused by infection or malignancy. Examples are ankylosing spondylitis and sacroiliitis. Chronic inflammation can give rise to spinal arthritis.
- **Metabolic:** Calcium and bone metabolism can cause the symptoms. Osteoporosis and osteosclerosis are examples.

Case No.1

- A 46-year-old man presents to you with a history of intermittent low-back pain of moderate intensity.
- The pain is aggravated by bending forward and is completely alleviated when he lies down. There is no local tenderness and neurologic examination is normal.
- The pain affects the patient's performance at work in a factory. He has hypertension, which is well controlled with losartan.

- Should radiology investigations be ordered for this patient?
- Should the patient's physician endorse absence from work?

- The patient stayed at work on modified duties (avoiding heavy lifting and bending forward). He performed exercises at work and at home.
- He continued to have residual pain (intensity 2/10), but he could manage with daily home exercises, heat and weekly massage sessions.

When to Image?

Imaging

- Joint guidelines from the American College of Physicians (ACP) and the American Pain Society explicitly recommend that:

"Do NOT image for non-specific LBP without red flags"

Imaging indications

- Progressive Neurologic deficit
- Infection
- Cancer
- Trauma or Osteoporotic Fracture
- Spondylarthritis

Counseling patients who request imaging

- They are unlikely to have a serious underlying condition.
- Incidental imaging findings, unrelated to their pain, are common, and may lead to unnecessary further tests or interventions.
- Imaging is appropriate if they do not improve as expected.

Case No.2

- A 75-year-old man presented with a four-week history of back pain that acutely worsened. The pain was associated with intermittent numbness of his feet which interfered with his ambulation. He denied trauma to his back and any recent falls. He had no constitutional symptoms or loss of bowel and bladder control.

Case No.2

- On his physical exam, his vitals were normal and he had normal and equal strength in extremities. There was local tenderness over midthoracic area.
- WBC: 13.6 x 109 /L, CRP: Normal, ESR: 45 mm/hr.
- PSA was noted to be 5.

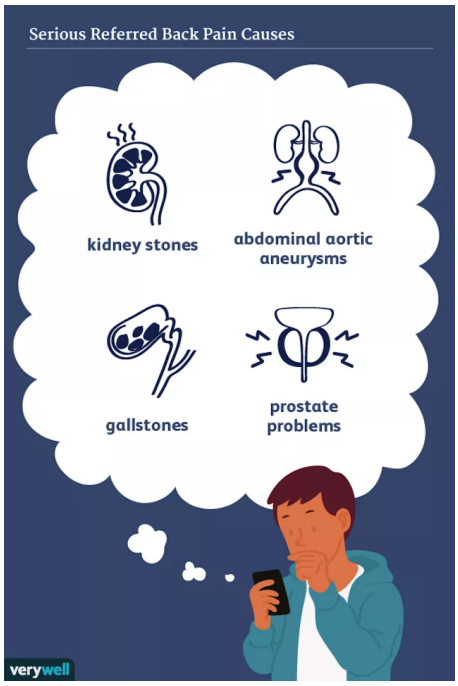
- Should radiology investigations be ordered for this patient?

- CT-guided biopsy: *Mycobacterium tuberculosis*

Case No.3

- A 37-yr-old female presented to you with vague LBP from 3 months ago. Pain is radiating to thighs and not related to activity. Physical examination of lumbar spine is normal.

Referred Back Pain



Classification of LBP Based on Types of Pain

Review > Lancet Rheumatol. 2024 Mar;6(3):e178-e188. doi: 10.1016/S2665-9913(23)00324-7. Epub 2024 Feb 1.

Nociceptive, neuropathic, or nociplastic low back pain? The low back pain phenotyping (BACPAP) consortium's international and multidisciplinary consensus recommendations

Jo Nijs [1], Eva Kosek [2], Alessandro Chiarotto [3], Chad Cook [4], Lieven A Danneels [5], César Fernández-de-Las-Peñas [6], Paul W Hodges [7], Bart Koes [8], Adriaan Louw [9], Raymond Ostelo [10], Gwendolyne G M Scholten-Peeters [11], Michele Sterling [12], Othman Alkassabi [13], Hana Alsobayel [14], Darren Beales [15], Paraskevi Bilika [16], Jacqui R Clark [17], Liesbet De Baets [18], Christophe Demoulin [19], Rutger M J de Zoete [20], Ömer Elma [21], Annelie Gutke [22], Rikard Hanafi [23], Sabina Hotz Boendermaker [24], Eva Huysmans [25], Eleni Kapreli [16], Mari Lundberg [26], Anneleen Malfliet [27], Ney Meziat Filho [28], Felipe J J Reis [29], Lennard Voogt [30], Kory Zimney [31], Rob Smeets [32], Bart Morlion [33], Kurt de Vlam [34], Steven Z George [4]

Types of Pain

Nociceptive Pain

- **Definition**: Caused by actual or potential tissue damage. It's a protective response that typically signals injury.
- **Mechanism**: Involves the activation of pain receptors (nociceptors) in response to injury, inflammation, or mechanical damage.
- **Characteristics**:
- Often sharp, aching, or throbbing.
- Usually, well-localized and can often be identified with a specific injury or condition (e.g., a broken bone, a burn).
- **Examples**: Pain from a sprained ankle, fractue, or pain from arthritis.

Neuropathic pain

- It is defined as pain caused by damage, dysfunction, or disease affecting the nervous system, which includes the peripheral nerves, spinal cord, and brain. This type of pain can arise from multiple sources, such as:
- **Injury or trauma**: Damage to nerves can cause abnormal pain signals.
- **Medical conditions**: Conditions like diabetes (diabetic neuropathy), shingles (postherpetic neuralgia), and multiple sclerosis can lead to neuropathic pain.
- **Infections**: Certain infections that affect the nervous system can result in pain.
- **Entrapment neuropathy or lumbar radiculopathy**

Nociplastic Pain

- **Definition**: A type of pain arising from altered nociception without any clear evidence of tissue damage. It reflects a change in the way pain signals are processed in the nervous system.
- **Mechanism**: It involves central sensitization or changes in the way the brain and spinal cord perceive and interpret pain signals, rather than direct damage to tissues.
- **Characteristics**:
  - Often diffuse and can be difficult to localize.
  - May be associated with heightened sensitivity to painful stimuli (hyperalgesia) or pain from stimuli that usually do not provoke pain (allodynia).
- **Examples**: Conditions like fibromyalgia, chronic fatigue syndrome, and some types of chronic headaches.

Type	Mechanism	Example
Nociceptive	Tissue damage (e.g., strain)	Acute muscle injury
Neuropathic	Nerve damage (e.g., radiculopathy)	Diabetic neuropathy
Nociplastic	CNS dysregulation (e.g., fibromyalgia)	Chronic widespread pain

Arthritis Care & Research
Vol. 75, No. 10, October 2023, pp 2215–2222
DOI 10.1002/acr.25104

AMERICAN COLLEGE of RHEUMATOLOGY
Empowering Rheumatology Professionals

REVIEW

Identifying and Managing Nociplastic Pain in Individuals With Rheumatic Diseases: A Narrative Review

Anne E. Murphy,[1] Deeba Minhas,[1] Daniel J. Clauw,[1] and Yvonne C. Lee[2]

Nociplastic pain

- Dysregulation of CNS pain processing pathways.
- Amplified processing of pain signals, decreased inhibition of pain, or both.
- Associated with fatigue, memory problems, poor sleep quality, and/or mood disturbances; sensitivity to noises, odors, bright lights.

Identifying and Managing Nociplastic Pain in Individuals With Rheumatic Diseases: A Narrative Review

Nociplastic Pain Case Scenario

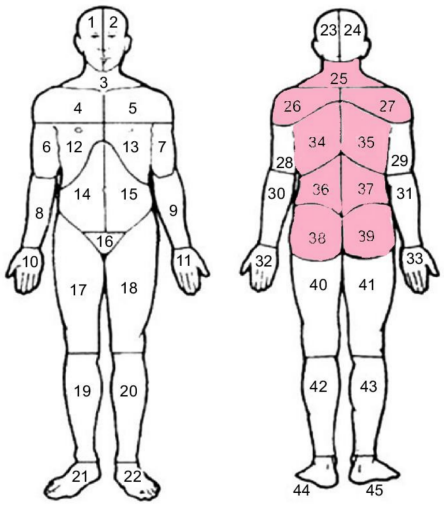
History

- 38 years old female patient, BMI: 19
- She reported low back pain (LBP), which started five months ago without a specific event.
- Her pain extended from low back to neck and included her shoulders.
- She reported that a cold shower or mild activity such as shopping worsened her pain.
- She complains of sleep disturbances, cognitive problems, and low energy levels.

Clinical Examination

- Red flags that indicate the possibility of cancer, cauda equina syndrome, or trauma were ruled out.
- Normal neurological examination.
- No signs or symptoms of spondyloarthropathy
- Pain worsened with movement in all directions.

Pain Distribution



Low Back pain Management

Nonspecific LBP

- LBP is an unsolved problem, and we currently **lack truly effective treatments**. Effects are often **small and short** lived, and many treatments **do not work at all**.
- Greater emphasis is now placed on **non-pharmacological** treatments.
- **Self-care advice and reassurance** should form the mainstay of non-pharmacological treatment for non-specific LBP.

There is a big gap between evidence and practice

Lancet 2018; 391: 2368–83

Low back pain 2

Prevention and treatment of low back pain: evidence, challenges, and promising directions

Nadine E Foster, Johannes R Anema, Dan Cherkin, Roger Chou, Steven P Cohen, Douglas P Gross, Paulo H Ferreira, Julie M Fritz, Bart W Koes, Wilco Peul, Judith A Turner, Chris G Maher, on behalf of the Lancet *Low Back Pain Series Working Group**

Prevention and treatment of low back pain: evidence, challenges, and promising directions

Prevention and treatment of low back pain: evidence, challenges, and promising directions

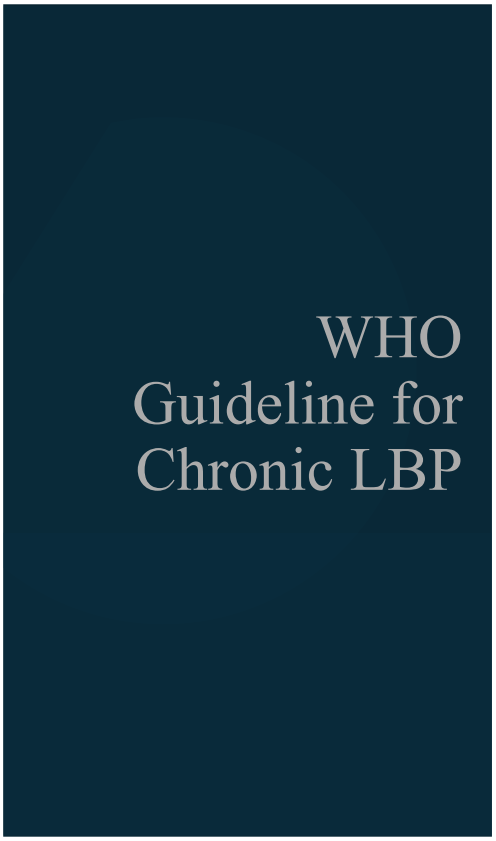
opioid analgesic medicines is discouraged

The only recommended drug for acute LBP is NSAID

SNRIs could be used for chronic LBP

WHO Guideline for Chronic LBP

2023



Cochrane Library

Cochrane Database of Systematic Reviews

Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews (Review)

Cashin AG, Wand BM, O'Connell NE, Lee H, Rizzo RRN, Bagg MK, O'Hagan E, Maher CG, Furlan AD, van Tulder MW, McAuley JH

Acute Low Back Pain

Chronic Low Back Pain

NICE National Institute for Health and Care Excellence

NICE guideline

Low back pain and sciatica in over 16s: assessment and management

NICE guideline
Published: 30 November 2016
Last updated: 11 December 2020

NICE Guideline (Pharmacological management of low back pain)

NICE Guideline (Pharmacological management of sciatica)

Systematic Review

Efficacy of antidepressants in the treatment of chronic nonspecific low back pain: a systematic review and meta-analysis

Márcio José Leão Nunes Filho, **Eduardo Silva Reis Barreto**, César Romero Antunes Júnior, Vinicius Borges Alencar, Liliane Elze Falcão Lins-Kusterer, Liana Maria Torres de Araujo Azi & ...show all

Pages 437-451 | Received 25 May 2024, Accepted 20 Sep 2024, Published online: 08 Oct 2024

Nine RCT, 1758 patients

Duloxetine at 60 mg provides consistent pain relief and improves the quality of life in NCLBP. Escitalopram might offer modest benefits but should be considered a third-line treatment. Other antidepressants, such as amitriptyline, bupropion, imipramine and desipramine, have limited evidence supporting their efficacy and are associated with adverse effects.

Pain Manag. 2024;14(8):437-451.

Cochrane Library

Cochrane Database of Systematic Reviews

Antidepressants for pain management in adults with chronic pain: a network meta-analysis (Review)

Birkinshaw H, Friedrich CM, Cole P, Eccleston C, Serfaty M, Stewart G, White S, Moore RA, Phillippo D, Pincus T

Our review and NMAs show that despite studies investigating 25 different antidepressants, the only antidepressant we are certain about for the treatment of chronic pain is **duloxetine**. Duloxetine was moderately efficacious across all outcomes at standard dose.

2023 176 studies with a total of 28,664 participants

Randomized Controlled Trial > Pain. 2016 Jul;157(7):1499-1507.
doi: 10.1097/j.pain.0000000000000554.

A randomized controlled trial of gabapentin for chronic low back pain with and without a radiating component

J Hampton Atkinson [1 2], Mark A Slater [1 3], Edmund V Capparelli [1 4], Shetal M Patel [1], Tanya Wolfson [5], Anthony Gamst [5], Ian S Abramson [6], Mark S Wallace [1 7], Stephen D Funk [1], Thomas R Rutledge [1 2], Julie L Wetherell [1 2], Scott C Matthews [1 2], Sidney Zisook [1 2], Steven R Garfin [1 8]

Gabapentin appears to be **ineffective** for analgesia in chronic low back pain with or without a radiating component.

12-week, gabapentin (forced titration up to 3600 mg daily) with inert placebo 108 randomized patients

FPIN's Clinical Inquiries

Gabapentin for Treatment of Radicular Low Back Pain

Corey Lyon, DO; Kyle Leggott, MD; and Shannon Langner, MD
University of Colorado Family Medicine Residency, Denver, Colorado
Kristen DeSanto, MSLS, MS, RD, University of Colorado Health Sciences Library, Denver, Colorado

Review

What

Kacper B **ałgorzata Biernikiewicz [4], Leszek M**

https://doi.org/10.3390/healthcare11121794

What Do We Know about Nociplastic Pain?

- **Limited Efficacy**: NSAIDs, paracetamol, opioids, and muscle relaxants
- **Mixed Evidence**: SNRIs: lack consensus; gabapentinoids: contradictory findings.
- Deeper understanding of nociplastic pain mechanisms is needed to guide effective therapies.

تا بدانجا رسید دانش من که بدانم همی که نادانم

Zhou *et al. BMC Musculoskeletal Disorders* (2024) 25:344
https://doi.org/10.1186/s12891-024-07468-0

BMC Musculoskeletal Disorders

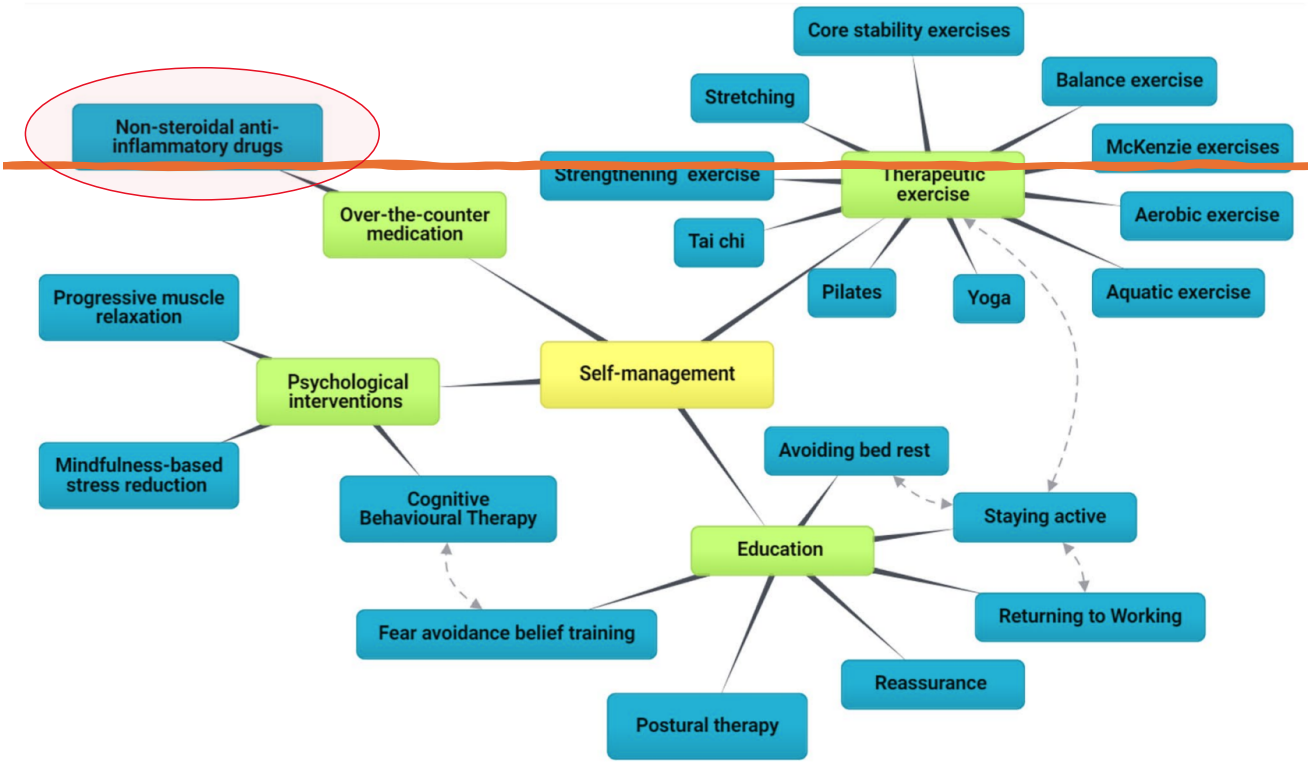
RESEARCH Open Access

Recent clinical practice guidelines for the management of low back pain: a global comparison

Tianyu Zhou[1*], David Salman[1,2] and Alison. H. McGregor[1]

Recent clinical practice guidelines for the management of low back pain: a global comparison

- MEDLINE, EMBASE, CINAHL, PEDro, and major guideline databases were searched from 2017 to 2022 to identify CPGs. CPGs focusing on information regarding the management and/or treatment of non-specific LBP were considered eligible.
- Our analysis identified a total of 22 CPGs.



Case No.4

- **Patient:** 28-year-old worker
  History: Lifted heavy equipment 2 days ago. Sudden onset of sharp lower back pain radiating to the buttocks. No leg pain or numbness. Pain worsens with bending or sitting.
  Exam: Reduced lumbar range of motion, tenderness at L4-L5 paraspinal muscles. Negative straight leg raise. Neurological exam normal.

Case No.4

Case No.5

- **Patient:** 68-year-old retired teacher
  History: Gradual onset of low back pain with bilateral buttock and thigh cramping after walking 10 minutes. Relieved by sitting or leaning forward. No pain at rest.
  Exam: Wide-based gait, lumbar extension reproduces symptoms. Normal strength/sensation.

Case No. 5

Case No.6

- **Patient:** 32-year-old male
  History: Gradual onset of morning stiffness >1 hour, improving with activity. Chronic dull low back pain for 6 months. Family history of psoriasis.
  Exam: Reduced lumbar flexion, limited chest expansion. Positive sacroiliac joint tenderness.
- **Labs:** Elevated CRP/ESR; HLA-B27 positive.
  Imaging: X-ray shows bilateral sacroiliitis.

Case No. 7

Patient: 58-year-old male with a 20-pack-year smoking history

- Progressive low back pain over 3 months, worse at night, partially relieved by NSAIDs.
- No history of cancer. Mild fatigue reported but attributed to work stress.
- Recent onset of constipation (assumed to be dietary).
- **Exam:** Mild midline tenderness at T10-T12. No neurological deficits.

Case No. 7

- X-ray: Mild degenerative changes; subtle loss of vertebral height at T12 dismissed as artifact.
- Labs: Mild anemia (Hb 11.2 g/dL), elevated alkaline phosphatase.

- Pain becomes unresponsive to NSAIDs. MRI ordered due to persistent symptoms: Reveals a T12 vertebral body lesion with epidural extension.
- CT-guided biopsy: Adenocarcinoma, later linked to occult lung primary (discovered on CT chest).

Case No. 8

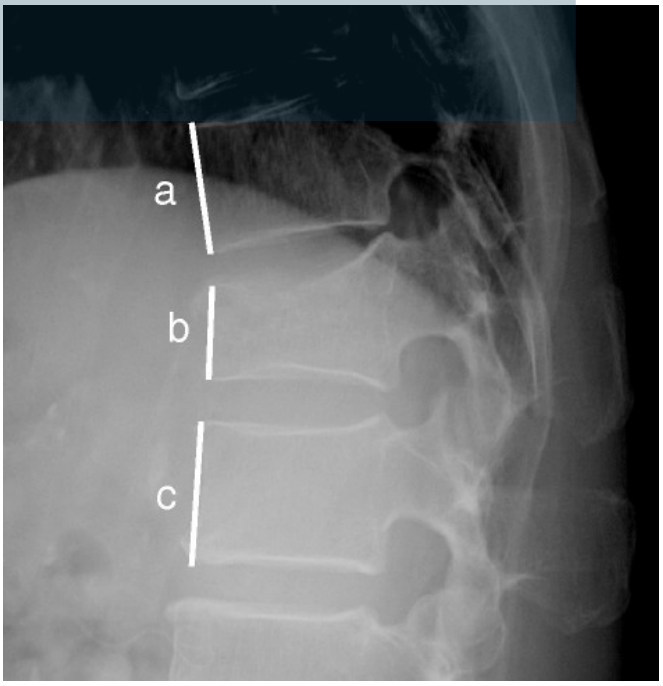
Patient: 75-year-old female with rheumatoid arthritis

History:

- Vague, progressive low back pain for 8 weeks. No recent trauma.
- Pain worsens with standing; minimal relief with rest.

Exam:

- Tenderness over L1. No neurological deficits.
- Kyphotic posture; difficulty lying flat.



Case No. 9

Patient: 40-year-old male with chronic disc disease
History:

- Known L4-L5 disc herniation. Presents with 2 days of worsening bilateral buttock pain and "heavy" legs.
- Reports urinary hesitancy (needs to strain) but denies retention. No saddle anesthesia.
- Bowel function normal.

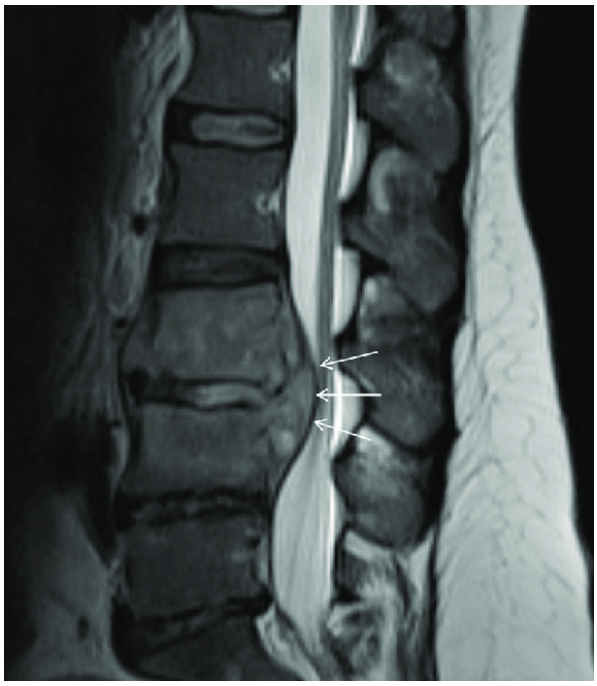
Exam:

- Reduced perianal sensation (subtle, only on pinprick testing).
- Mild bilateral foot weakness (4/5 strength).
- Straight leg raise positive at 30° bilaterally.

Case No. 9

Case No. 10

- Labs: WBC 14,000/μL, CRP 120 mg/L, ESR 85 mm/hr. Blood cultures pending.
- X-ray: Unremarkable (no fractures or degenerative changes).
- Blood cultures grow *Staphylococcus aureus*.



Case No. 10

• **Emergency Action:**

Neurosurgery emergently performs decompression and drainage. IV antibiotics initiated.

Post-op: Neurologic deficits stabilize, but mild residual weakness persists.

Case No. 10

1. **Red Flags**: Fever + neurologic deficits + risk factors (diabetes, IV drug use).
2. **Diagnostic Pitfalls**:
    1. Early symptoms mimic mechanical back pain.
    2. Fever attributed to other infections (UTI).
3. **Why Imaging Was Critical**:
    1. Normal X-rays do not rule out spinal infection.
    2. MRI is gold standard for detecting epidural abscess.
4. **Consequences of Delay**:
    1. Risk of permanent paralysis or sepsis if untreated >24–48 hours.

Take home massages

- **Avoid unnecessary imaging**: Reserve for red flags

Acute LBP Management

- **First-line**:
    - **Non-pharmacologic**: Superficial heat, massage, spinal manipulation.
    - **Pharmacologic**: NSAIDs (small benefit) or short-term muscle relaxants.
- **Avoid**:
    - Paracetamol (no benefit over placebo).
    - Opioids (unless NSAIDs contraindicated and only for severe pain).

Take home massages

Chronic LBP Management

- **Non-pharmacologic first**:
- Exercise (core strengthening, yoga, physiotherapy)
- Cognitive Behavioral Therapy (CBT), mindfulness, multidisciplinary rehabilitation
- **Pharmacologic**:
- Duloxetine (SNRI)
- **Avoid**: Opioids, gabapentinoids, tricyclic antidepressants

Less is more"

Avoid over-testing/overtreatment
for non-specific LBP


THANK YOU