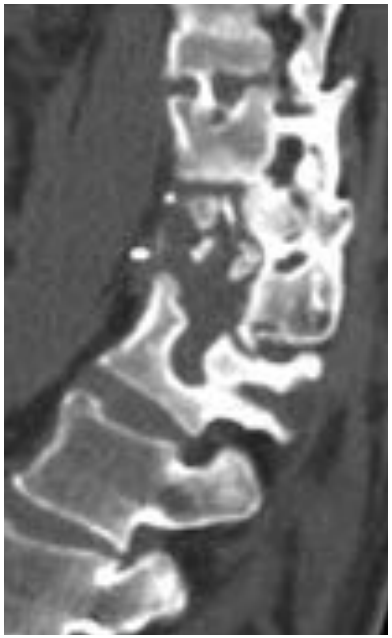
# Spinal infections



Dr.C.S.Vishnuprasath.,M.S.,DNB.,FNB(Spine).,
Consultant spine surgeon,
SKS Hospitals, Salem.

# Why spinal infection is a matter of concern?

- Uncommon
- Extremely destructive
- Spinal instability
- Neurologic damage.
- Wide spectrum of clinical presentations
- Mimic  noninfectious conditions.

# Types of spinal infections

1. Granulomatous infections

2. Pyogenic-bacterial infections

3. Postoperative spinal wound infection

4. Spinal infection in the immunocompromised.

# Granulomatous infections

1. **Tuberculous infections**
   - Hematogenous foci.
   - Contiguous disease
   - Lymphatic spread from pleural disease.

2. **Fungal infections** – Candida, Aspergillosis

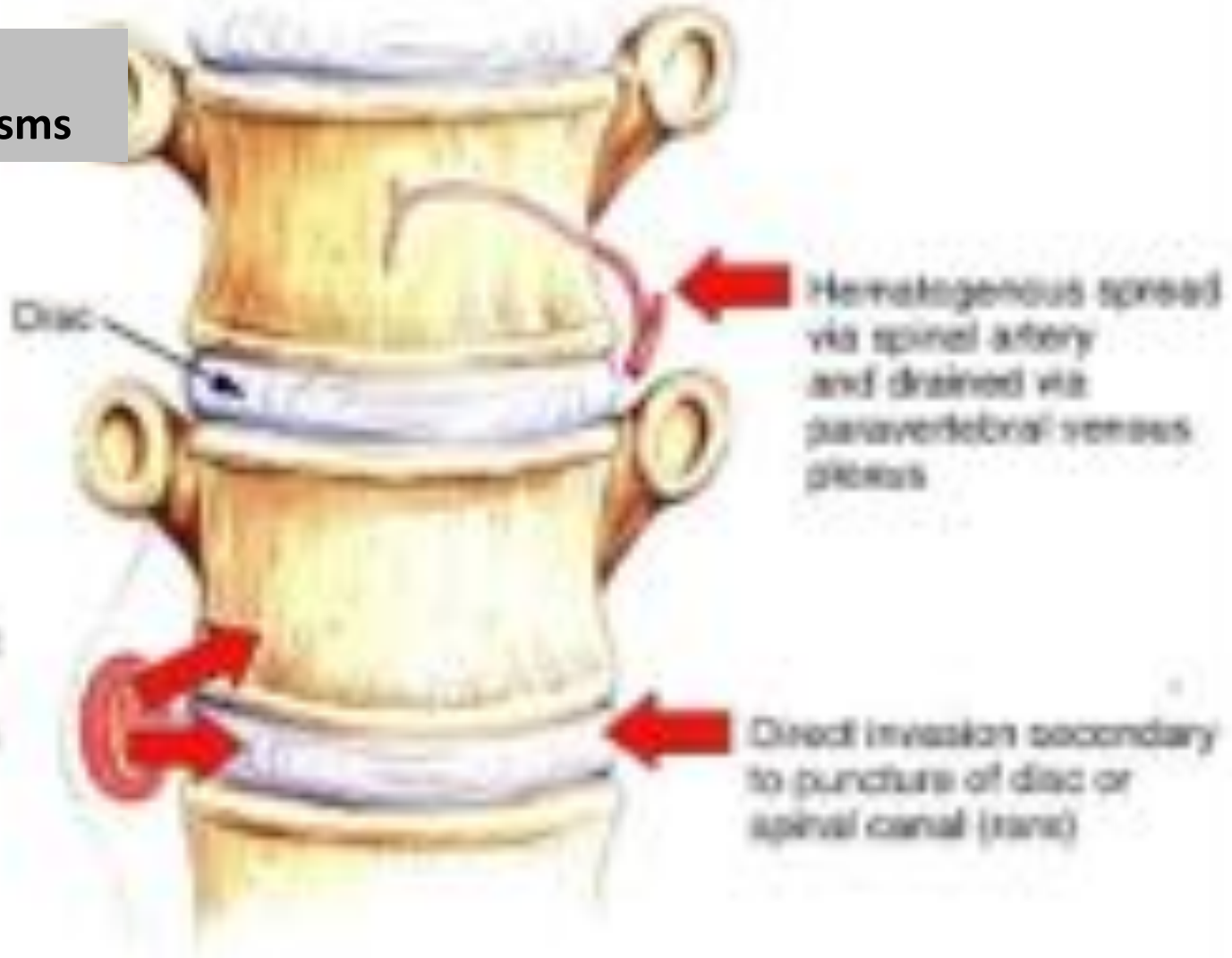
3. **Parasitic infections-** Hydatid, Toxoplasmosis

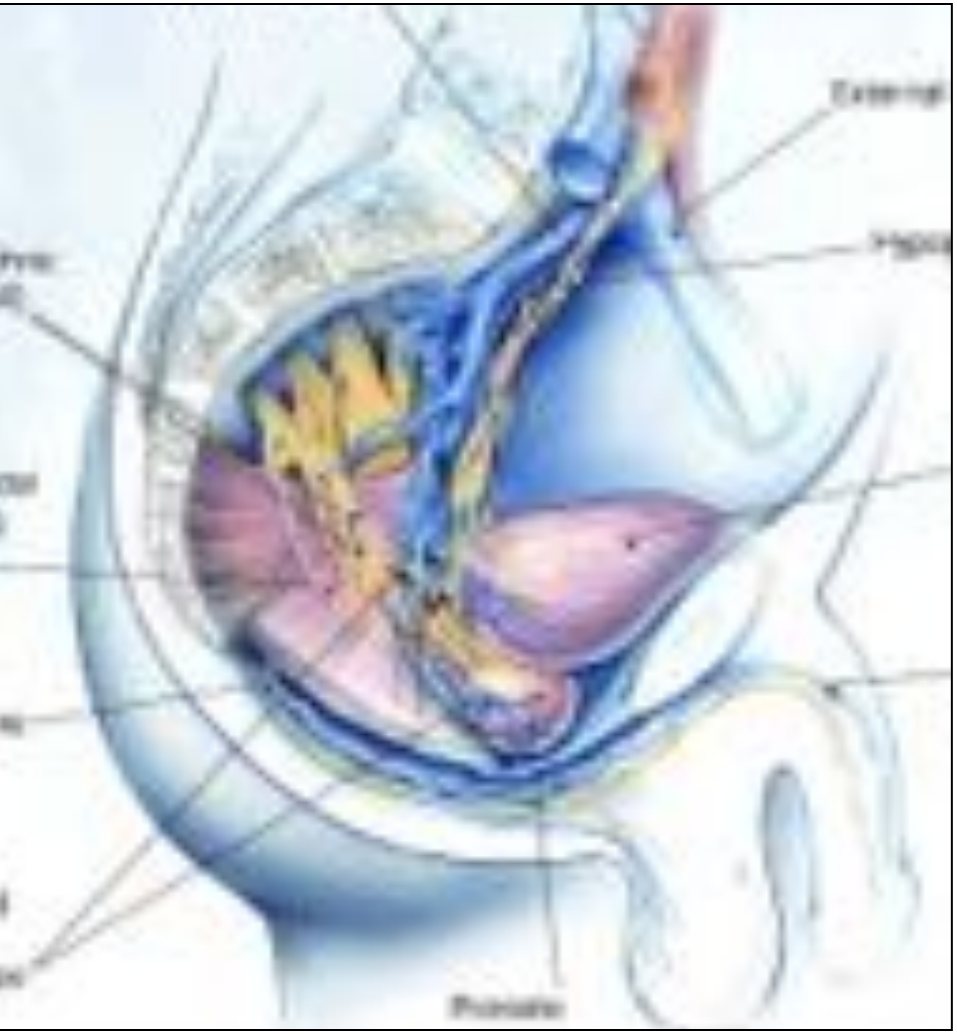
# Spinal tuberculosis – Problem statement

- 1/3rd of the world's population infected with *M. tuberculosis* .
- Spinal TB < 1% among all TB.
- 50% of all cases of skeletal TB.
- M/C region- Thoracolumbar junction.
- Neurologic complications - 10% to 43%.

# Pyogenic bacterial infection

**Staphylococcus**
**Gram negative organisms**





| | |
|---|---|
| Genitourinary tract | 29% |
| Soft tissue infections | 13% |
| Upper respiratory tract | 11% |

# History & presentation

- **Pain**
- **Constitutional symptoms**
- **Weakness**
- **Deformity**
- **Swelling/Discharging sinus**

# Pain – Most common

- **Axial pain** – Change of posture /Turning in bed
- **Continuous** – inflammation
- **Radicular pain**
- **Night pain-** Releif of muscle spasm/ Venous engorgement of inflammed tissue

# Constitutional symptoms

- **Fever** – Evening rise of temperature- TB
- Pyogenic infections- **Septic features**
- Loss of weight/ Loss of appetite

# Weakness
# Neurological defecit

- Mild root involvement – complete paraplegia/Quadriplegia.

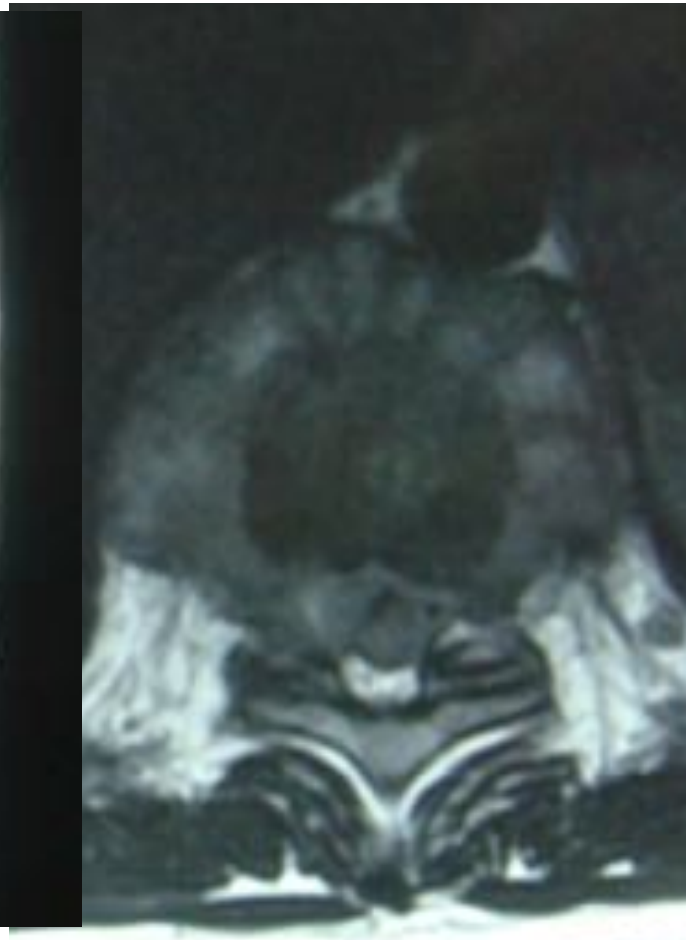
- Seddon- Early onset/ Late onset

- Hodgson- Defecit in active disease stage

  Defecit in healed stage

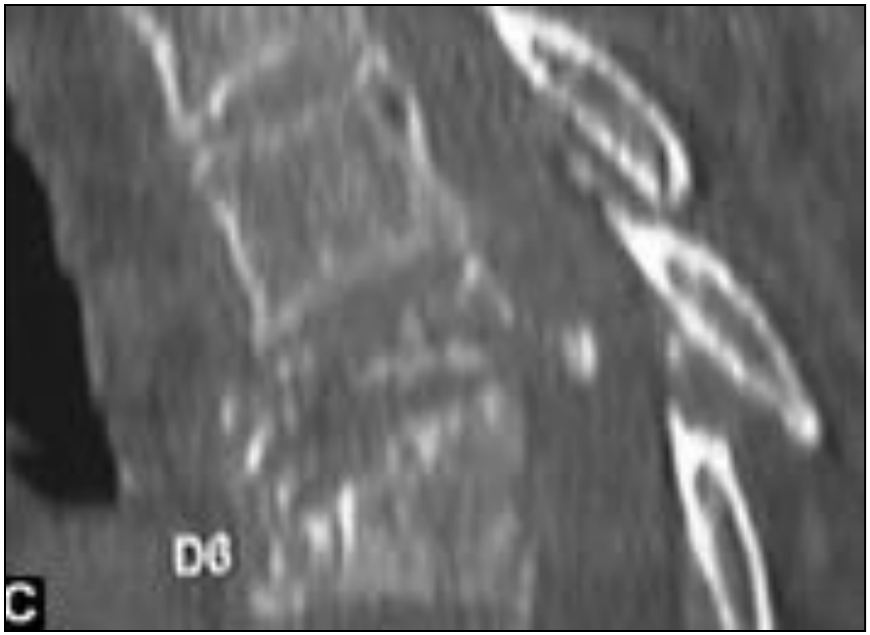
# Defecit in active disease
# Pathological fracture / abscess



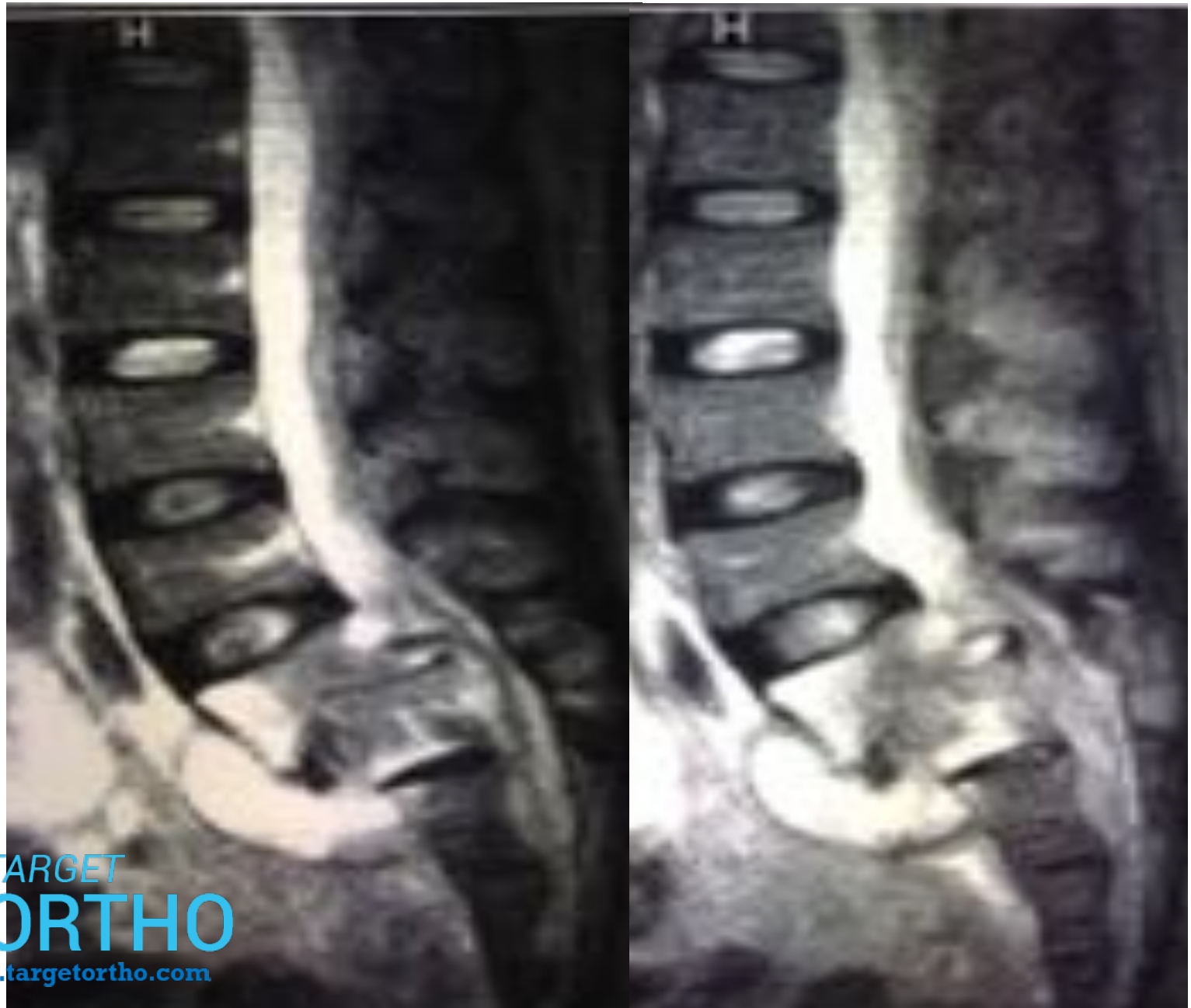


# Defecit in active disease
# Epidural abscess

# Defecit in active disease
# Bony sequestrum

# Defecit in active disease- Subluxation



Defecit in active disease abscess with deformity

# Defecit in healed disease

**Internal gibbus – cord streching**

# Pyogenic discitis with extensive epidural abscess
# Rapid onset of defecit
# (?arterial thrombosis)

MRI showing extensive epidural abscess extending beyond 10 segments

- **80%** pres
- Conserv age increase of 15° in deform deg.
- Kyphotic sequence
- vertebra e until the healthy vertebra ly and consolidate.

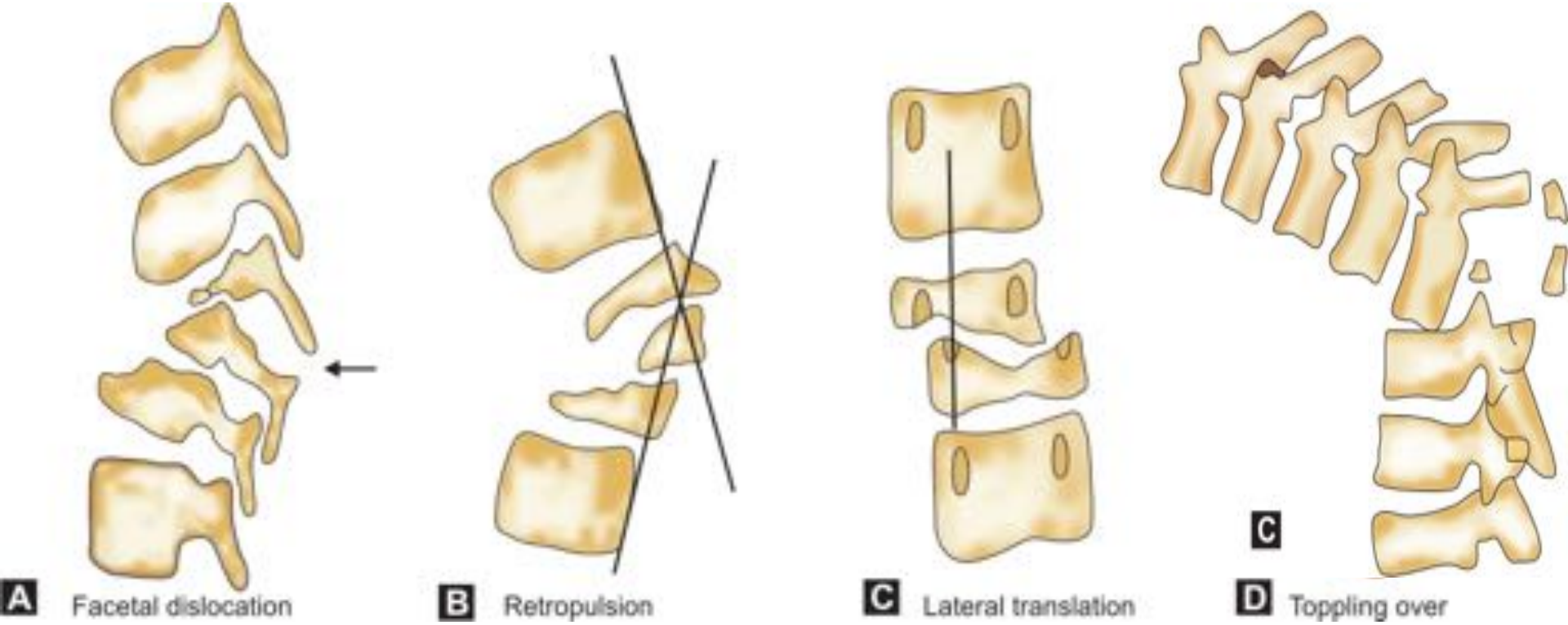

TARGET
ORTHO
(C) www.targetortho.com


Kyphus


Gibbus

# Spine at risk signs in children

## High risk of kyphotic deformity as they grow

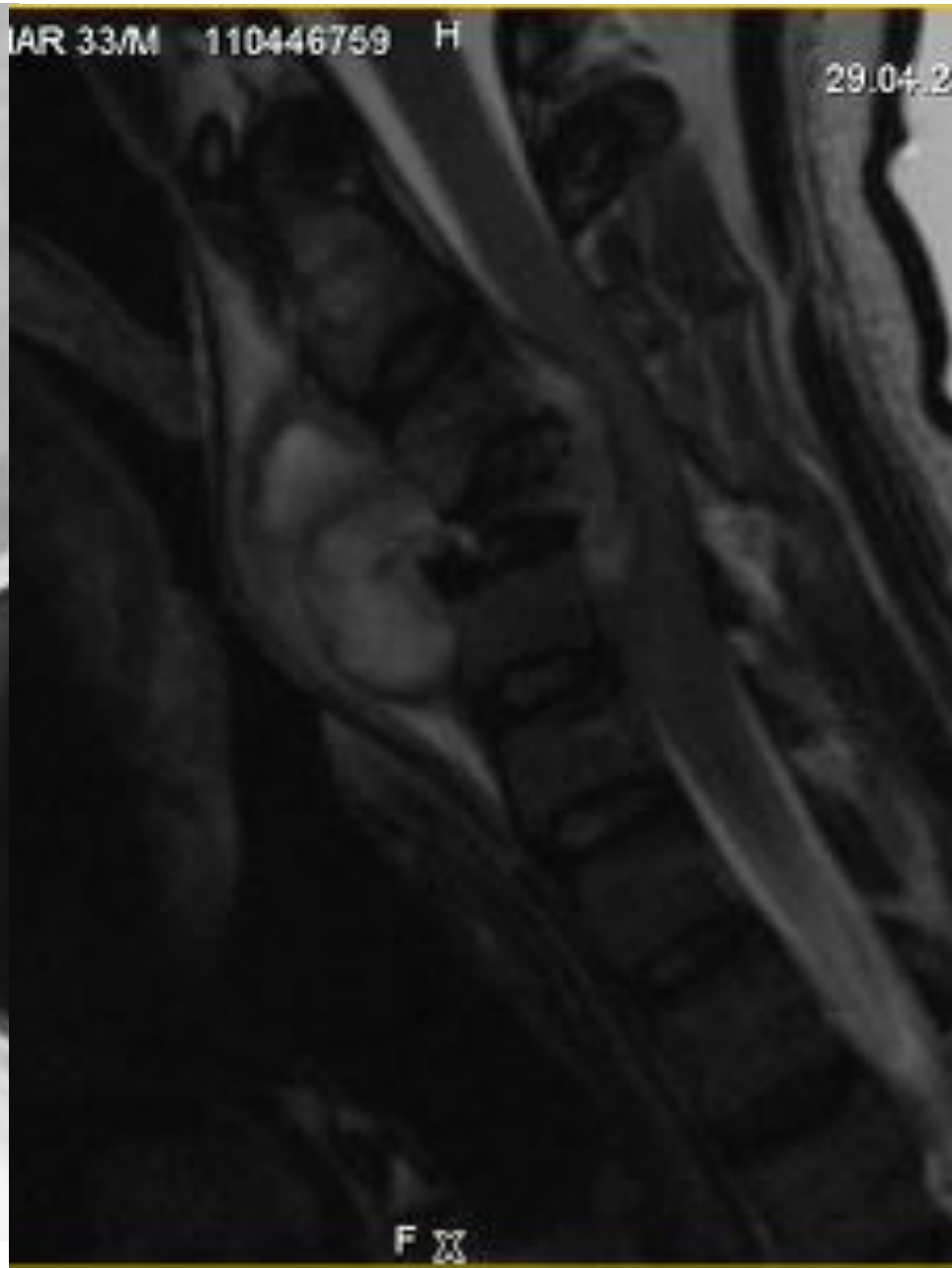


# Cold abscess

# Cervical spine

Retropharyngeal abscess

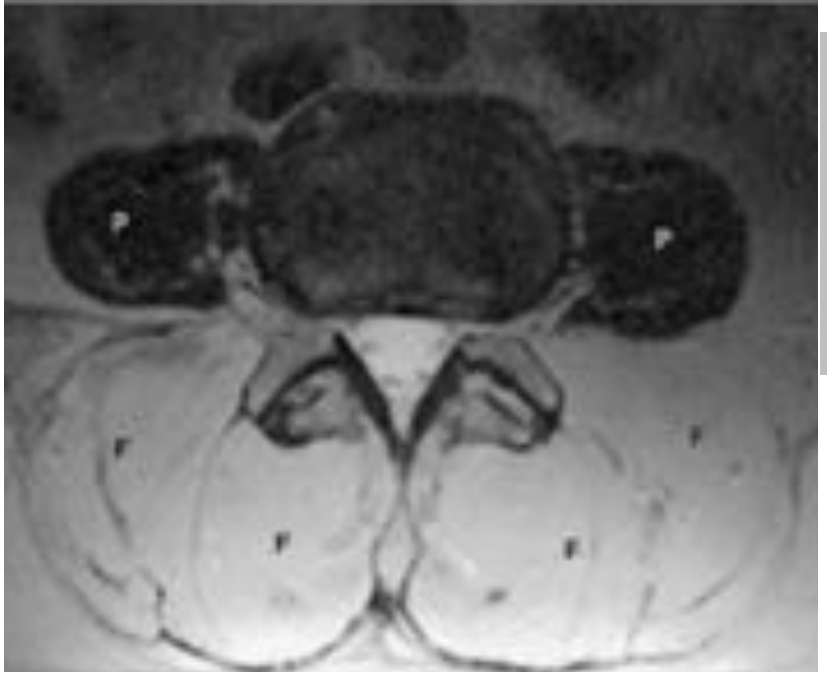
Along brachial plexus

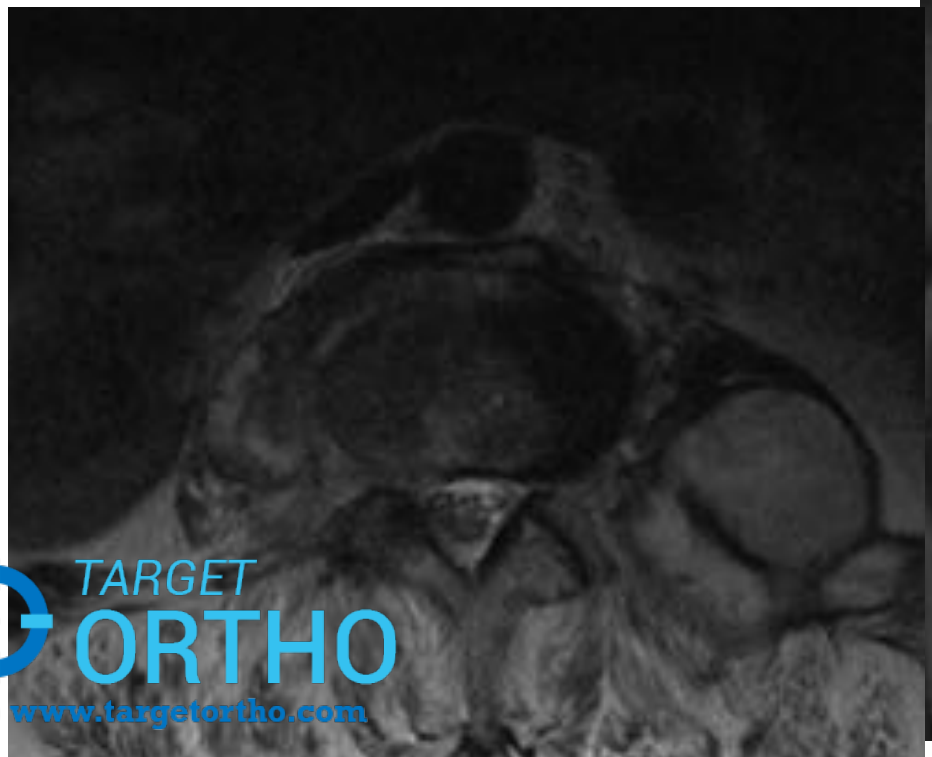


# Thoracic spine

## Intercostal NV bundle / Mediastinum / Abdomen

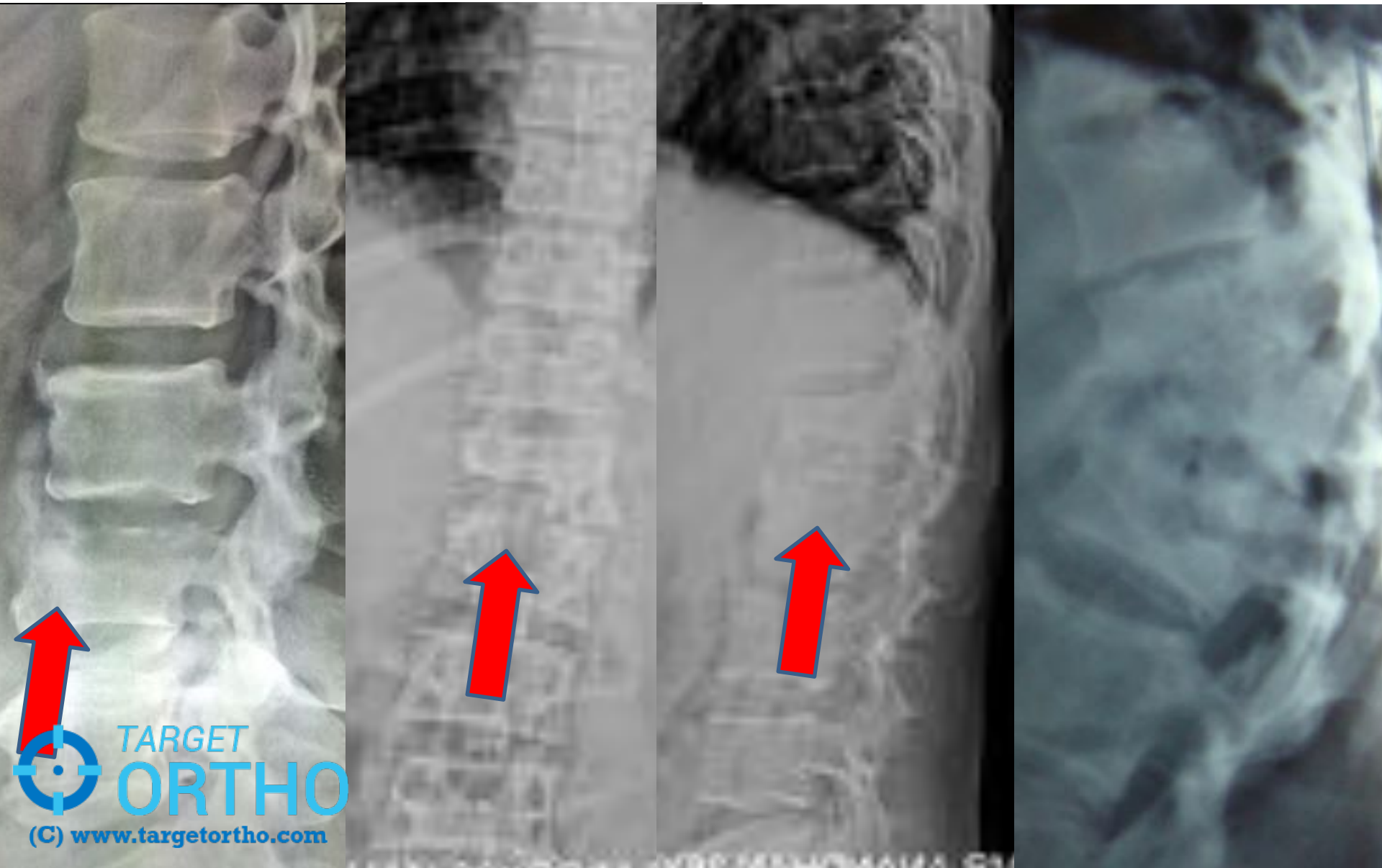

# Thoracolumbar spine
# Psoas abscess

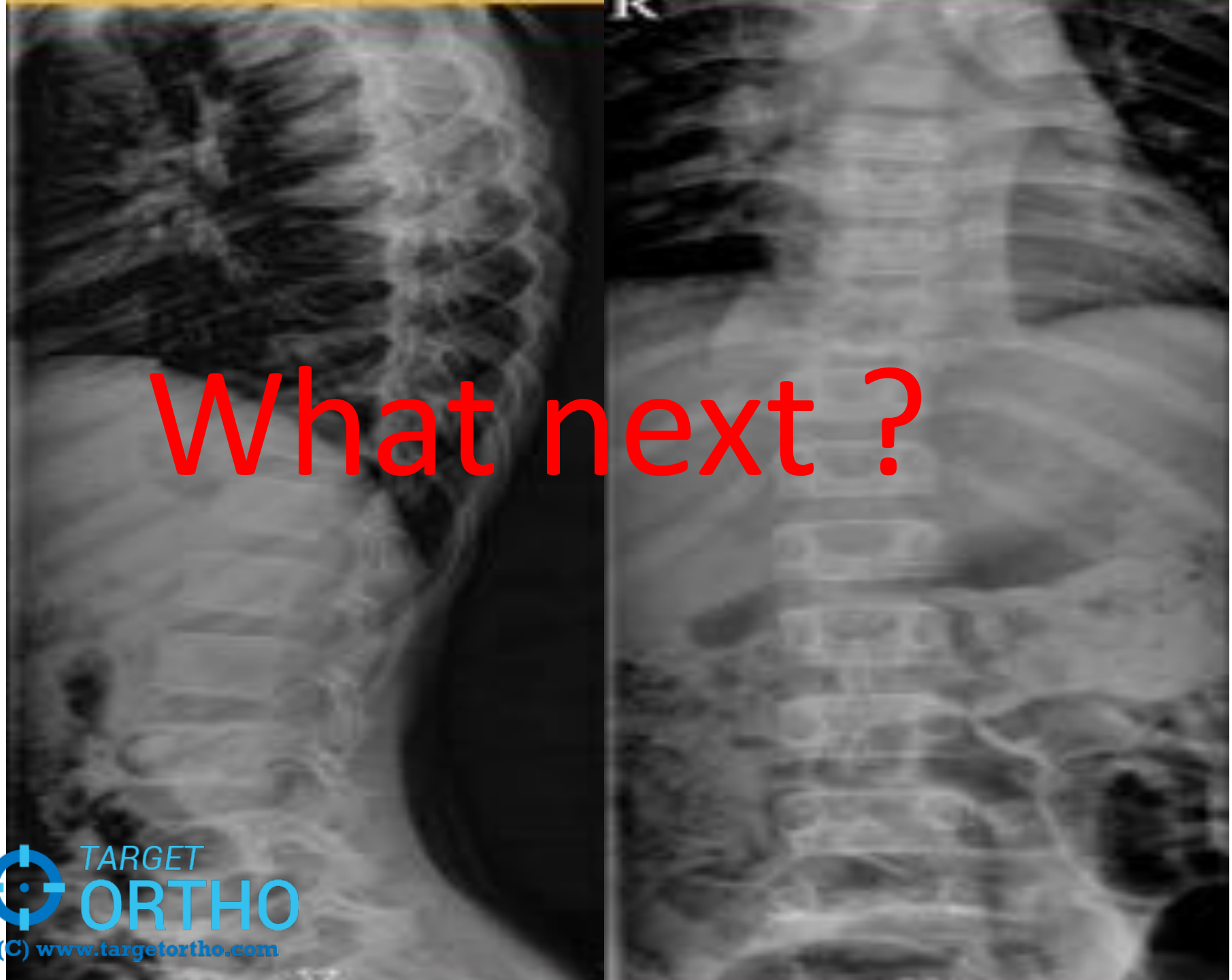




- 13 yr boy –mid back ache & discharging sinus – 3 months
- Constitutional symptoms +
- Night cries +
- Not walking due to pain
- O/E  purulent discharging sinus from mid thoracic level.
- **Brisk DTRs**
- Power & sensation normal.

# X- ray



- **Total count and differential count**

Leucocytosis and lymphocytosis – inconsistent finding

**Ekere AU, Yellowe BE, Echem RC. Conservative management of tuberculous spondylitis in a developing country. Niger J Med. 2005;14:386-9.**

# ESR

More than 100 mm in 1st hr significant .

Prognostic value - response to treatment

Decreases from 3rd month

Thelander U, Larsson S. Quantitation of C-reactive protein levels and erythrocyte sedimentation rate after spinal surgery. Spine. 1992;17:400-4.

# Diagnosis

**ESR & CRP- elevated > 90%;**
**Monitoring the treatment**

**CRP- Acute – used in monitoring pyogenic infection**

**ESR- Monitoring TB**

# Search for the potential causes of bacteremia

1. **Blood cultures-** 16 to 24% positive.

2. **Urine culture** - most common identifiable cause of bacteremia-29%

# TUBERCULIN TEST

More th

Positive **evere**
**react**

**False –v**

**False + v** bacilli and
BCG v



Edwards PQ, Edwards LB. Story of the tuberculin test from an epidemiologic viewpoint. Am Rev Respir Dis. 1960;81:1-47.

# Immunological test
# ELISA

Detects the change in immunoglobulin

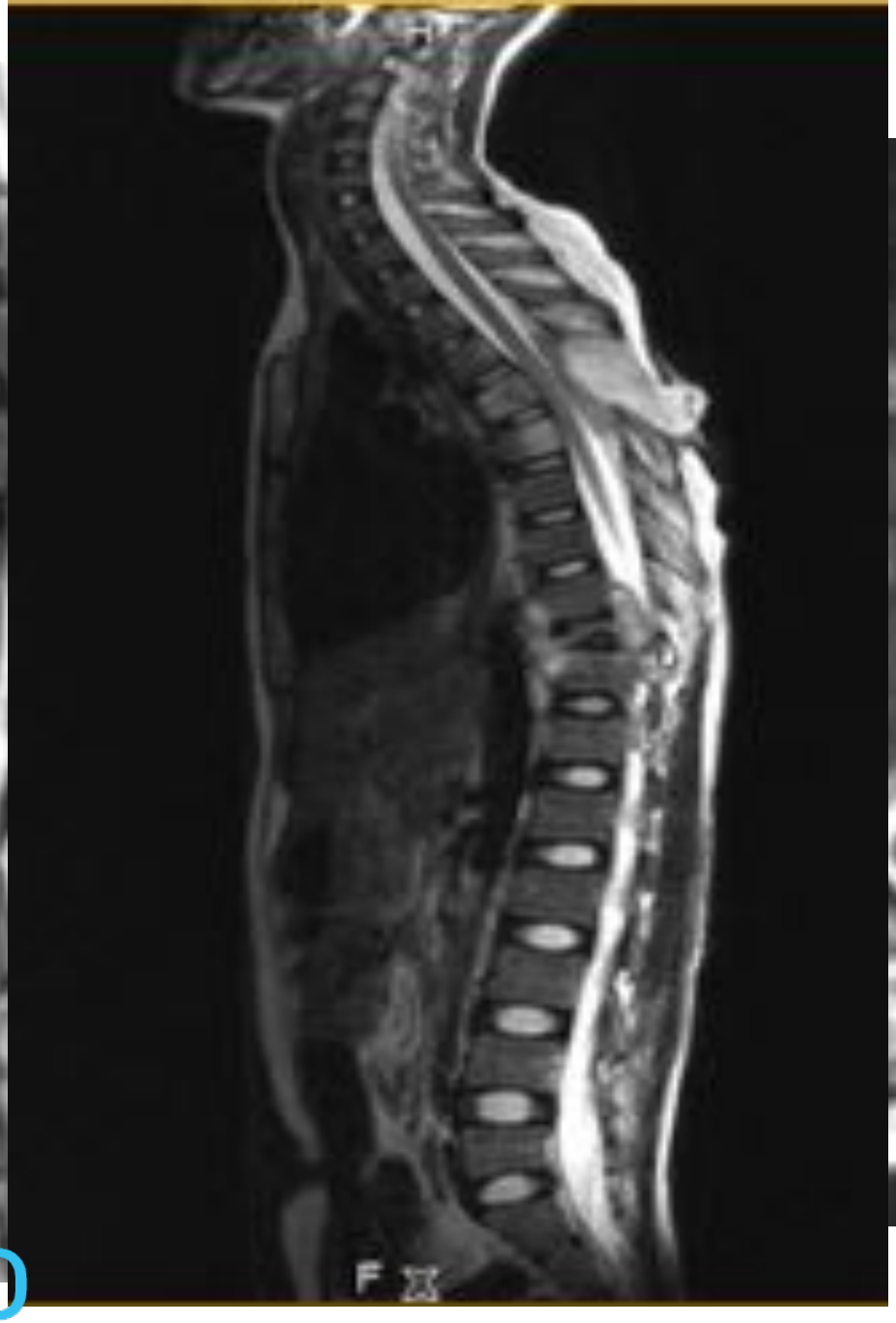
IgM – 1st 3 months

IgG - after three months

Low sensitivity - **High false positive**

**Screening test** than a diagnostic tool

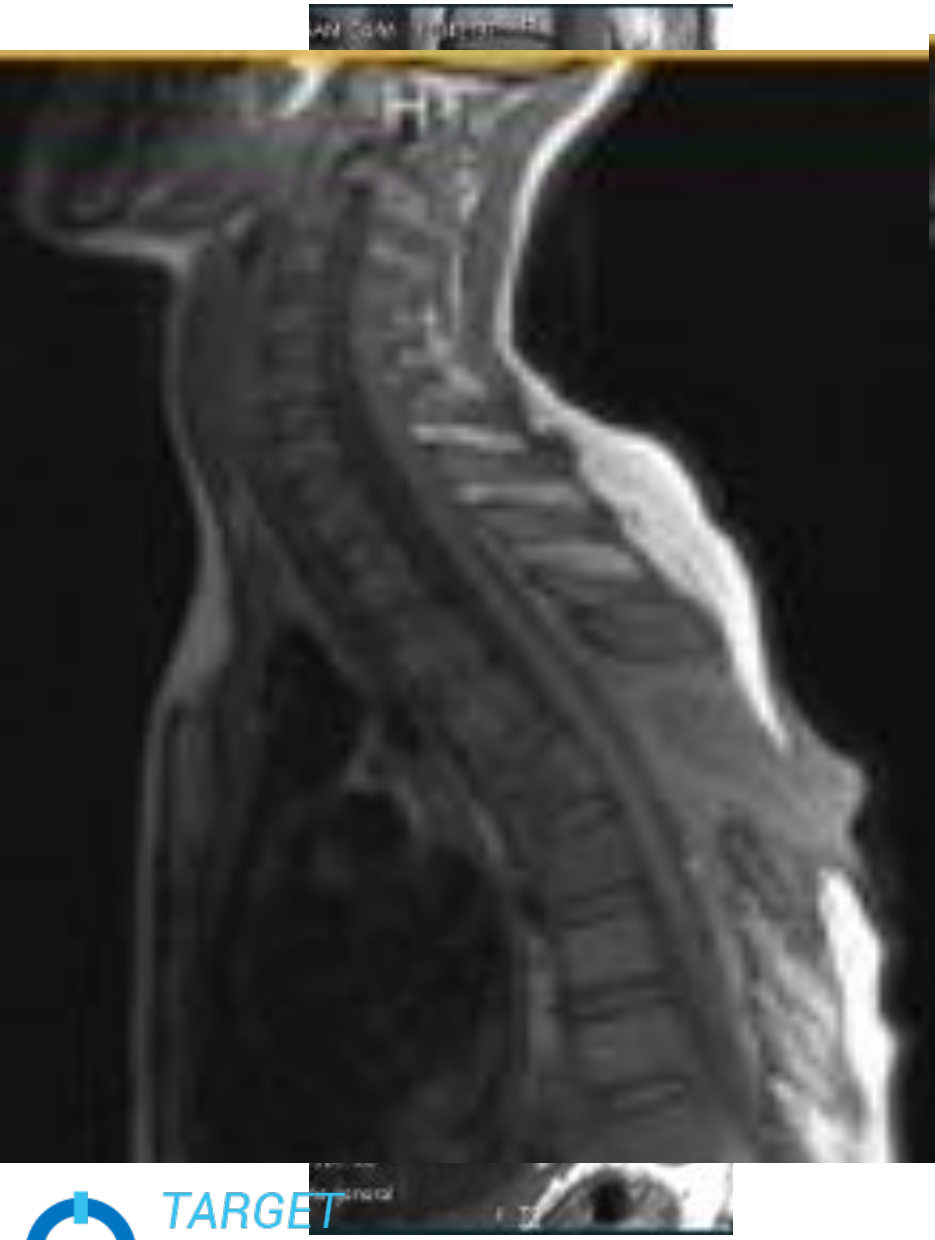
Ramachandran R, Paramasivan CN. What is new in the diagnosis of tuberculosis? Part 1: Techniques for diagnosis of tuberculosis. Ind J Tub. 2003;50:133-50.



# Skip lesions

- 7-10% - multi level lesions

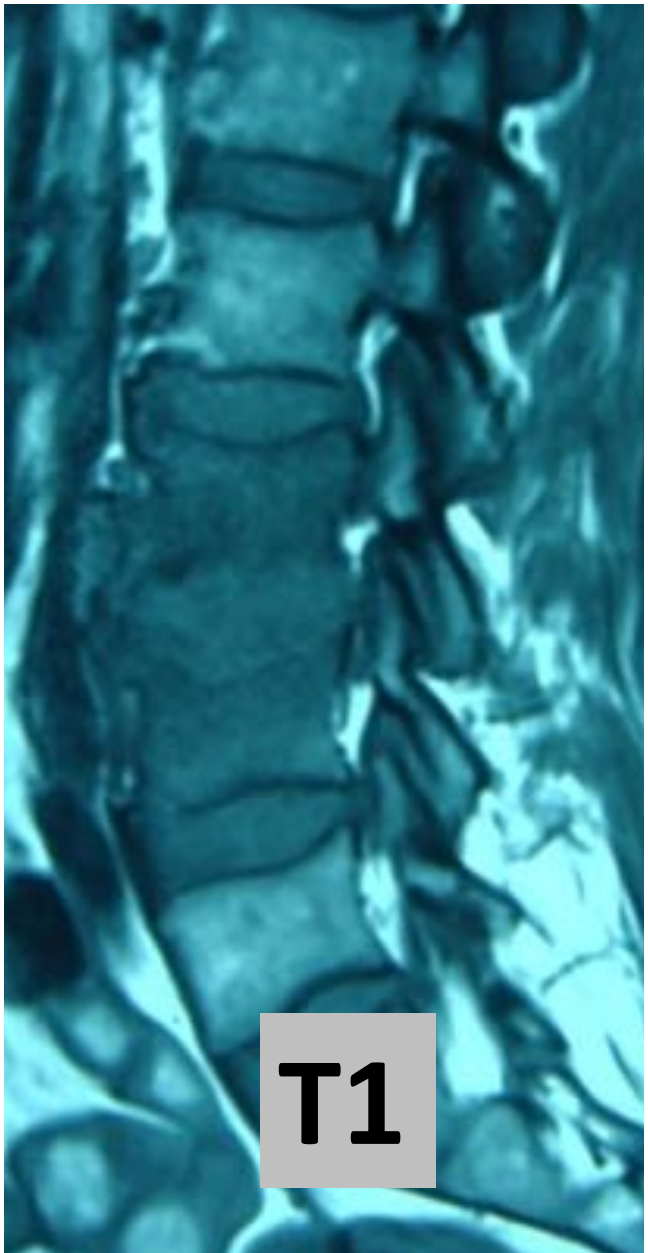
Tuli SM. Tuberculosis of the skeletal system: bones, joints, spine and bursal sheaths. 2nd edition, Jaypee Brothers 1997.



Low signal intensity on T1W

High intensity on T2W of vertebral body

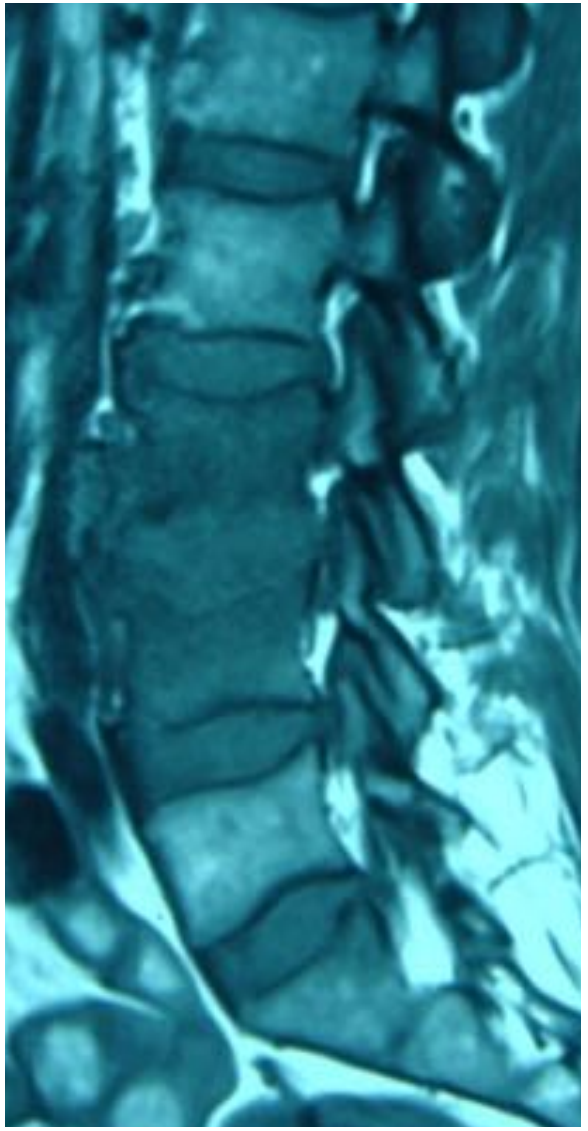
# Edema in vertebral body


# Most common site

**TB – Thoracic / Thoracolumbar**

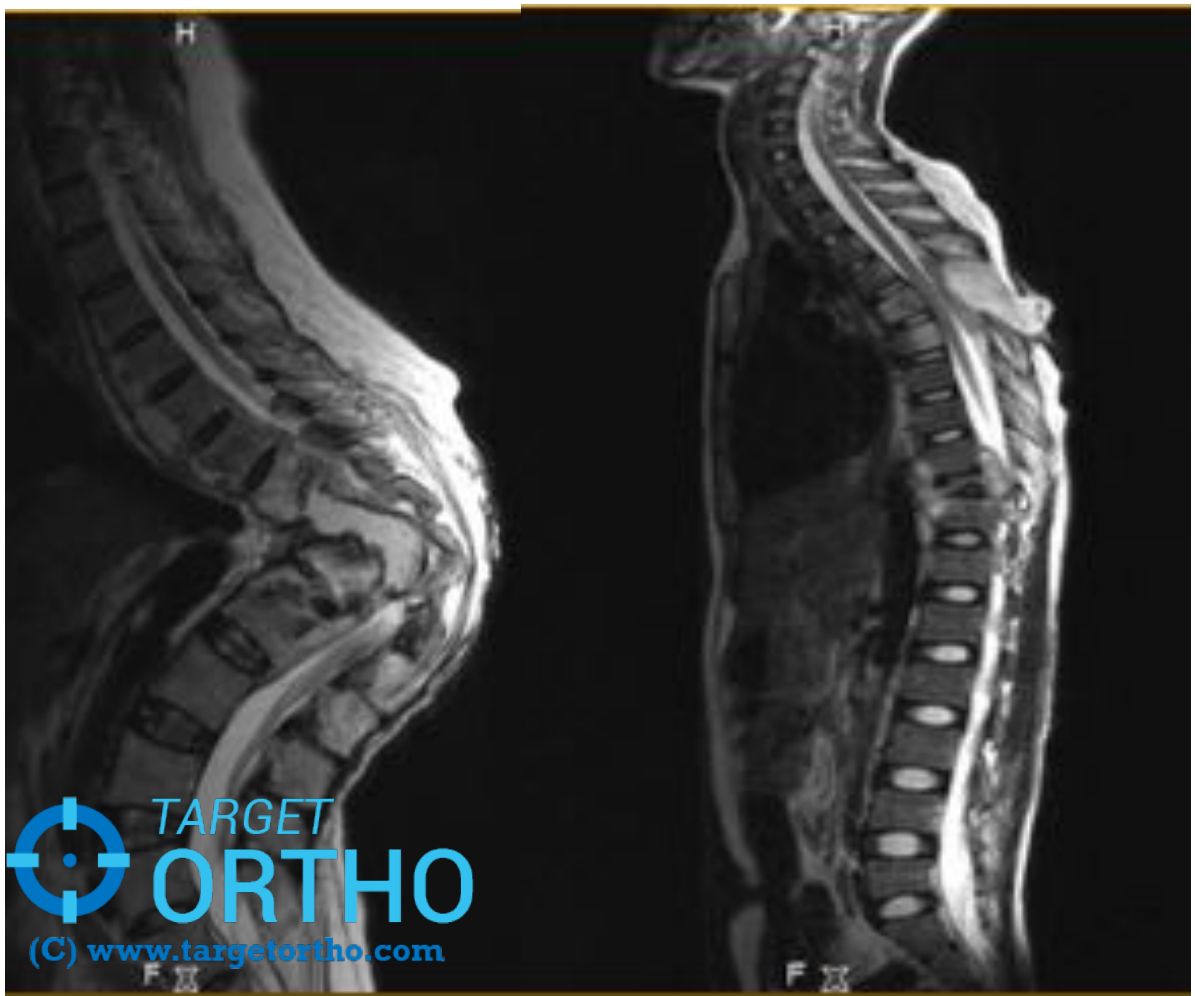

**Pyogenic- Lumbar**

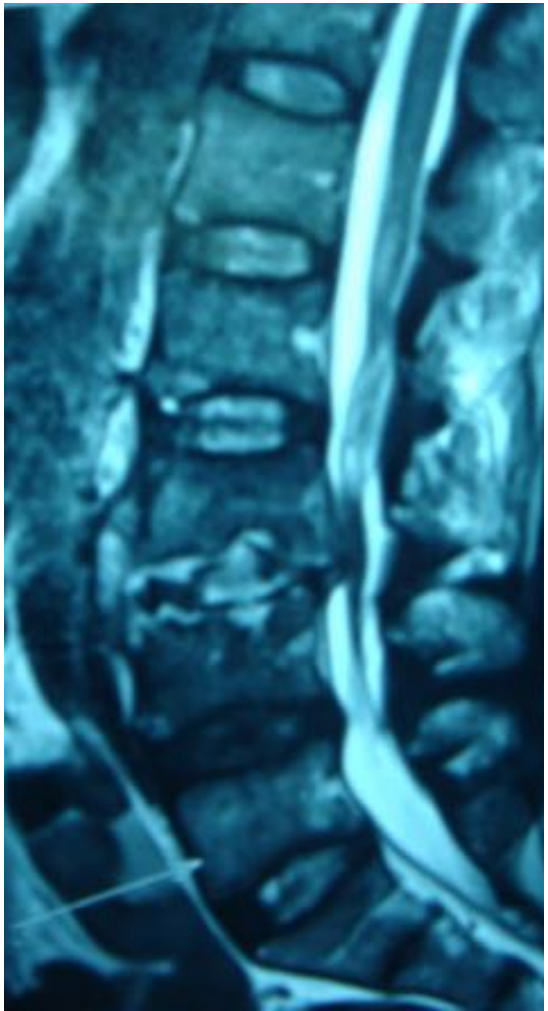


# Number of segments involved

**TB- multiple vertebral body involvement**
**skip lesions**

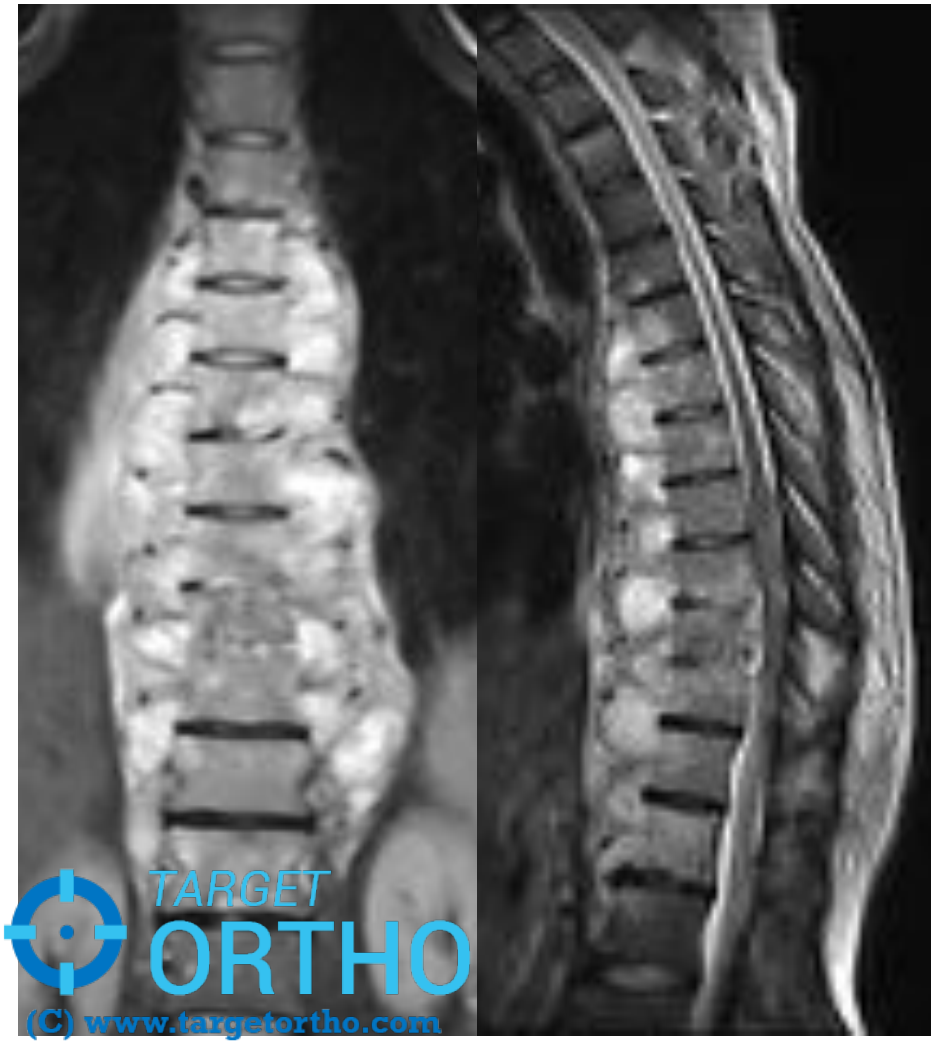
**Pyogenic- single level**



# Paraspinal abscess

## TB – paraspinal abscess

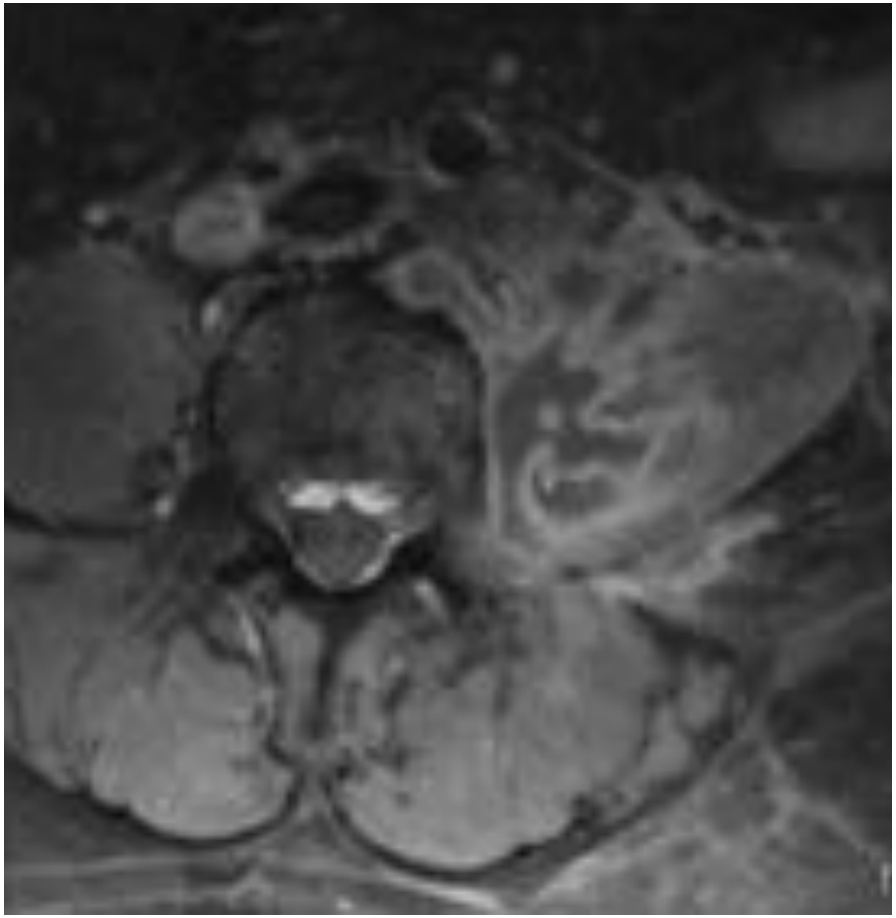



## Pyogenic- disc space

# Abscess character

**TB – thin walled abscess**

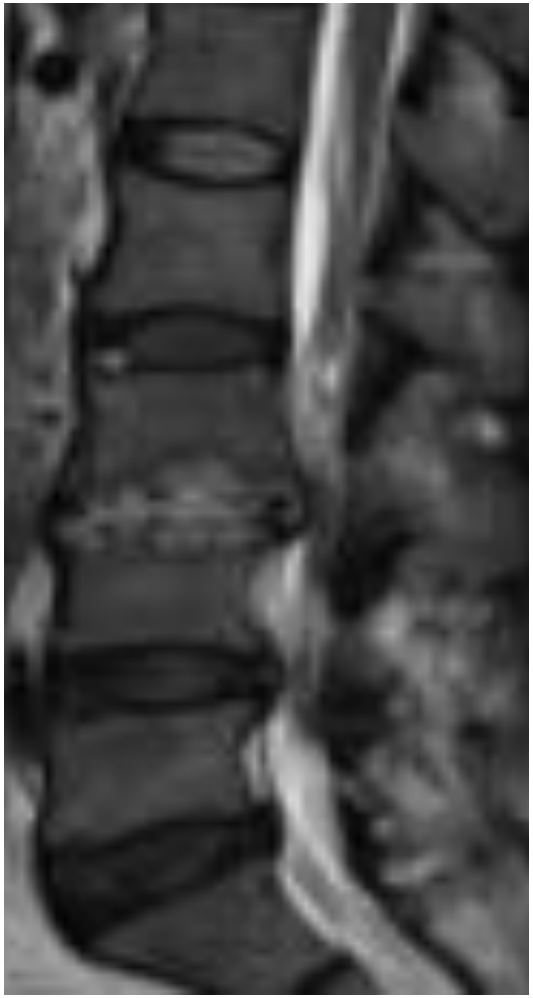
**Pyogenic – thick walled irregular abscess**



# Vertebral body destruction

**TB- body destruction**

**Pyogenic- disc space reduction**

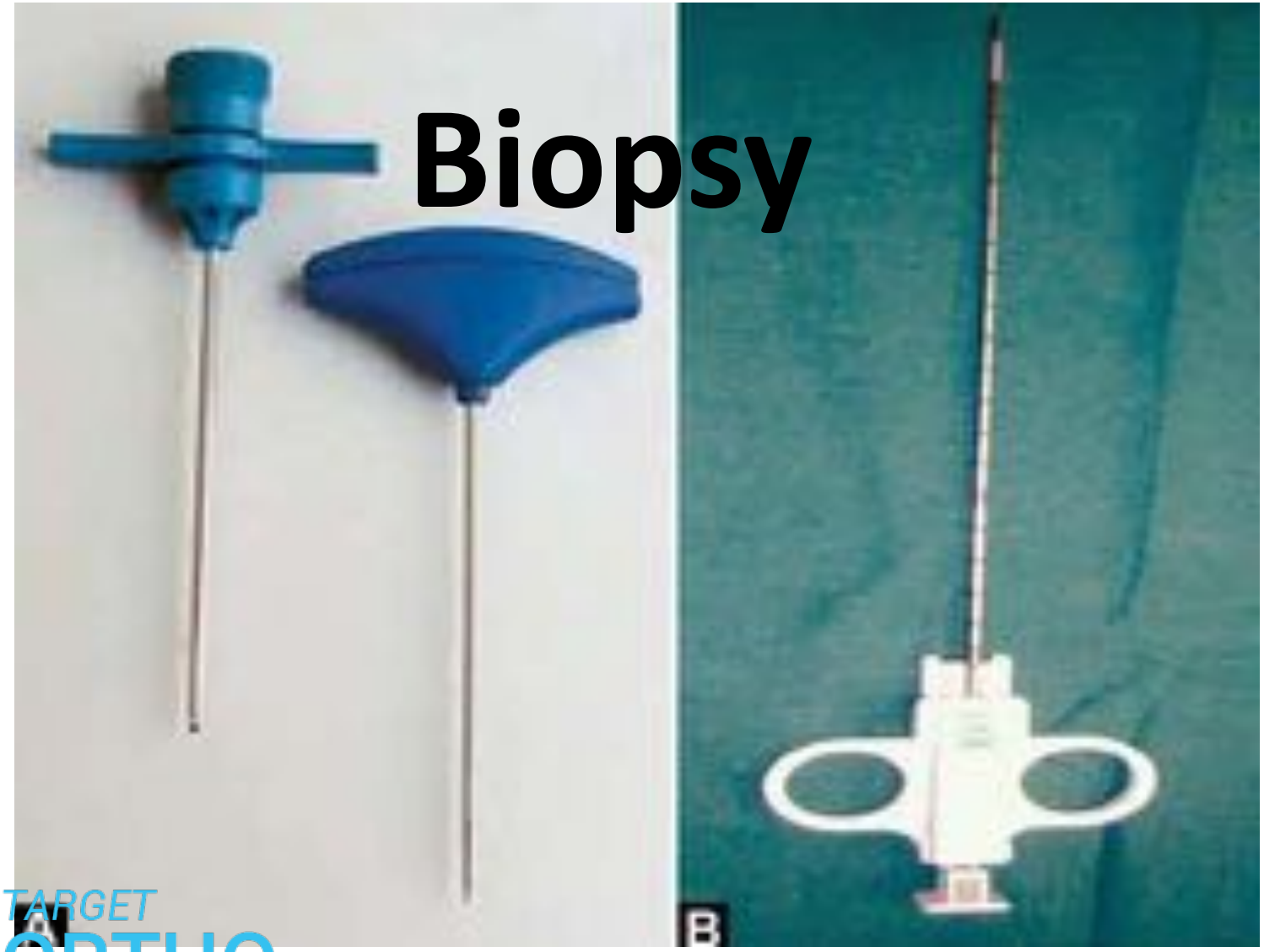


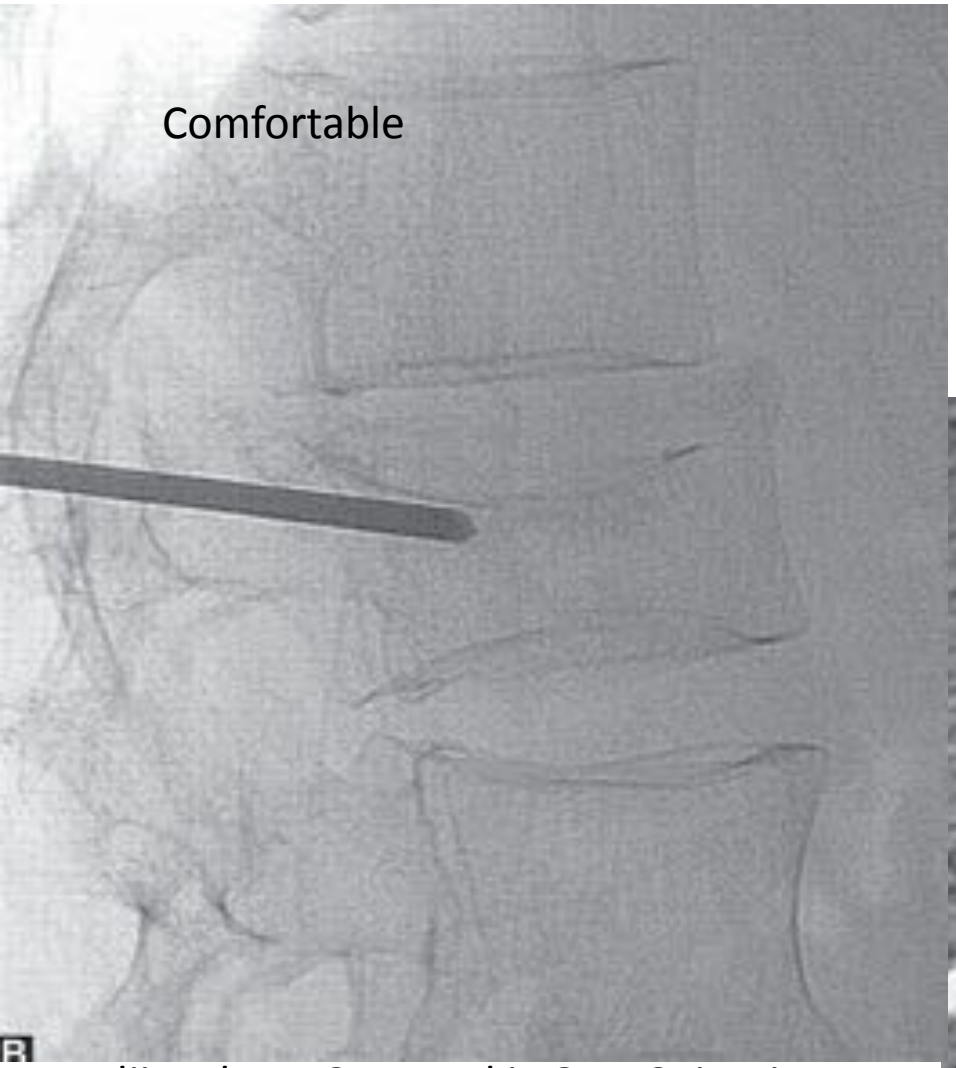
# Confirmation of the diagnosis

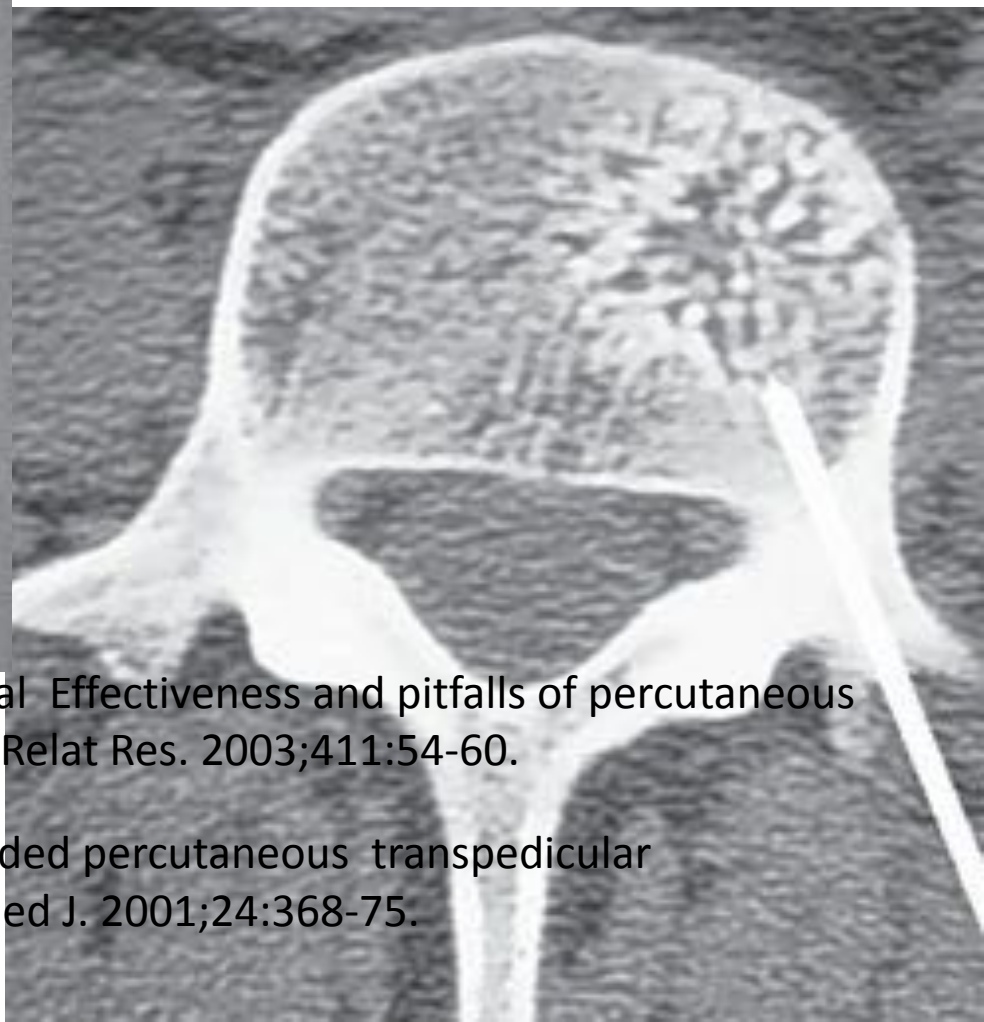
- Abscess – Aspiration of abscess
- Mainly bony involvement – biopsy

- Pus
  - Gram stain
  - AFB stain
  - Culture & Sensitivity
  - TB PCR
- Bone
  - Biopsy
  - Tissue culture
  - TB PCR

# Biopsy



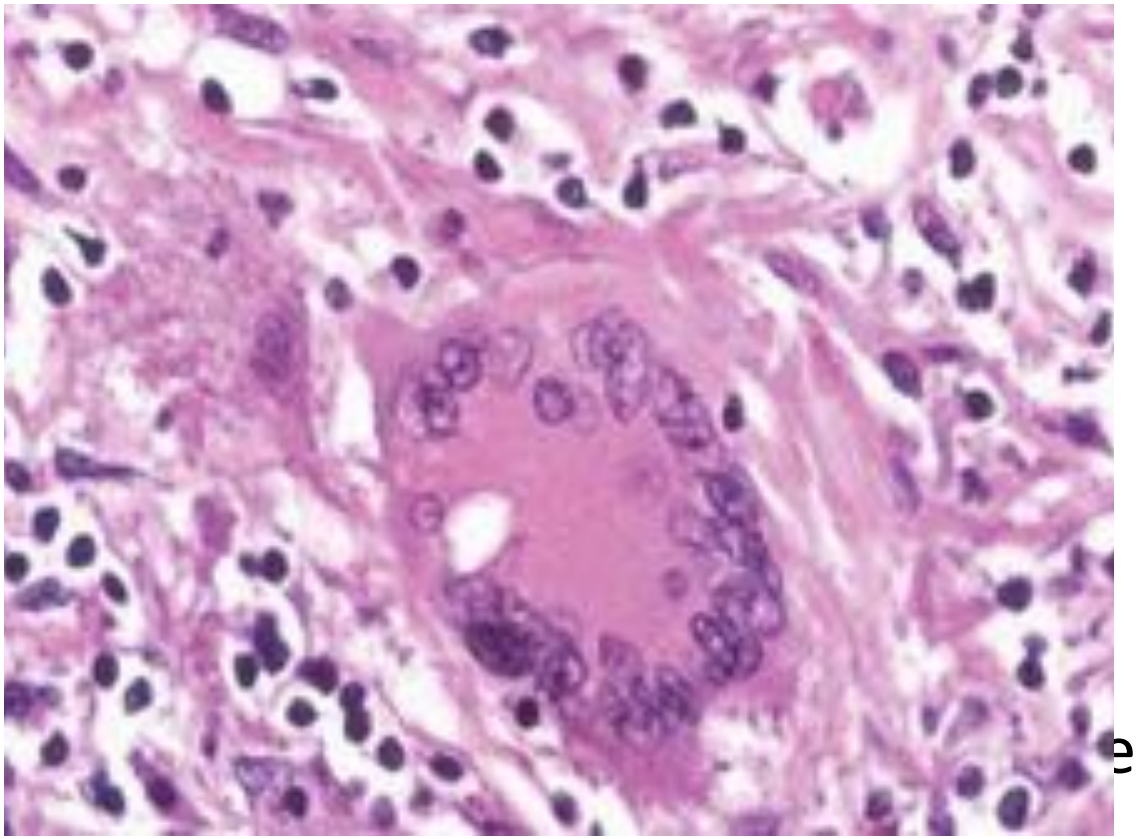


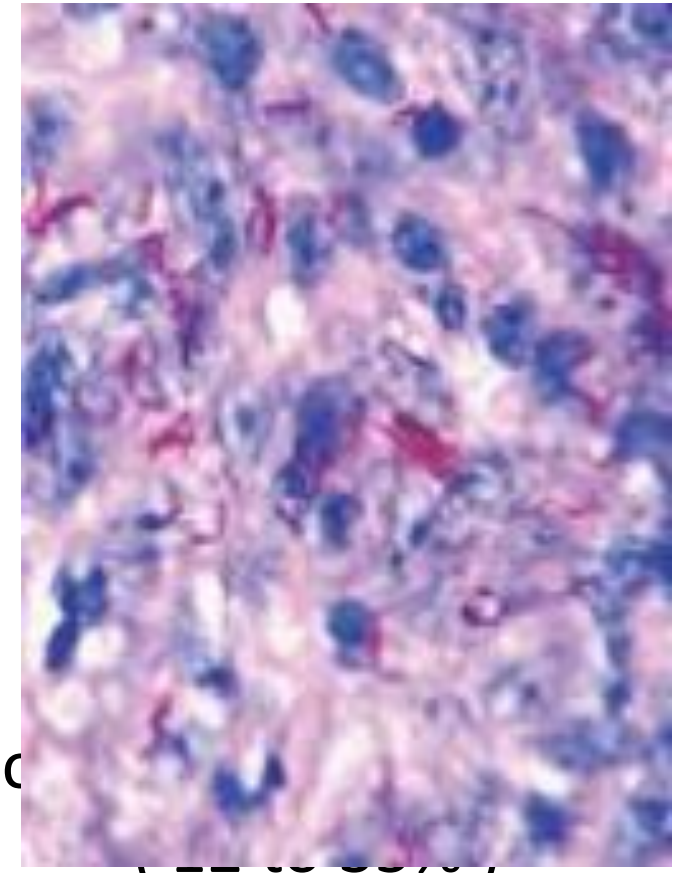



Hadjipavlou AG, Kontakis GM, Gaitanis JN, et al Effectiveness and pitfalls of percutaneous transpedicle biopsy of the spine. Clin Orthop Relat Res. 2003;411:54-60.

Hsu WC, Lim KE. Computed tomography-guided percutaneous transpedicular biopsy of the thoracic spine. Chang Gung Med J. 2001;24:368-75.

# HISTOPATHOLOGICAL EXAMINATION





# Culture

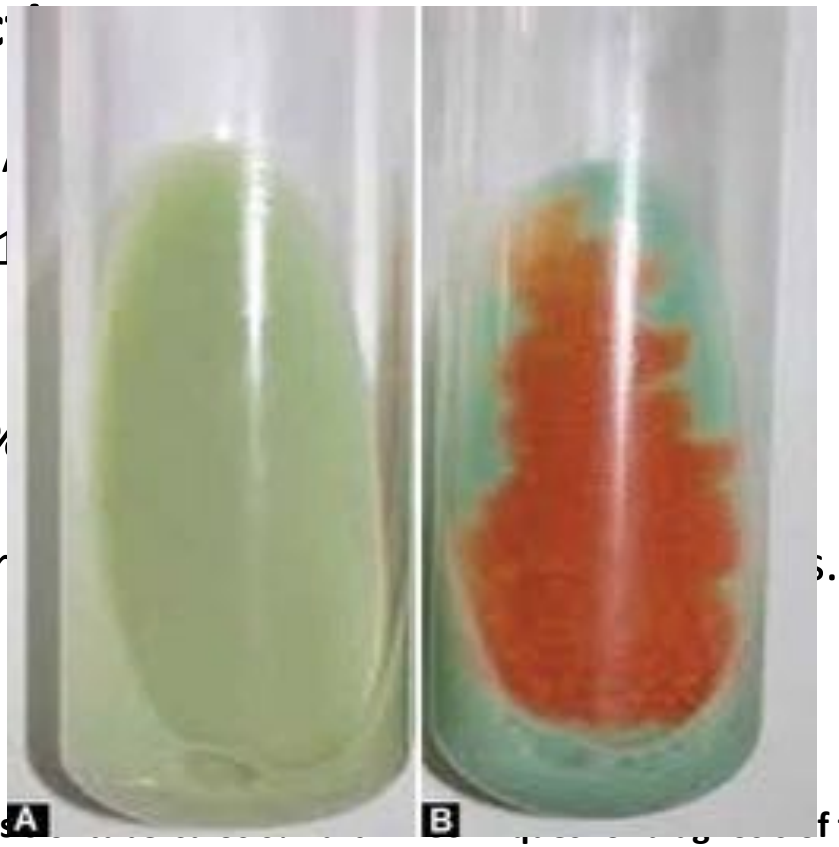
**Positive predic**

**BACTEC - 83.87%-**

**(** Metabolism of 1 - quantified )

**L-J media -61.29%**

Previous ATT decr s.




**what is new in the diagnos f tuberculosis. Ind J Tub. 2003;50:133-50.**

# POLYMERASE CHAIN REACTION (PCR)

- Amplification of target genes.
- Sensitivity -60 to 75%
- Specificity  of 94 to 100%
- Tissue  PCR – preferred in extrapulmonary TB.

- **Advantages**

  More sensitive

  Result - 1 day

  Differentiates typical & atypical

  Drug resistance

# POLYMERASE CHAIN REACTION (PCR)

- **Rapid PCR**

  **(Multiplex real time PCR)**: Faster within hrs.

- **False +** : Dead bacteria

  No differentiation - active and inactive disease.

- **False -** : PCR inhibitory substance samples.

Colmenero JD, Morata P, Ruiz-Mesa JD, et al. Multiplex real-time polymerase chain reaction: A practical approach for rapid diagnosis of tuberculous and Brucellar vertebral osteomyelitis. Spine 2010;35: 24, E1392–E1396.

**31 to 39% - not possible to get bacteriological, histopathological or other forms of confirmation .**

**Corroborative evidence of multiple investigation reports than relying only on one or two tests**



Rajasekaran .S *ASSI Textbook of Spinal Infections and Spinal Trauma* 1st edition Jaypee Brothers Medical Publishers (P) Ltd

# Management of TB spine

- Medical disease
- **2 HRZE/ 7 HRE- 9 months ATT**
- Bed rest

- Brace

- Monitoring with ESR / radiology

# Role of **DOTS**

## **D**irectly **o**bserved **t**reatment **s**trategy

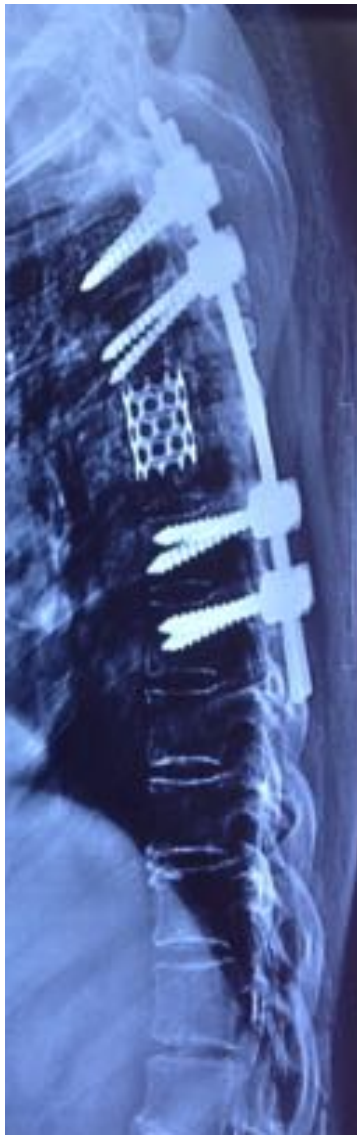
- Increases compliance and decrease drop out rate.
- Based on **lag period phenomenon-** bacilli once exposed to drug takes several days to regrow
- Argument of high relapse rates using intermittent regimes is not proven in any studies.

# Surgical indication

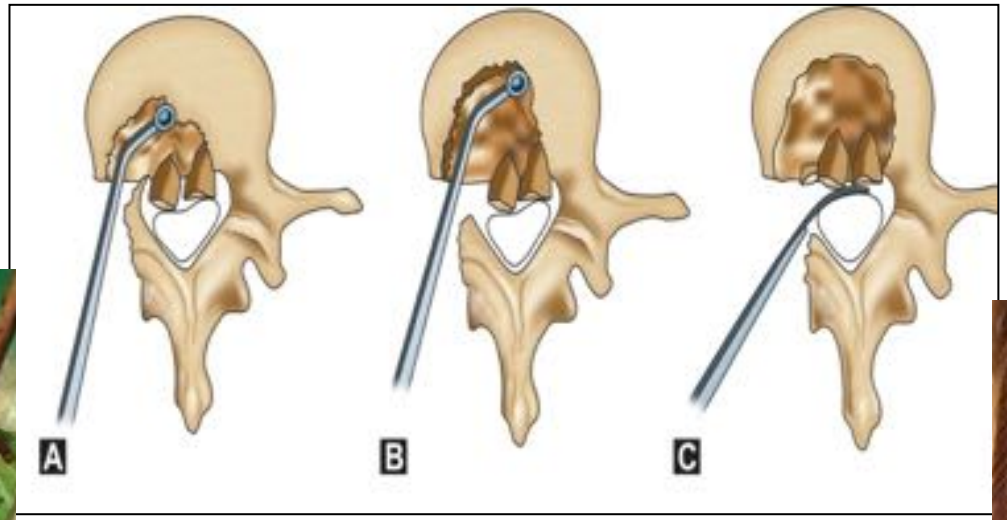
- Aim of treatment- eradication of the infection.
- Majority -nonoperative treatment alone

**<u>Small proportion of patients require surgery to</u>**

1. Relieve severe pain,
2. Prevent or reverse neurologic deficits,
3. Prevent or correct kyphotic deformity, and
4. Stabilize the spine.

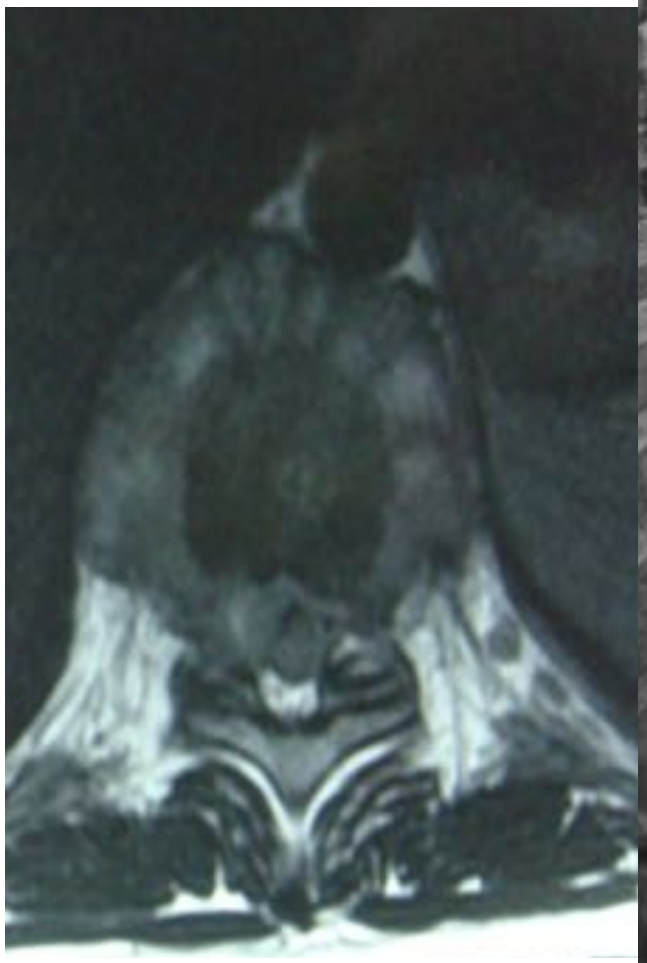


# Case-1 Transpedicular approach





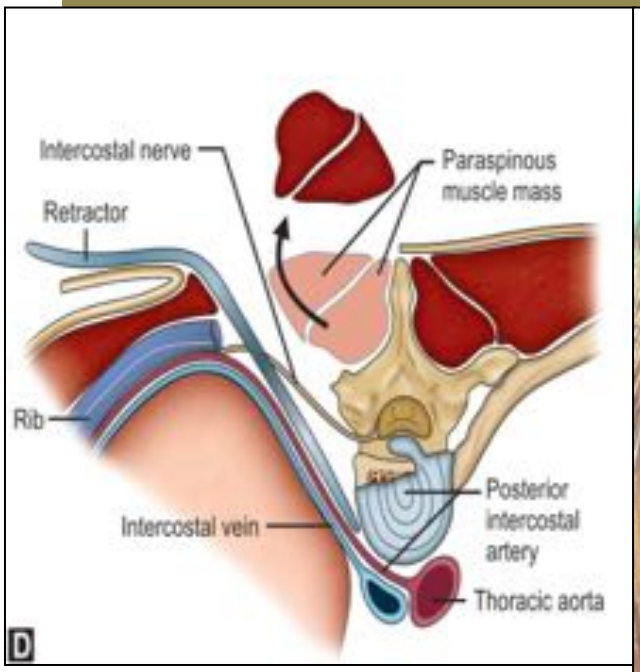
# Case-1
# Transpedicular approach

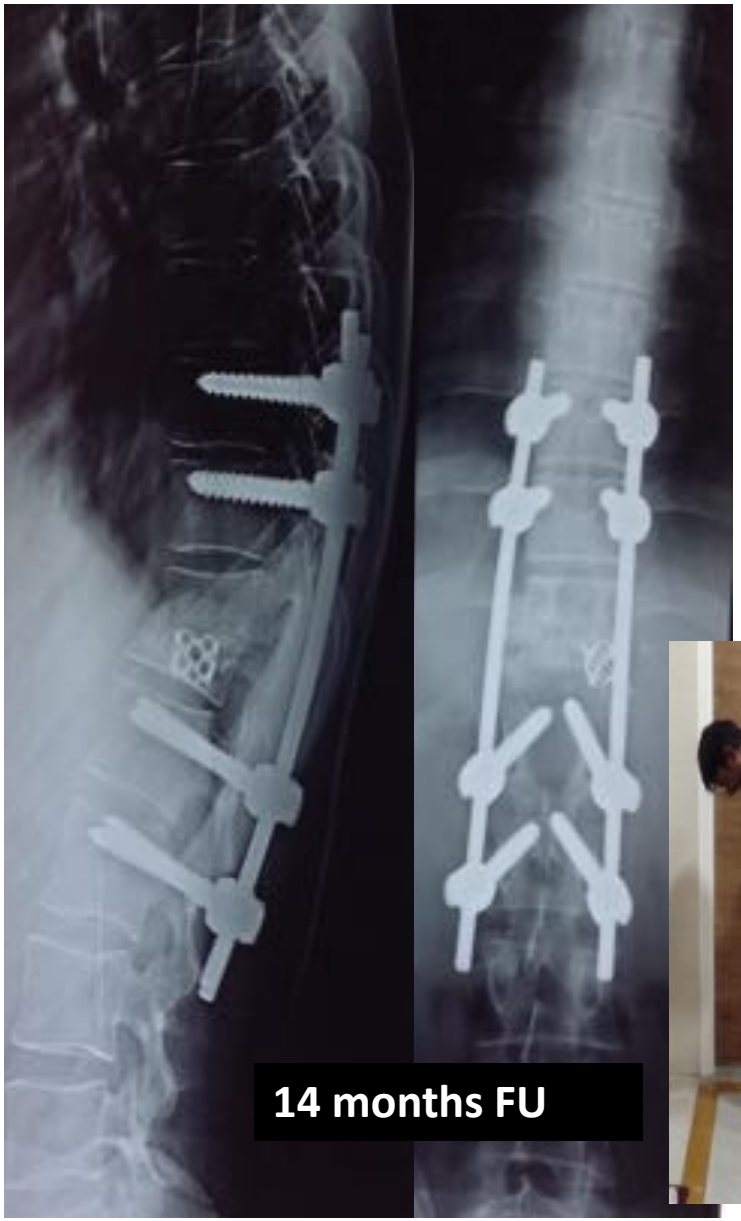
12 months follow up

Case-2

# Costotransversectomy approach

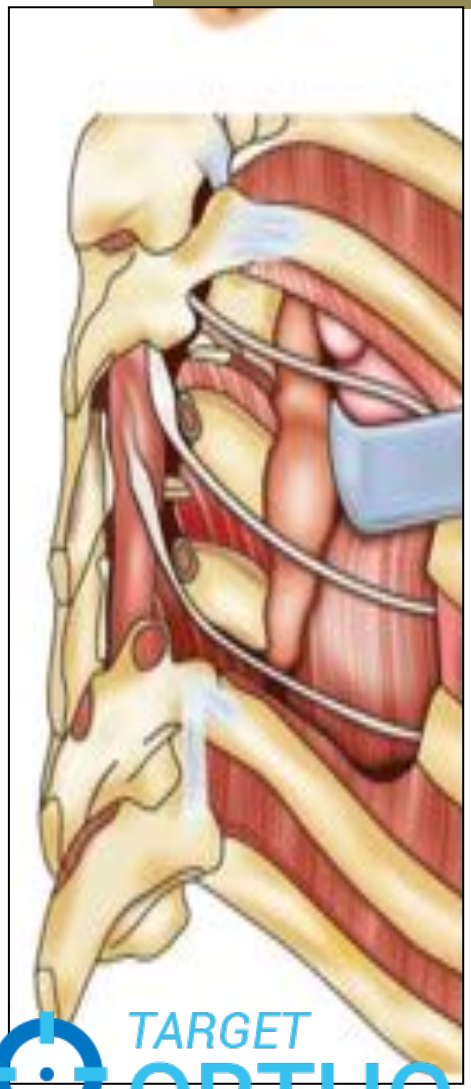


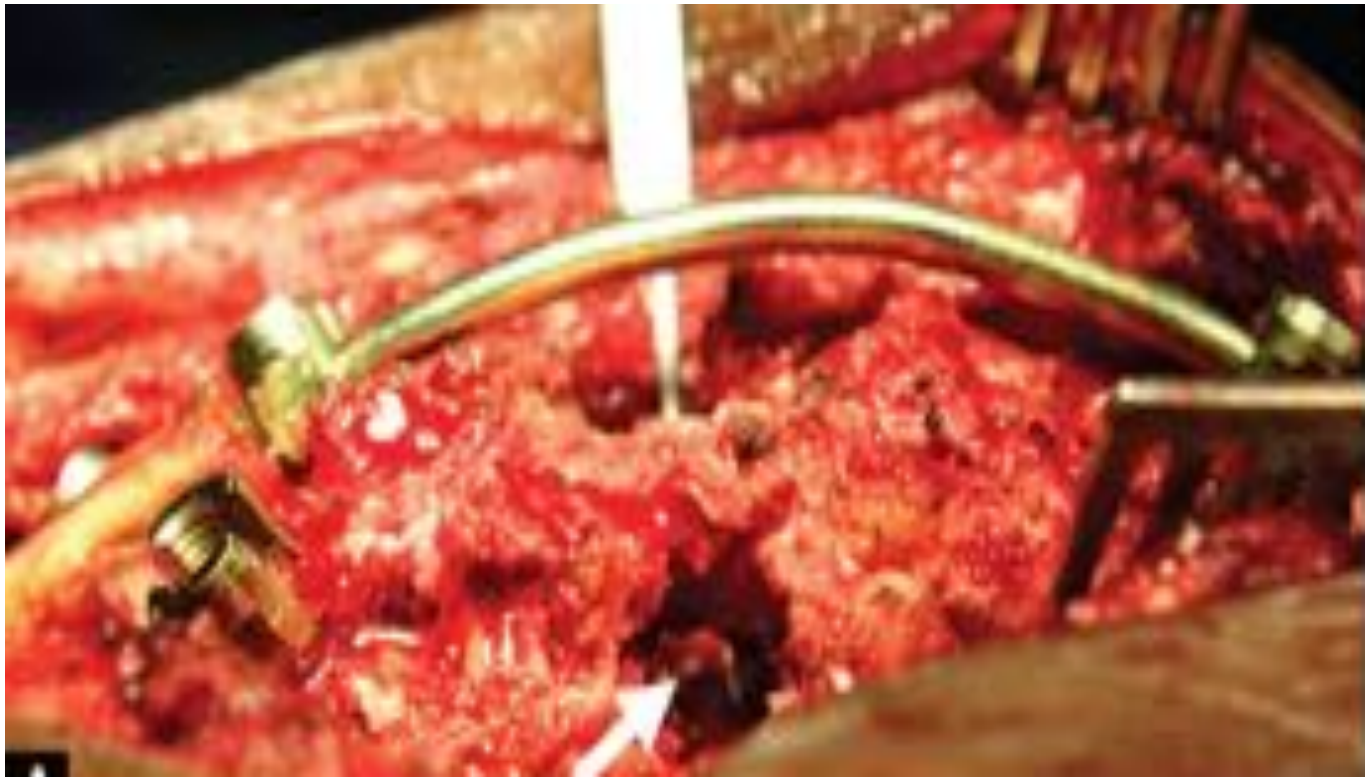

# Case-2 Costotransversectomy approach



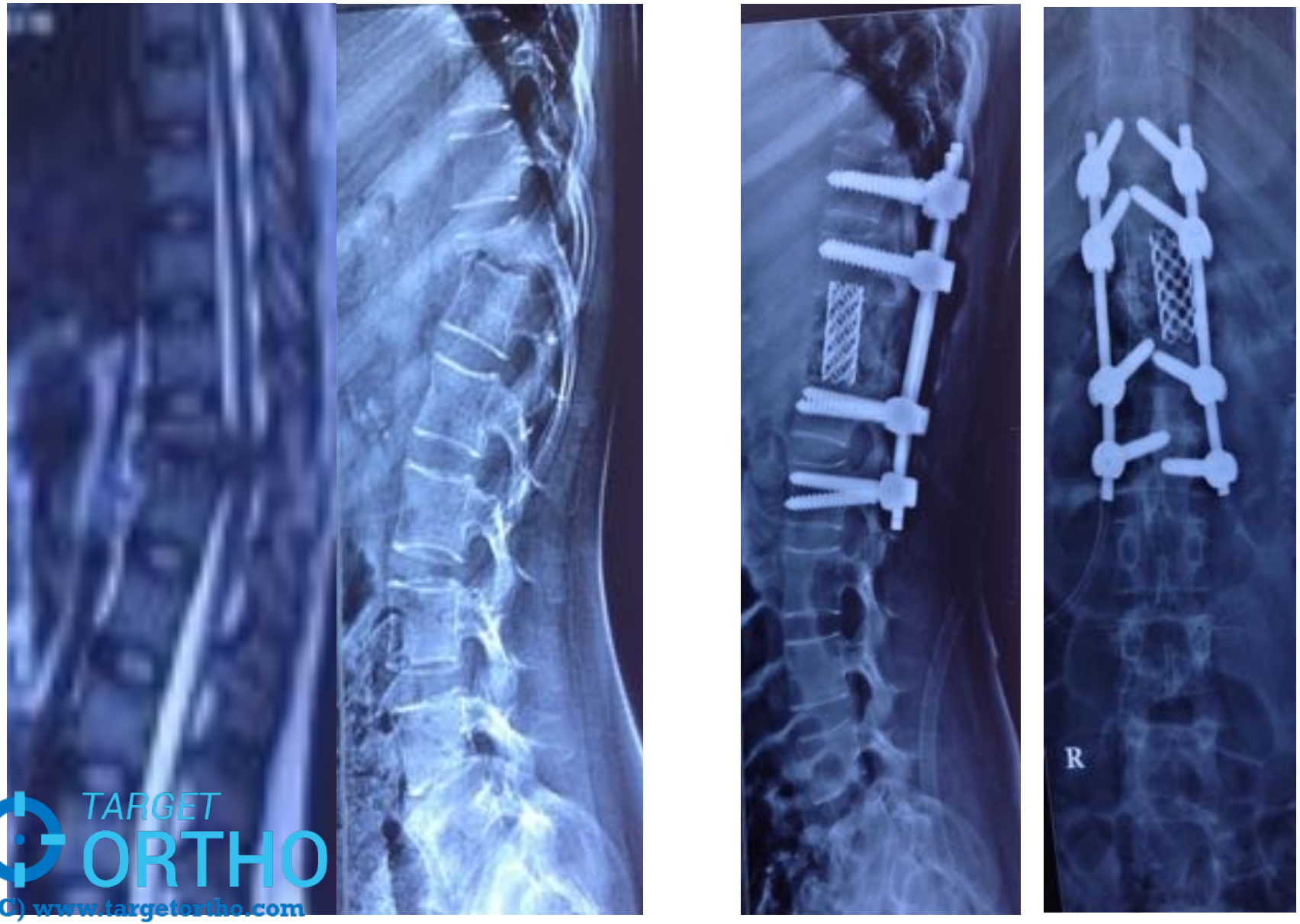
14 months FU

# Case-3
# Extracavitary approach

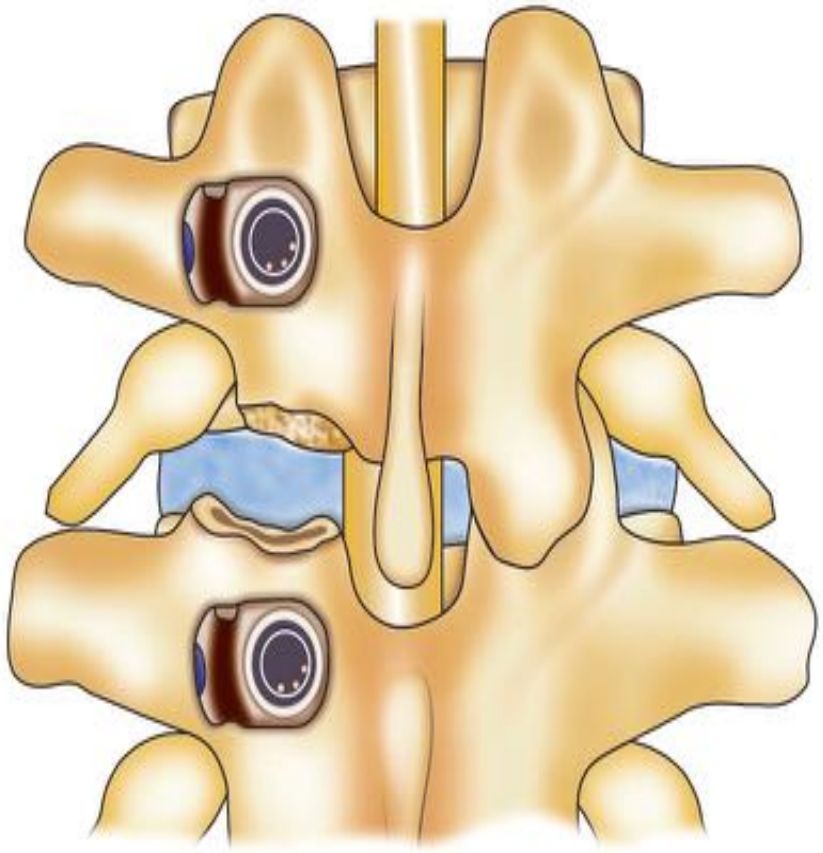




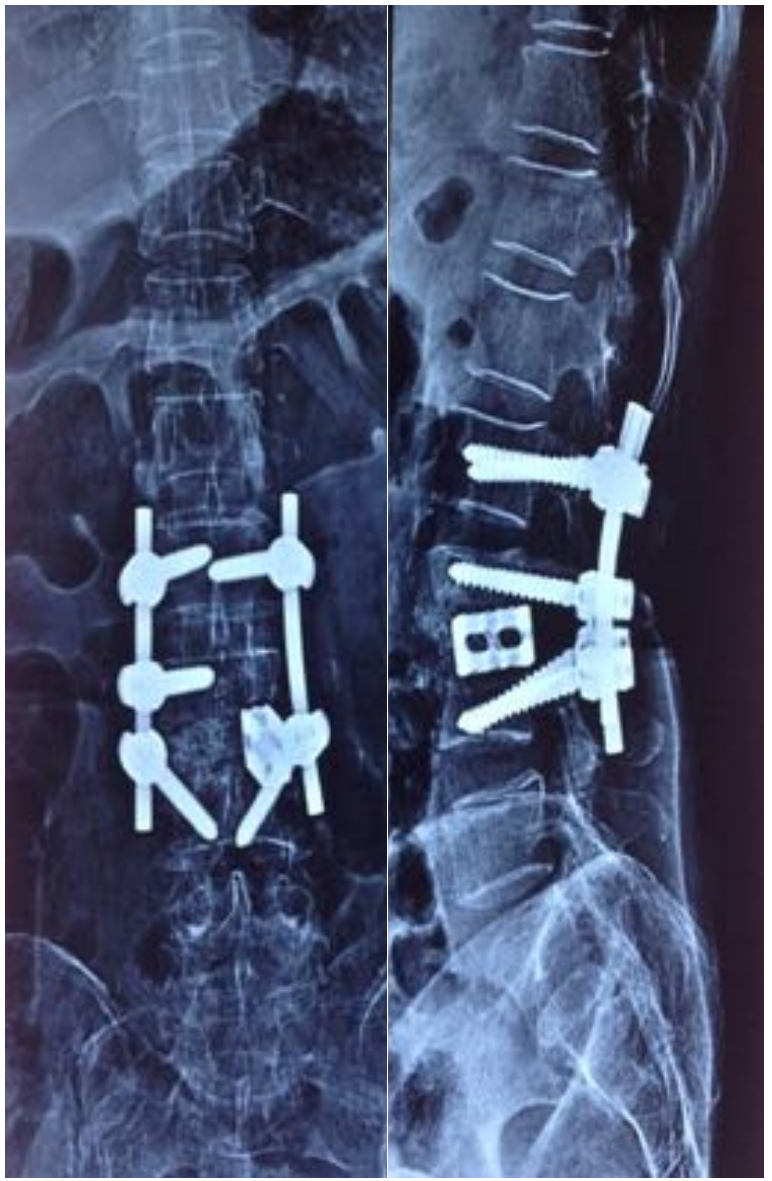
# Case-3 Extracavitary approach

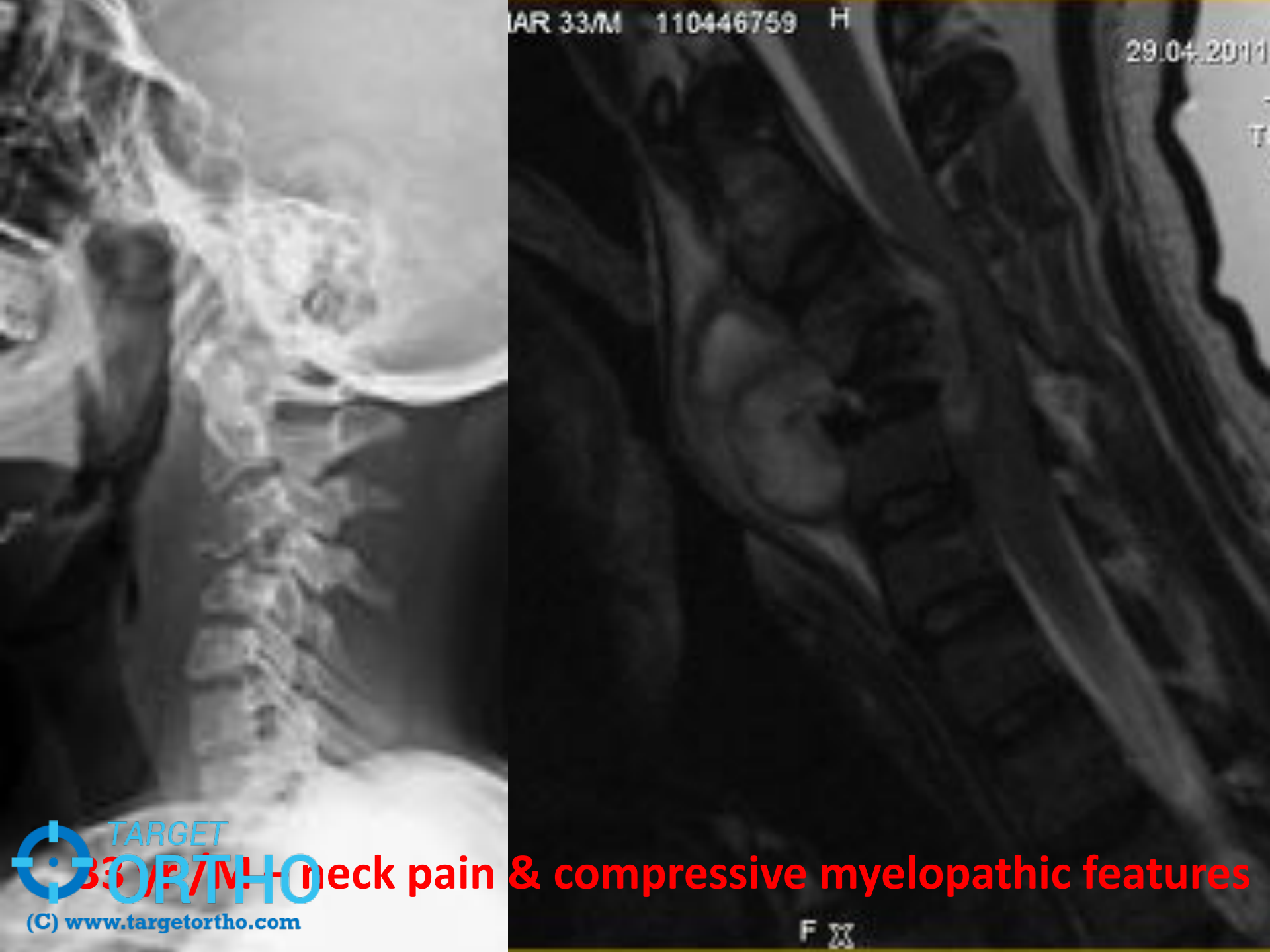


# Case-4
# TLIF



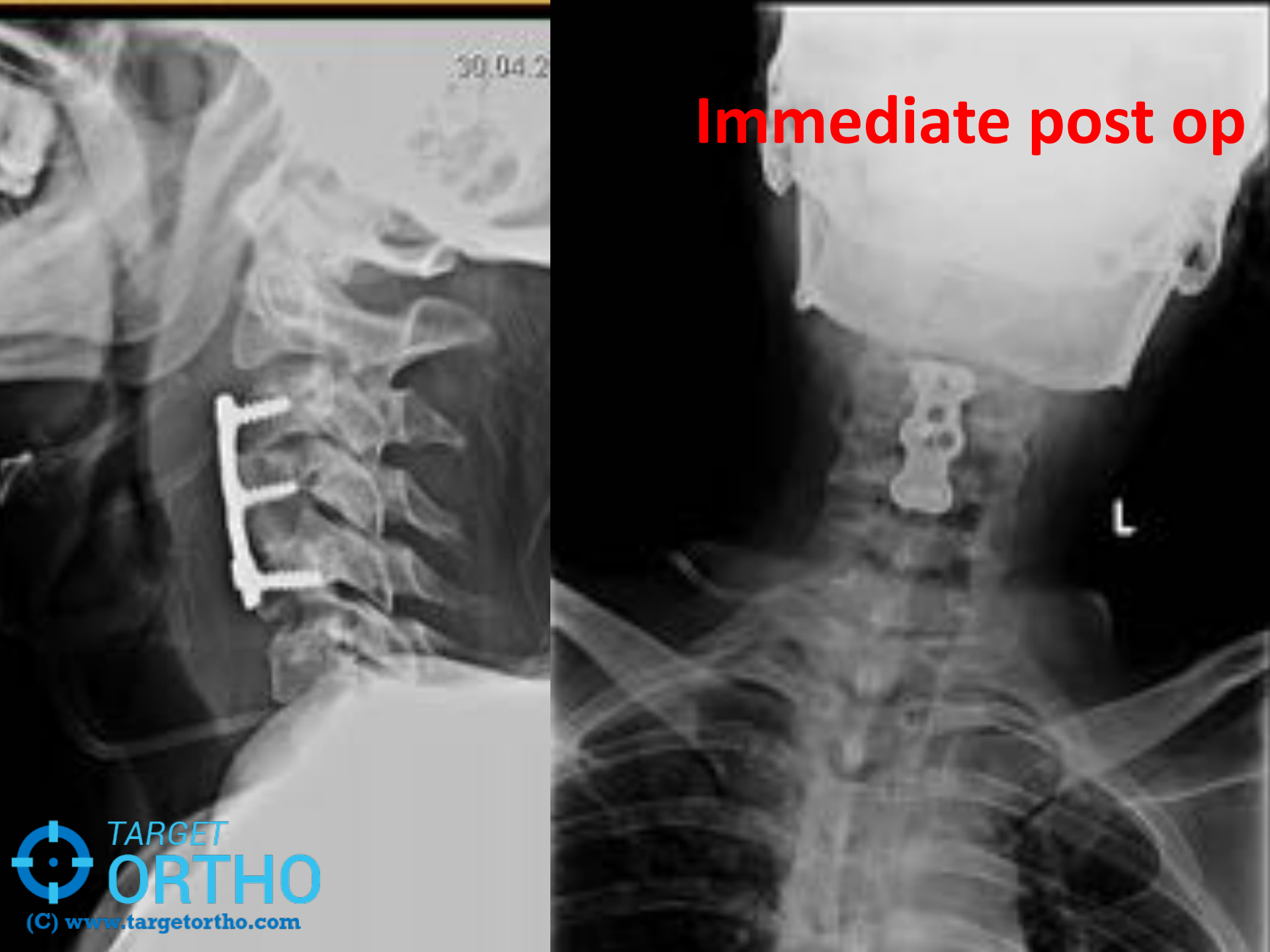
# Case-4 Transforaminal lumbar interbody fusion






TARGET ORTHO

33 yr/M - neck pain & compressive myelopathic features

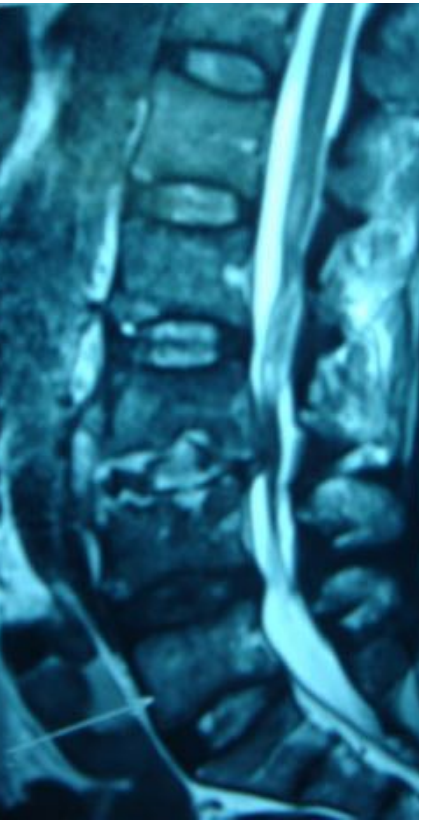
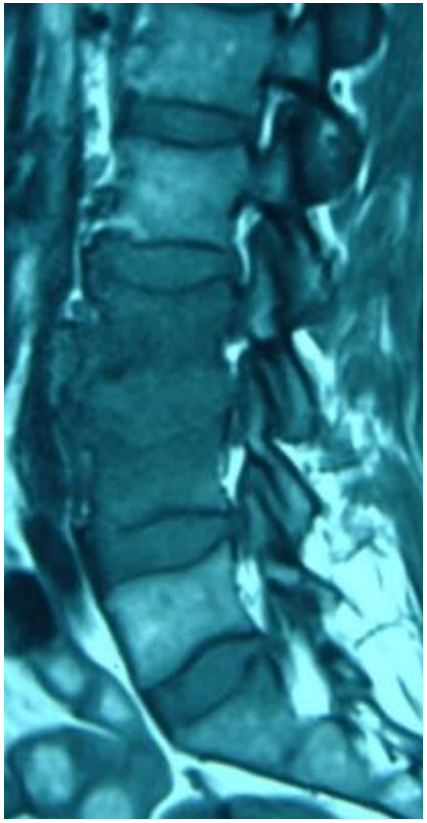
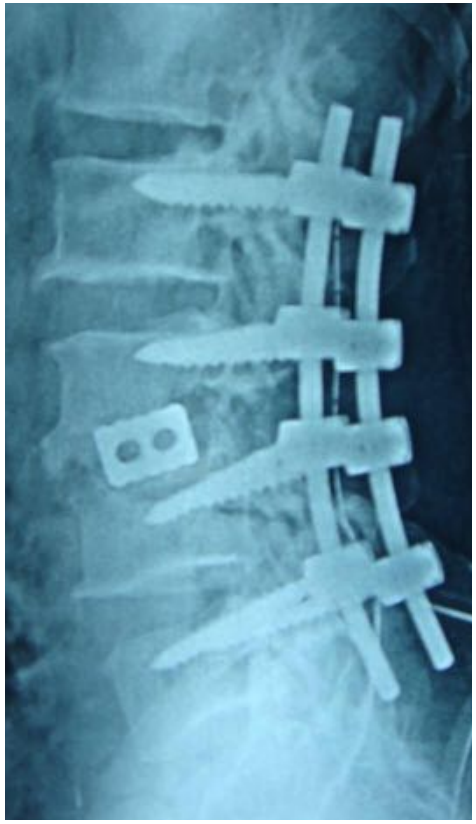

Immediate post op
L
TARGET
ORTHO
(C) www.targetortho.com

# Pyogenic spondylodiscitis Treatment

- • ***The Goals of Surgical Intervention***

1.
    1. *Debridement*
2.
    2. *Drainage of abscess*
3.
    3. *Decompression*
4.
    4. *Stabilisation*

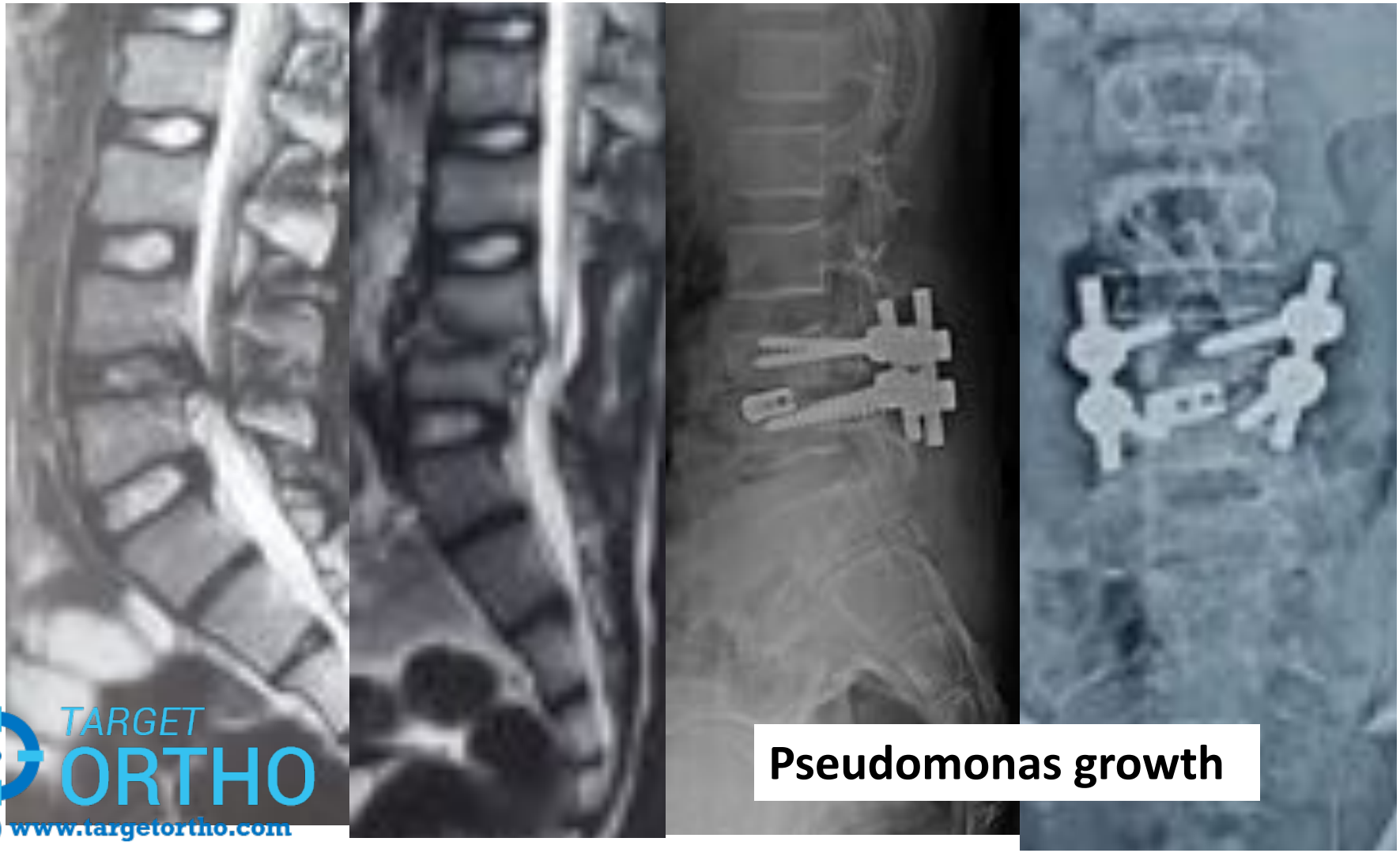
# L3-L4 infective spondylodiscitis



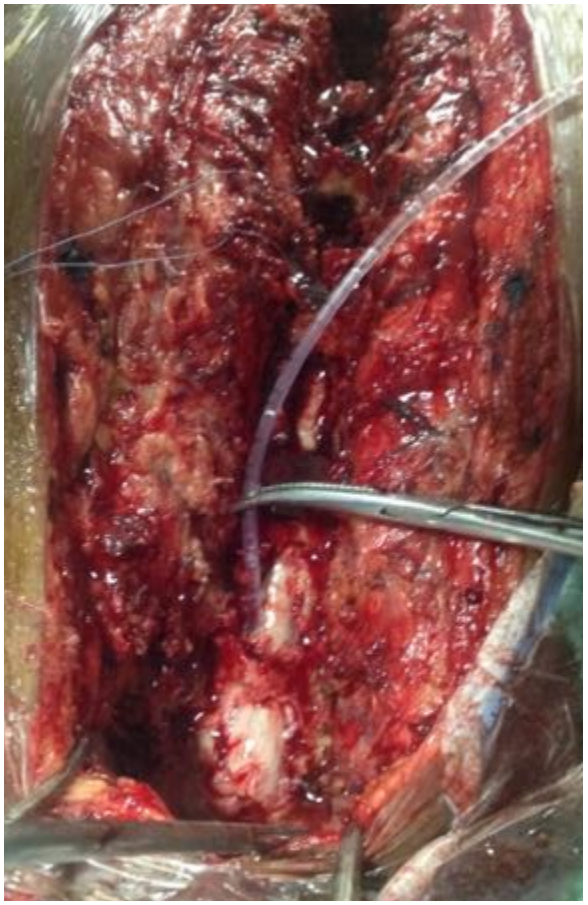

Started on emperical ATT – 6wks
Culture- Klebsiella
Inj.Piperacillin +tozabactum – 6 weeks.

# Post operative discitis



# Pyogenic discitis with extensive epidural abscess

MRI showing extensive epidural abscess extending beyond 10 segments


**Limited laminectomy approach-** alternate level laminectomy along with wash using irrigation catheter in the intervening segments

**The merits of limited laminectomy approach:**

1. Less operating time and blood loss,
2. Decreases the chance of instability and deformity associated with extensive laminectomy.

Post op MRI showing resolution of abscess

# Inconclusive investigations

- **Pyogenic group**
  - 1.Urine culture
  - 2.Blood culture
  - 3.Foci of infection
  - 4.Post operative infection
  - 5.Sepsis
  - 6.Biopsy report
- TB
  - 1.Concominant lung infection
  - 2.Multifocal spinal involvement
  - 3.Pts with MRI evidence of infection and corroboratory blood investigation reports

Necrotic bone and an abundance of inflammatory cells (neutrophils and macrophages) filling the marrow space.

# MDR - TB

- **Resistant to INH & Rifampicin**
- Incomplete & inadequate ATT course
- Incidence- **3%** of newly diagnosed.
- **Treatment strategy:**
  Pus – culture & sensitivity

  Till report -HRZES + Moxifloxacin(400 bd) + cycloserine

  After C/S report – 5 drugs according to sensitivity for 18 months.

**Guidelines for Treatment of Tuberculosis, Fourth Edition.Geneva: World Health Organization; 2009**

# XDR - TB

- **Resistant to almost all drugs used to treat TB.**

Resistant to best 1st line drugs- INH & Rifampicin

Resistant to best 2nd line drug- fluoroquinolones

Resistant to atleast one of 3 injectable drugs(amikacin, kanamycin ,capreomycin)

**Guidelines for Treatment of Tuberculosis, Fourth Edition.Geneva: World Health Organization; 2009**

# Thank you