RADIOLOGICAL ASPECTS OF SPINAL TB

Radiological investigations

X-RAY

ultrasound

CT

MRI

Radionuclide imaging

PLAIN RADIOGRAPH

- Radiographs are normal in the initial stages of the disease
- More than 50% of bone has to be destroyed before a lesion is seen on radiograph. It takes 6months
- Classic roentgen triad in spinal TB - primary vertebral lesion
  Disc space narrowing
  paravertebral abscess

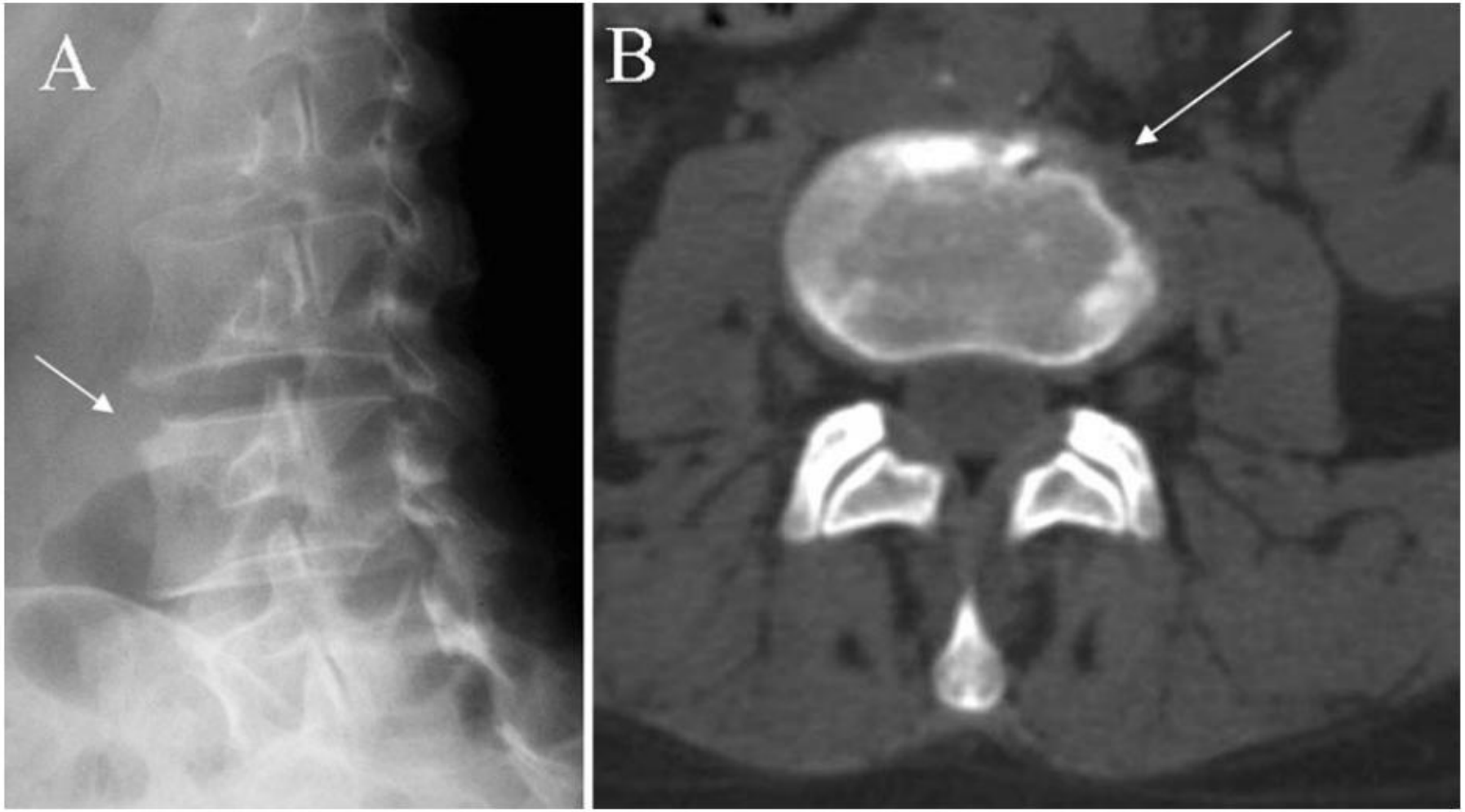
Typical features in long standing paraspinal abscess

- Fusiform paraspinal soft tissue shadow with calcification
- Produce erosions around anterior margins of vertebral bodies forming a scalloped appearance

- Earliest finding- radiolucencies & loss of definition of end plate margins
- Skip lesions may be seen with involvement of non contiguous vertebrae

DEFORMITIES

- Anterior wedging leading to kyphosis & gibbus deformity
- bony ankylosis
- Vertebra plana –single collapsed vertebra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HEALED TB

- Restoration of vertebral height takes atleast 15 mths
- sclerosis – ivory vertebra
- ankylosis is a surest sign of healing

CT

- Patterns of bony destruction
- Calcifications in abscess - pathognomic for TB
- Regions which are difficult to visualize on plain X ray like

craniovertebral junction

cervicodorsal junction

Sacrum

Sacroiliac joints

posterior spinal TB (Lesions < 1.5 cm are usually missed due to overlapping of shadows on x-rays)

Types of destruction

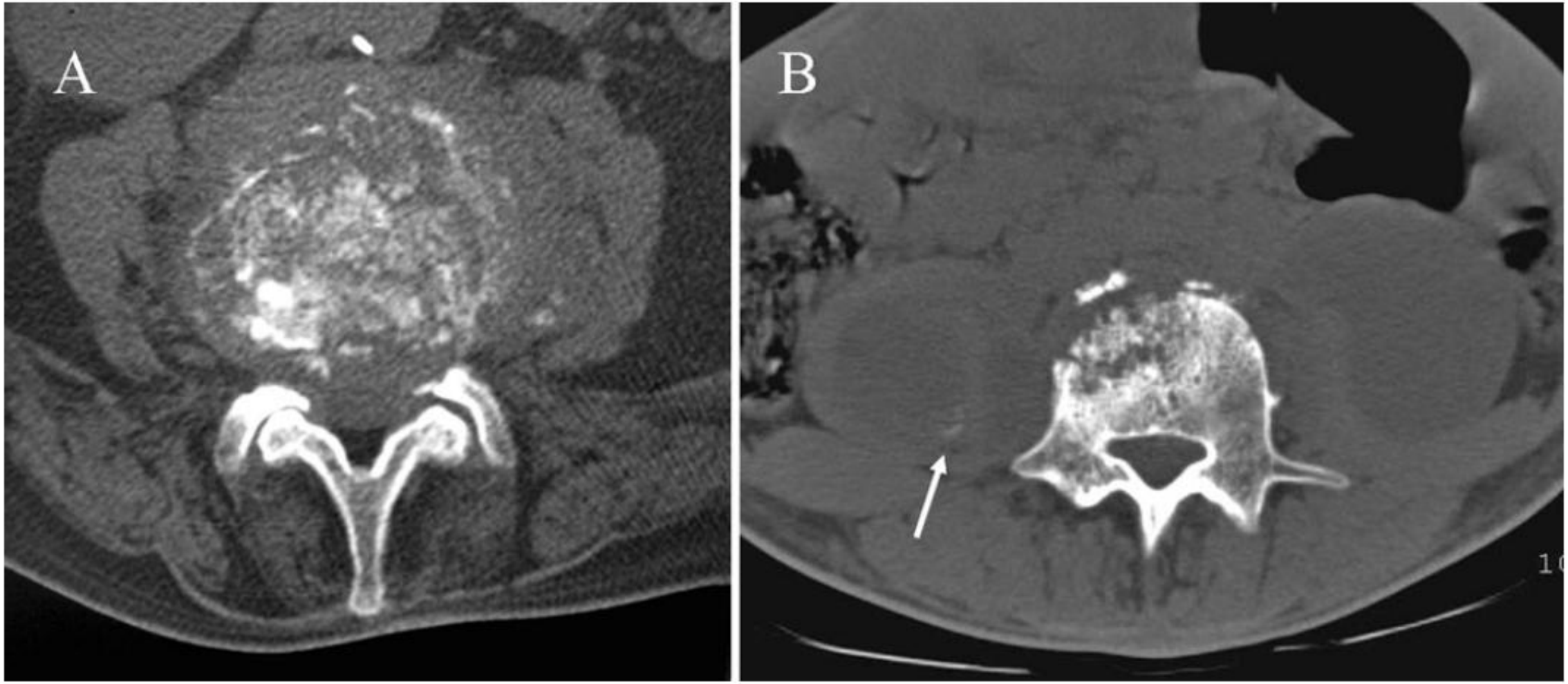
Fragmentary

Osteolytic

Subperiosteal

Localised

CECT – Paraspinal abscesses with enhancement of granulation tissue & walls of the abscesses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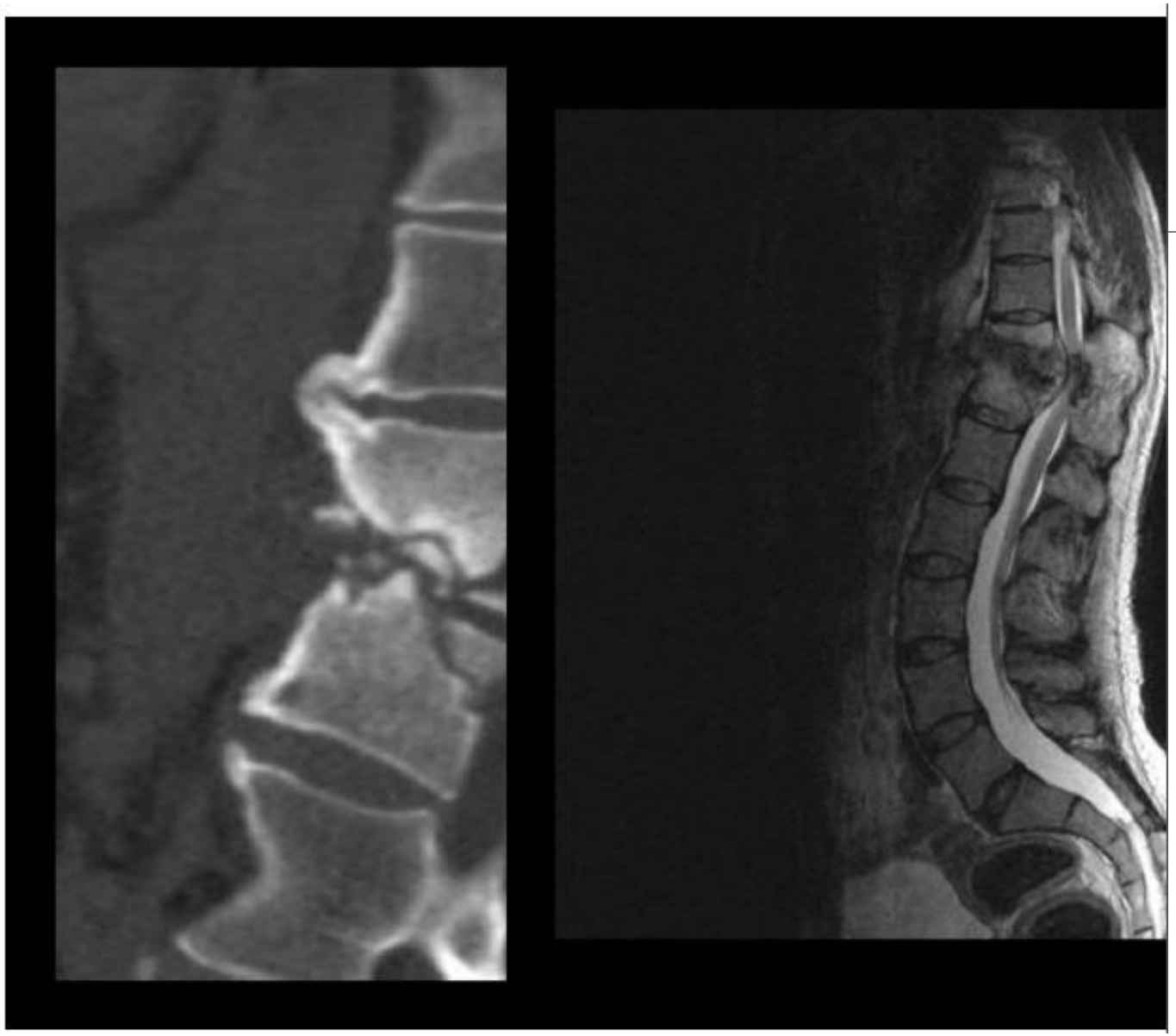

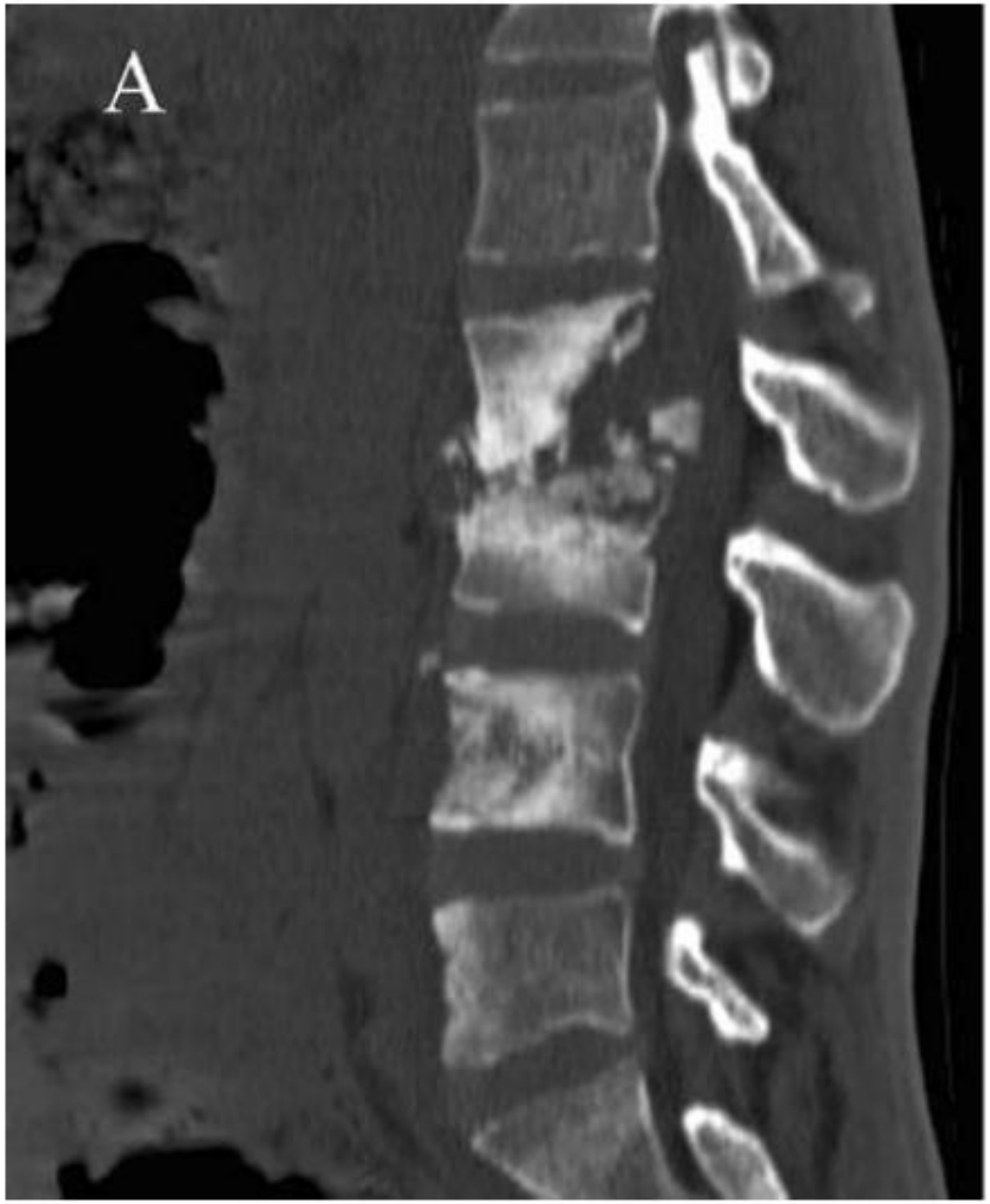
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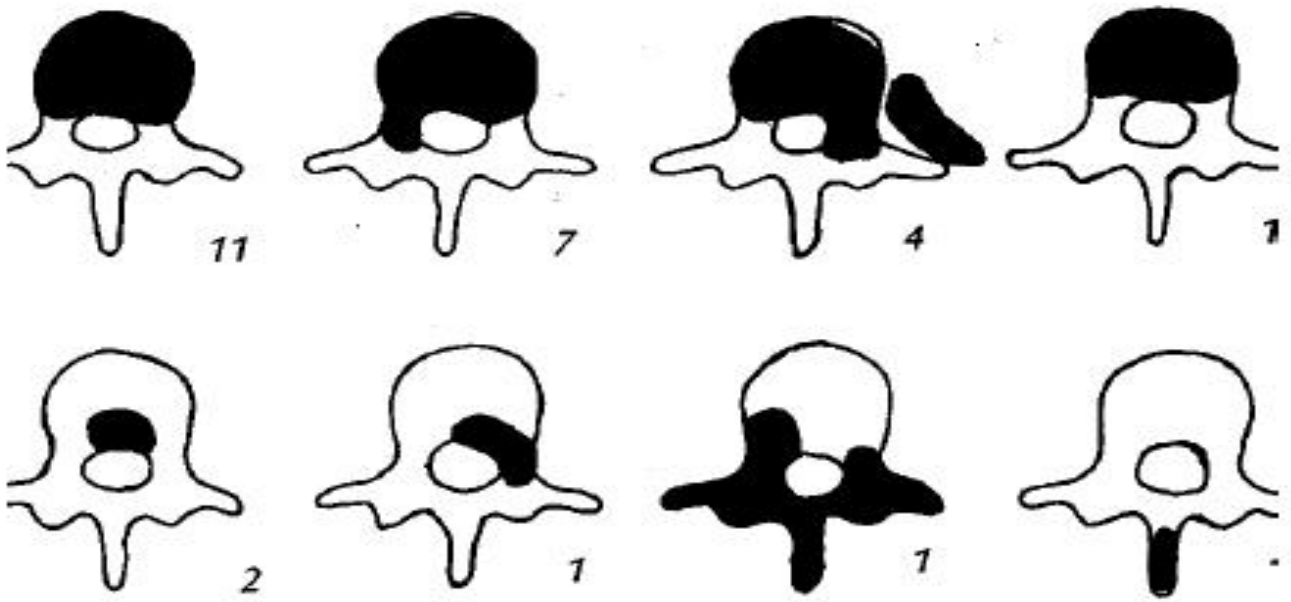


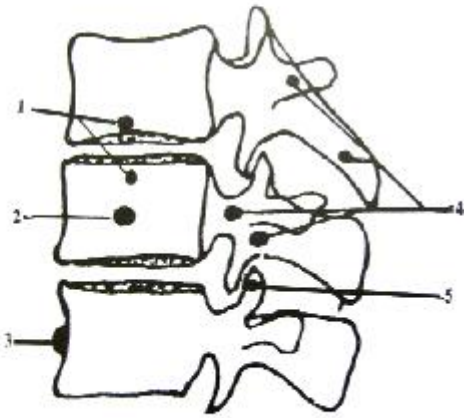
LOCATION OF VERTEBRAL BODY DESTRUCTION

MRI

- Detects marrow infiltrations in vertebral bodies leading to early diagnosis – BM Edema
- Changes of discitis
- Assessment of extradural abscess or subligamentous spread
- skip lesions
- spinal cord involvement
- spinal arachnoiditis
- Lack of ionizing radiation & high contrast resolution

PATTERNS OF VERTEBRAL INVOLVEMENT

- The primary focus of infection in the spine can be either in the vertebral body or in the posterior elements.
- Four patterns :
  - ❑ Paradiscal (Commonest)
  - ❑ Central
  - ❑ Anterior, &
  - ❑ Appendiceal



PARADISCAL TYPE :

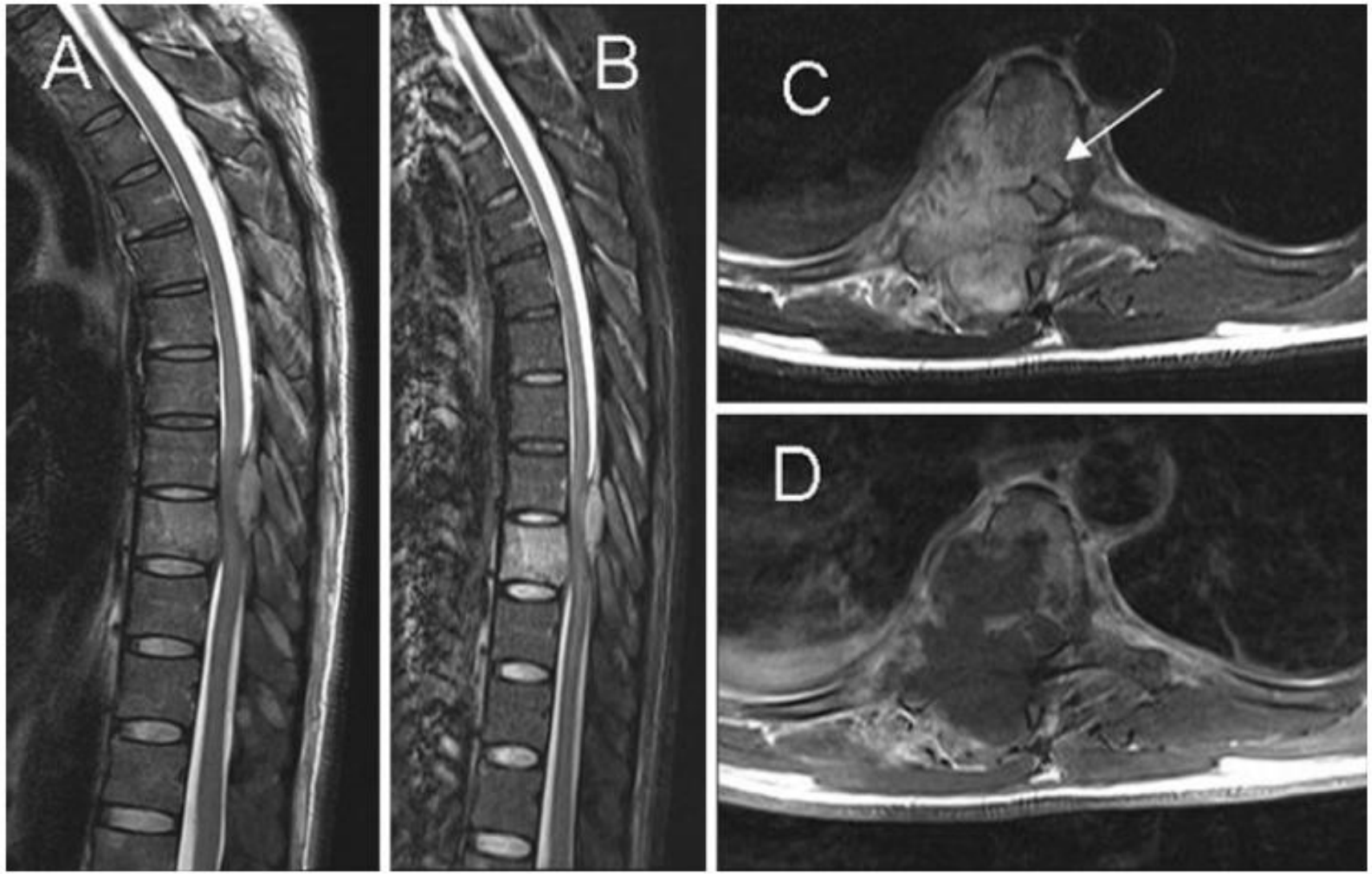
Paradiscal infection begins in the vertebral metaphysis, eroding the cartilaginous end plate, leading to disc space narrowing due to the infection itself or due to disc herniation into the end plate.

The disc shows high signal on T2.On contrast the infected disc enhances allowing differentiation of the non infected part.

The spreading of infection into the surrounding soft tissues is common, and usually progresses in anterolateral direction

The abscess has a thin smooth wall contrast enhancement, whereas the phlegmon has uniform enhancement .

Paraspinal abscesses occur in the thoracic spine, & can spread through the ilio-psoas compartment and have the capacity to reach the retroperitoneum, pelvis or thigh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ANTERIOR TYPE

In the anterior pattern the infection starts in the corner of the vertebral body, it spreads to the adjacent vertebrae underneath the anterior longitudinal ligament.

Subligamentous dissemination stripes the periosteum and the anterior longitudinal ligament from the vertebral surface.Periosteum stripping makes the avascular vertebrae more vulnerable to infection.

Combined ischemic and high pressure attacks produce scalloping of the anterolateral surface of the vertebral bodies (‘‘gouge defect’’).

Finally, the progression of bone lesion produces anterior vertebral collapse, leading to kyphosis.

MRI findings consist of a subligamentous abscess with contrast enhancement, preservation of the disks, and abnormal signal involving multiple vertebral segments with heterogeneous signal intensity


A

CENTRAL TYPE

- In central lesions the infection affects one single vertebral body.
- The disc is uninvolved.
- If the infection progresses, the whole vertebral body collapses resulting in vertebra plana
- Infection spreads to the contiguous vertebra or to the paraspinal space.

D/D LYMPHOMA OR METASTASIS


A
B

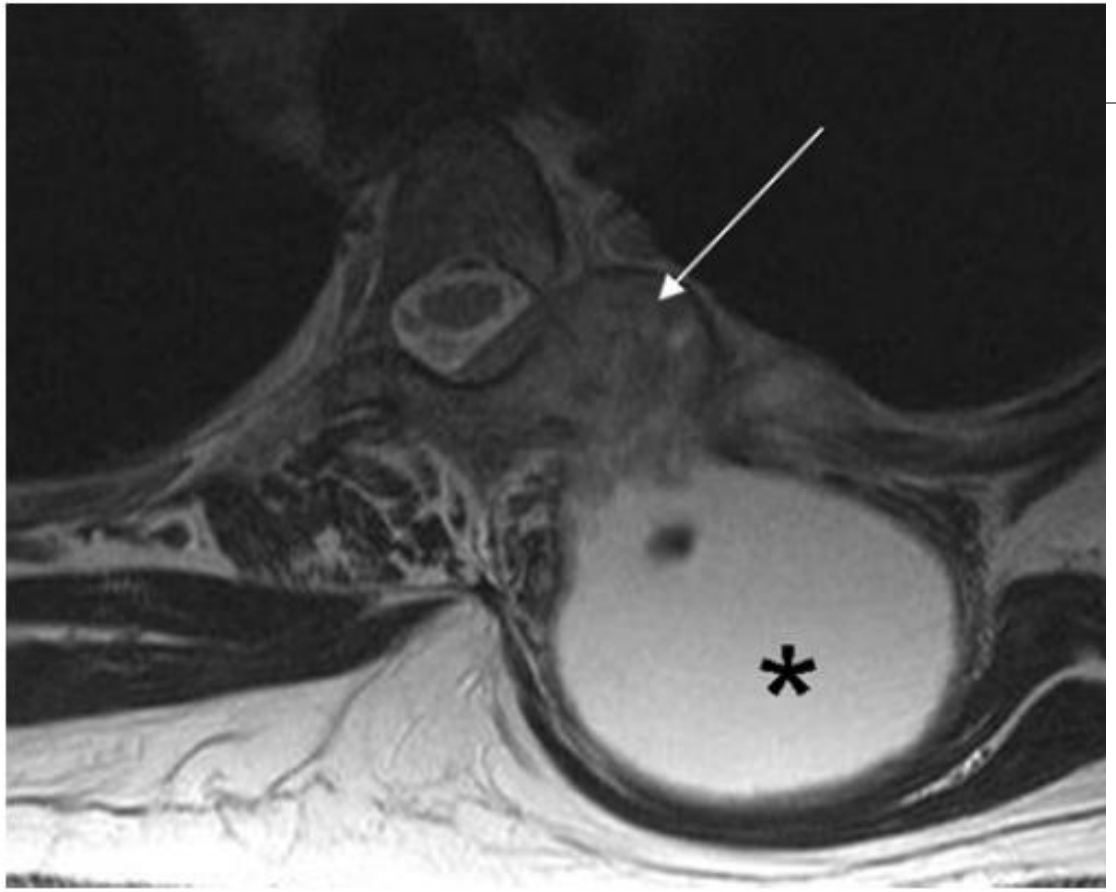
POSTERIOR OR APPENDICEAL TYPE

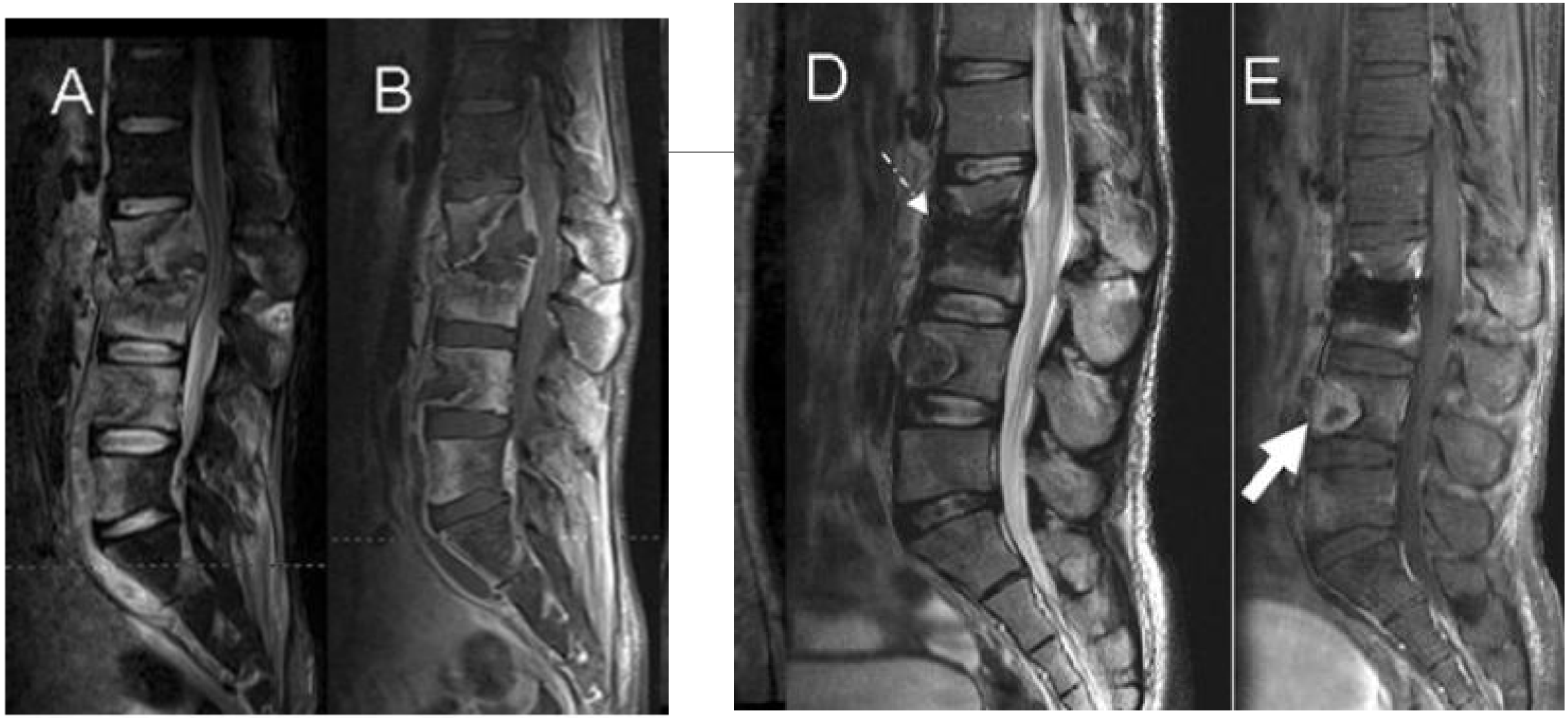
Isolated infection of pedicles & laminae(neural arch) , transverse process & spinous process

Rare type

Occurs in isolation or in conjunction with the typical paradiscal variant

Radiographically appear as erosive lesions or paravertebral shadows with intact disc space

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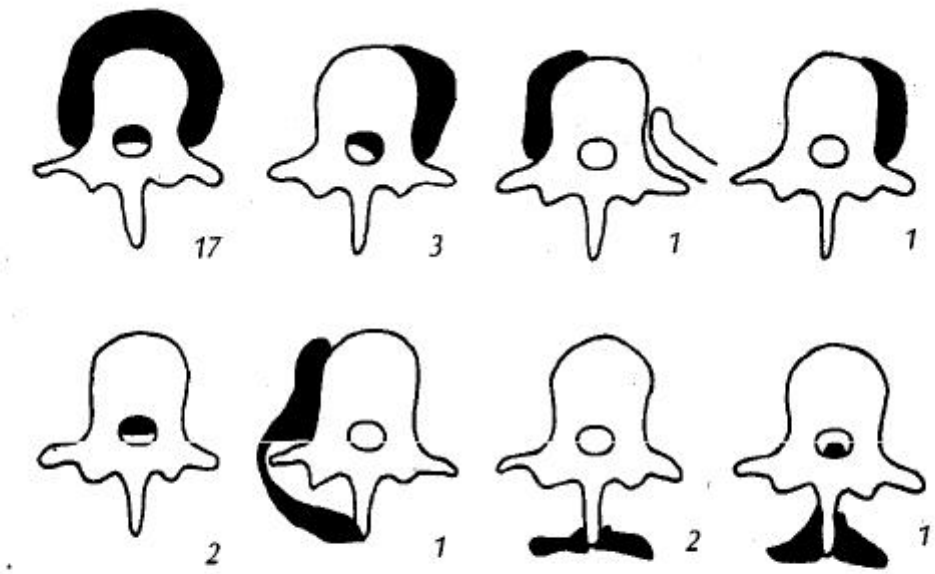


LOCATION OF PARAVERTEBRAL ABSCESS

DIFFERENTIAL DIAGNOSIS

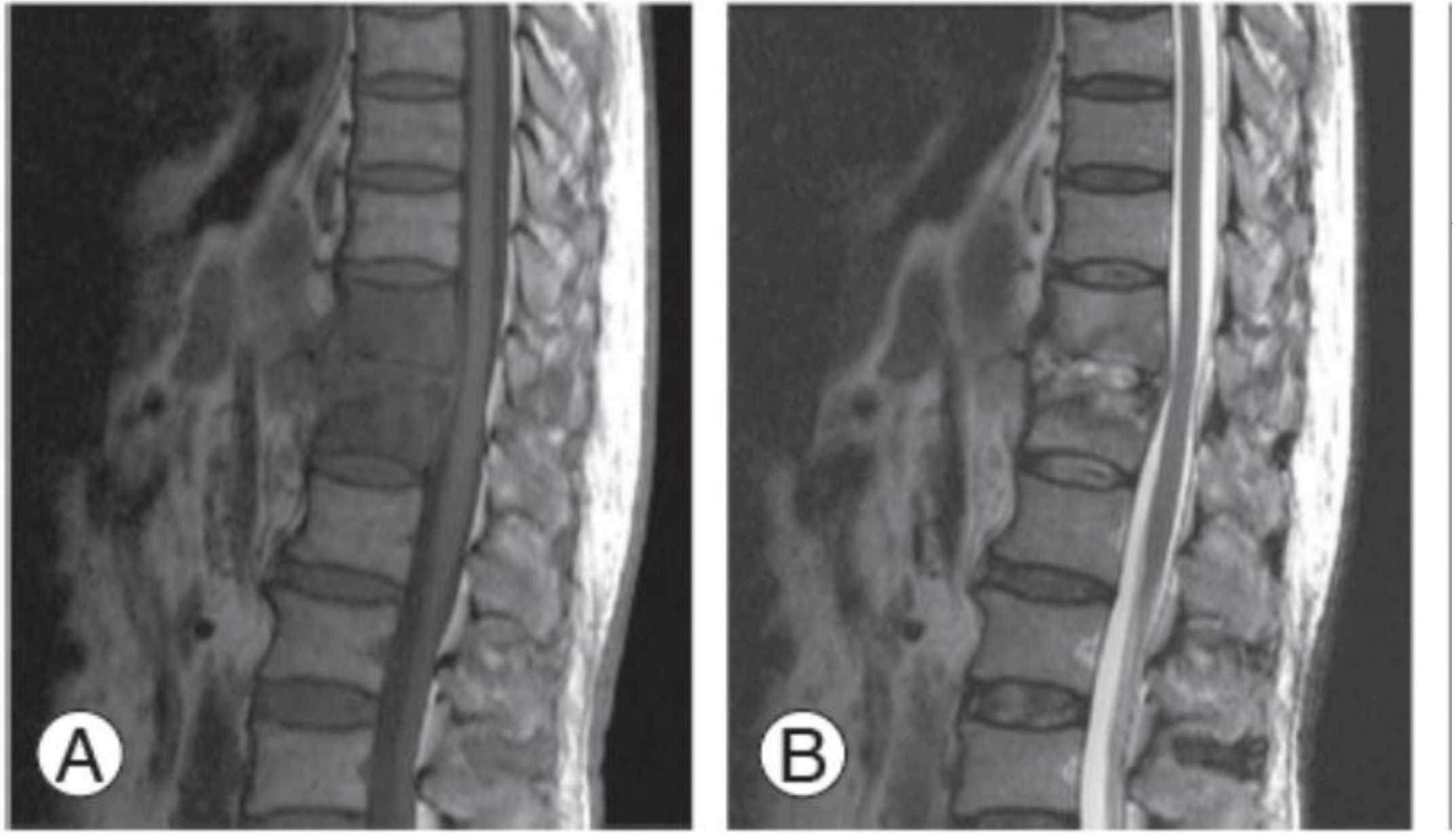
The differential diagnosis of the tuberculous spine includes:

1. **SPINAL INFECTIONS- pyogenic, brucella & fungal.**
2. **NEUROPATHIC spine**
3. **NEOPLASTIC commonly lymphoma/ metastasis**
4. **DEGENERATIVE**

No pathognomonic imaging signs allow tuberculosis to be readily distinguished from other conditions. Biopsy is definitive.

Table 2. Magnetic resonance imaging findings of pyogenic and tuberculous spondylitis

Variable	Pyogenic spondylitis	Tuberculous spondylitis
Para- or intraspinal abscess	Absence	Presence
Abscess wall	Thick and irregular	Thin and smooth
Postcontrast paraspinal abnormal signal margin	Ill-defined	Well defined
Abscess with postcontrast rim enhancement	Disc abscess	Vertebral intraosseous abscess
Vertebral body enhancement pattern	Homogeneous	Heterogeneous and focal
Involvement of vertebral bodies	Involvement ≤2 vertebral bodies	Multiple body involvement
Commonly involved region	Lumbar spine involvement	Thoracic spine involvement
Degree of disc preservation	Moderate to complete disc destruction	Normal to mild disc destruction
Bony destruction more than half	Infrequent and mild to moderate	Frequent and more severe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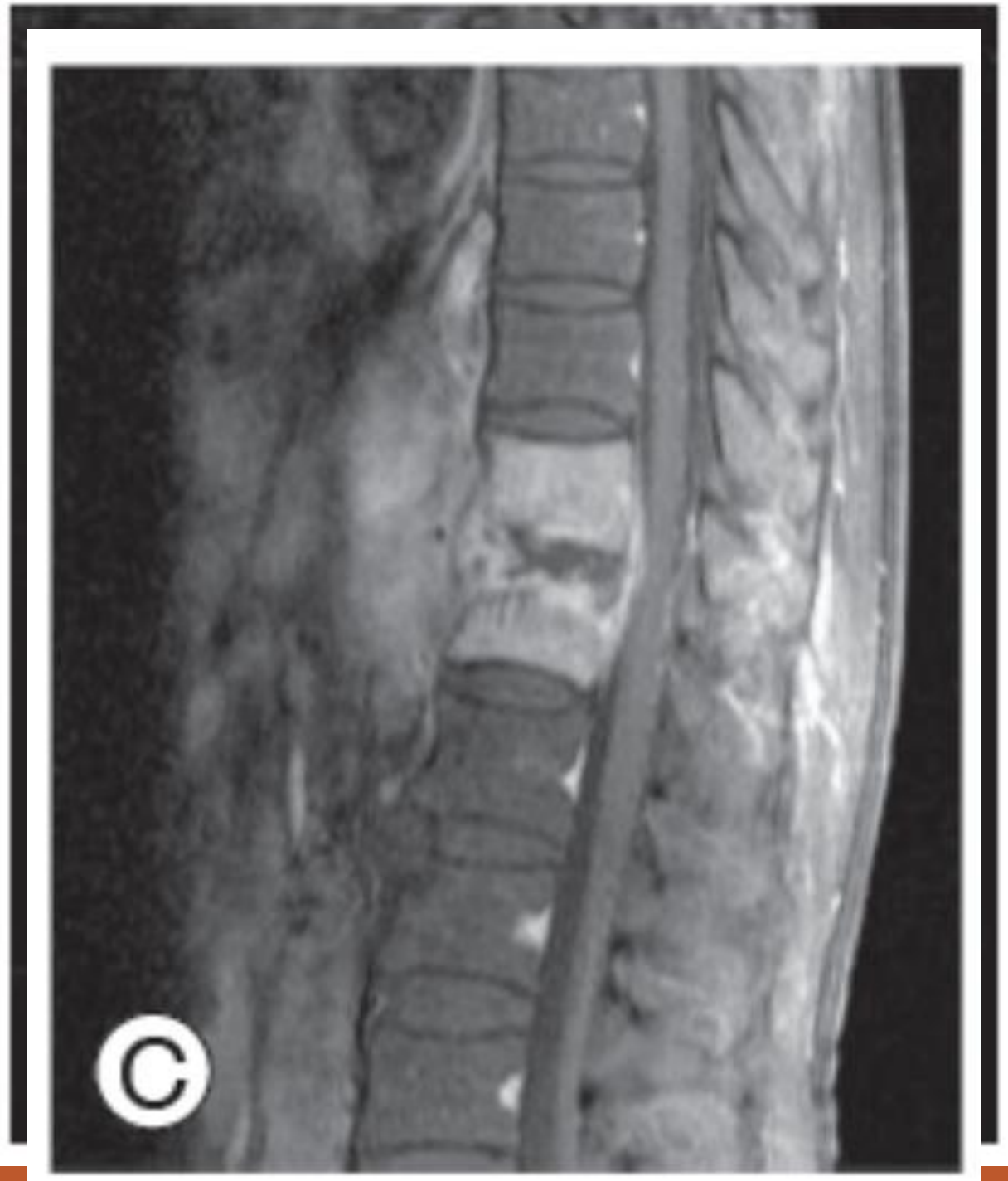
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DD : BRUCELLA SPONDYLITIS

1. Predilection for the ***lumbar spine.***
2. ***Intact vertebral architecture*** despite evidence of diffuse vertebral osteomyelitis·
3. Gibbus deformity rare.
4. Smaller paraspinal abscesses
5. Facet joint involvement

DD: NEOPLASTIC

when 2 contiguous vertebral bodies are involved without intervening disc, it is difficult to differentiate tubercular spondylitis (central type) from neoplastic condition.

TUBERCULAR

- A destructive bone lesion associated with a ***poorly defined vertebral body endplate, w***ith or without a loss of disk height, suggests an infection, which has a better prognosis.

LYMPHOMA/ METASTASIS

- The saying "***good disk, bad news; bad disk, good news***" describes the idea that a destructive bone lesion associated with a ***well-preserved disk space with sharp endplates suggests*** neoplastic infiltration.

Thank You