Spinal injections

Dr.C.S.Vishnu prasath

Consultant spine surgeon

TARGET ORTHO

(C) www.targetortho.com

Lumbar disc prolapse

- M/C cause of lower limb radiculopathy
- Natural history- Majority improve with conservative Tt
- Disc herniations often shrink over a period of time

TARGET ORTHO
(C) www.targetortho.com

When should we offer surgery in lumbar disc prolapse?

- Cauda equina syndrome
- Progressive neurologic deficit
- Persistent radicular pain despite conservative management (6-12 weeks)

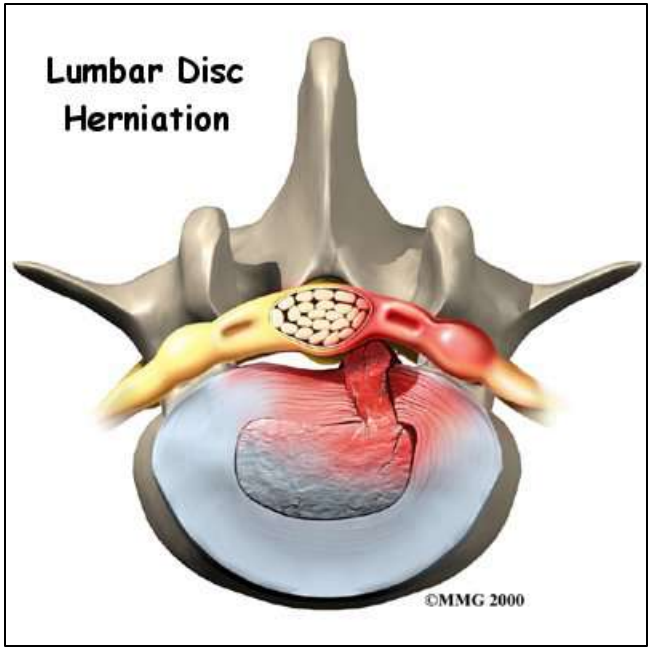
TARGET ORTHO
(C) www.targetortho.com

What to do with these patients?

- Severe acute r pain with minimal or without def
- Less than 6 we n
- Not respondin rd conservative management.

TARGET ORTHO
(C) www.targetortho.com

Pathophysiology of radicular pain

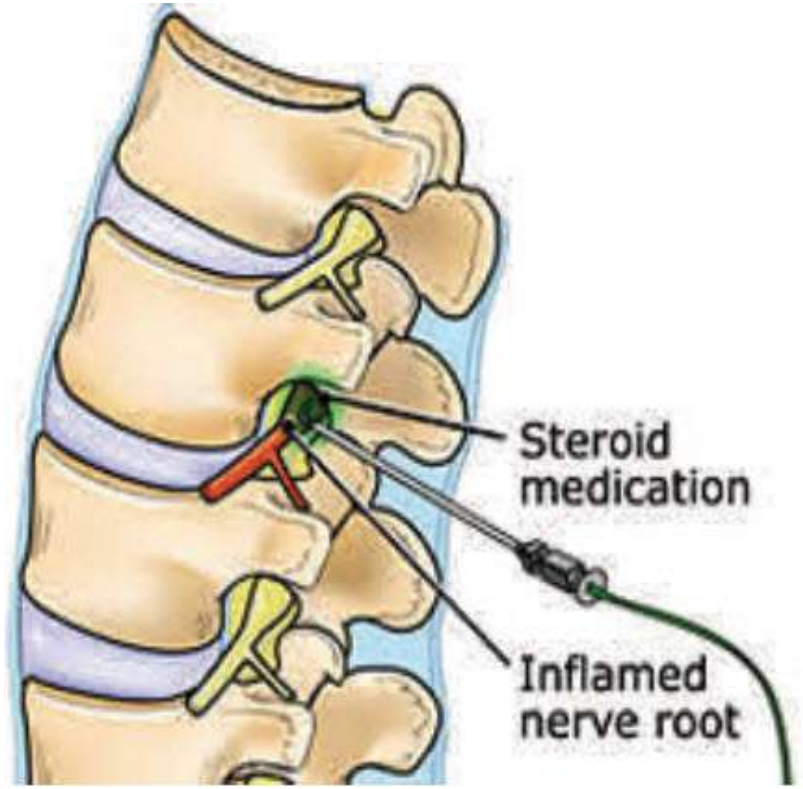


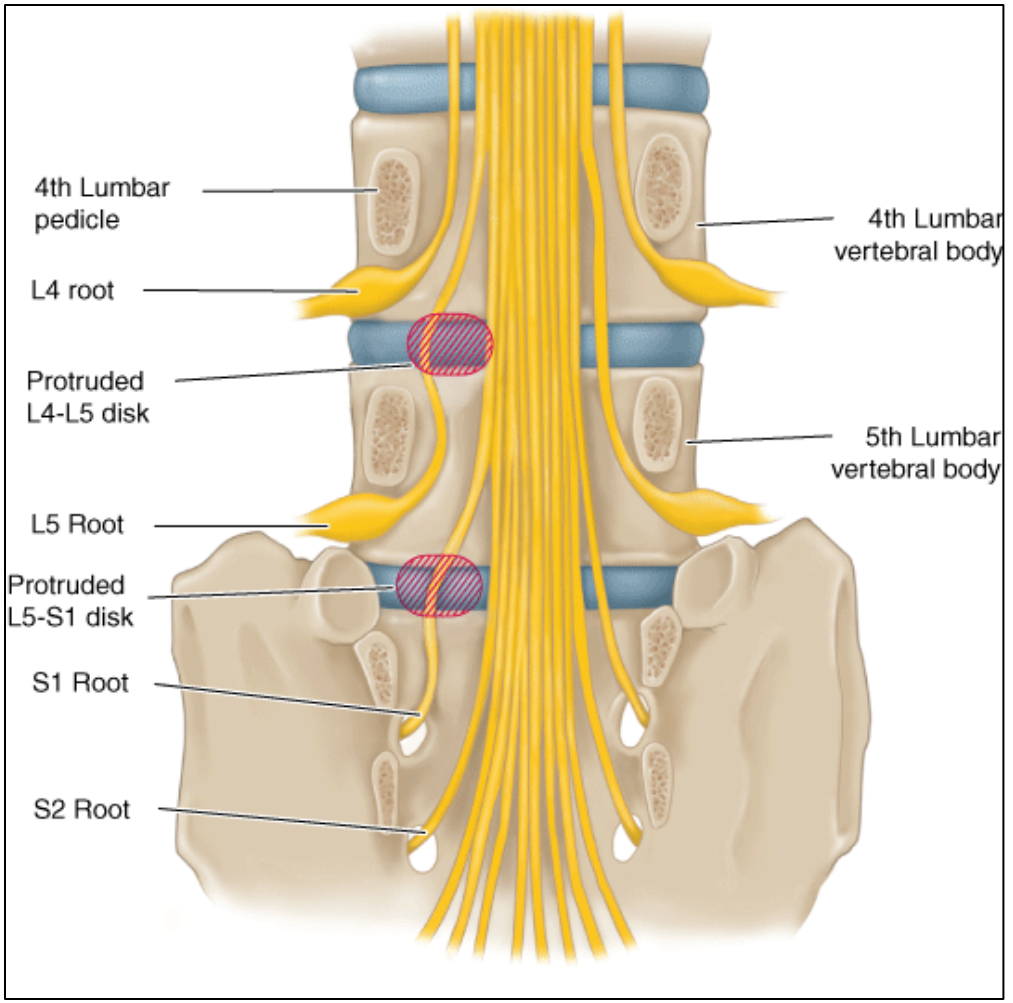
- Mechanical compression- not the reason
- Inflammatory reaction
- TNF-α release

- **Systemic steroids**
- **Epidural steroids**

TARGET ORTHO
(C) www.targetortho.com

Transforaminal steroids





TARGET ORTHO
(C) www.targetortho.com

SNRB technique

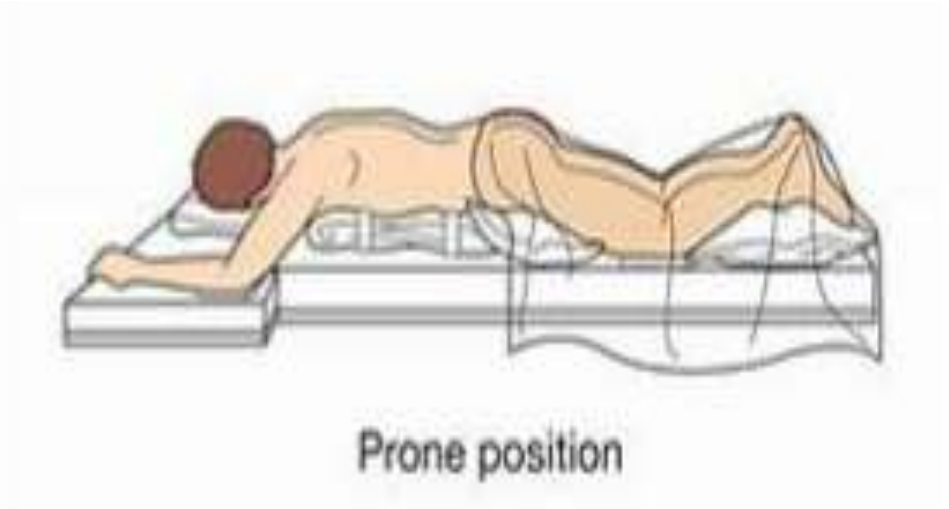
TARGET ORTHO
(C) www.targetortho.com

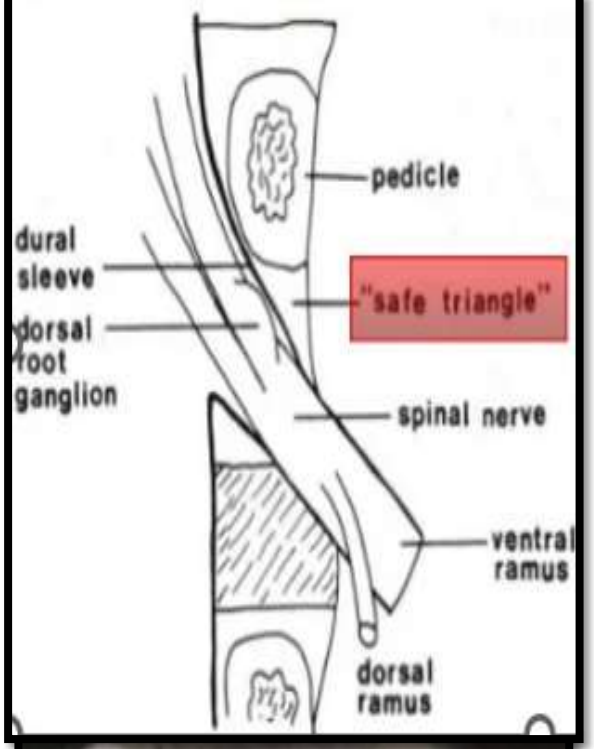
Nerve Block Technique

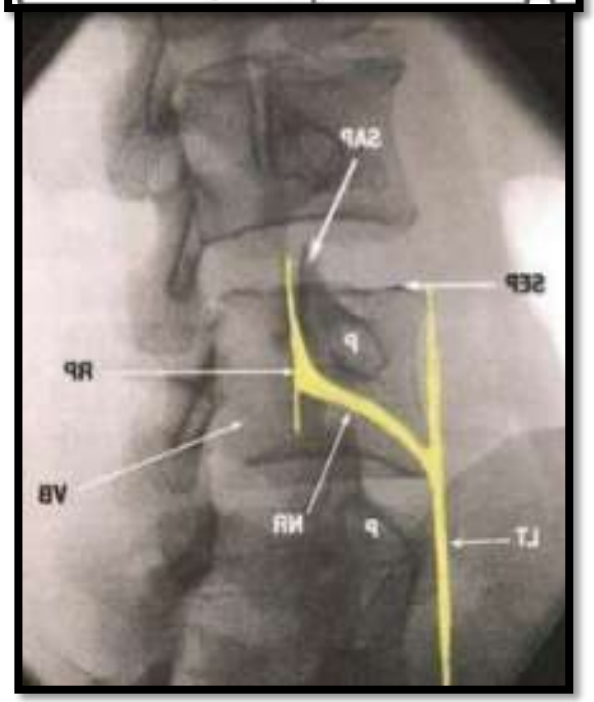
- Sterile spinal tray
- **18G spinal needle**
- 0.5% Bupivacaine
- 2% Lignocaine with Adrenaline
- 10ml & 5ml Syringes
- 40mg Triamcinolone (Kenocort)
- Dye - contrast solution (Iohexol)

TARGET ORTHO
(C) www.targetortho.com

- Prone position



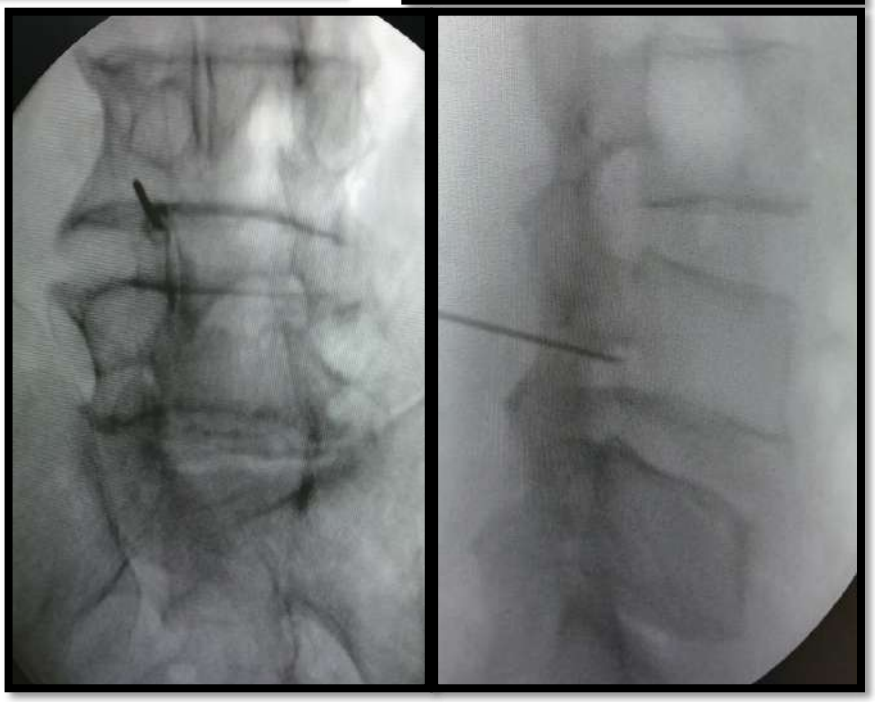




TARGET ORTHO
(C) www.targetortho.com

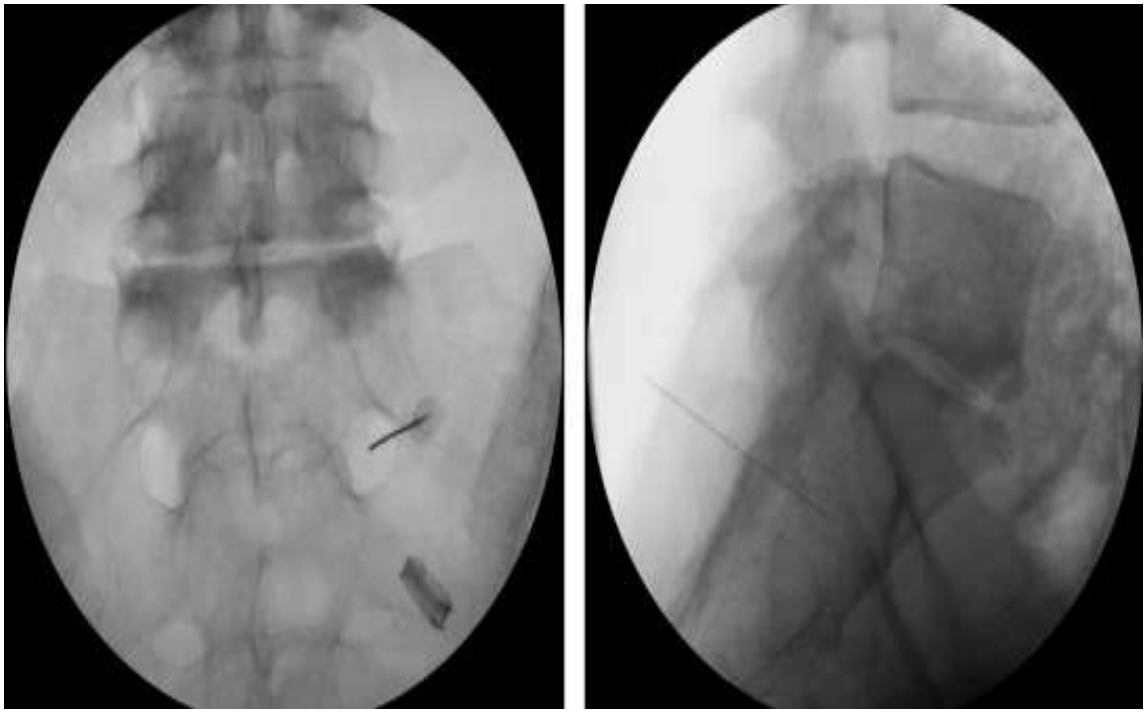
Landmarks:

- L3-4 to L4-5 levels: same side oblique view → “Scotty Dog.”



TARGET ORTHO
(C) www.targetortho.com

- L5-S1: Caudal angulation of 30*
  →Sacral foramen



TARGET ORTHO
(C) www.targetortho.com

After verifying needle position, 1 mL of contrast solution (Iohexol) .

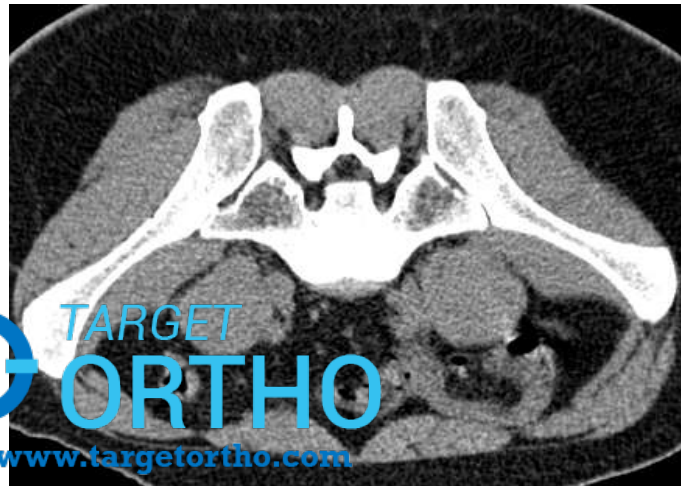
Pain reproduction was elicited.

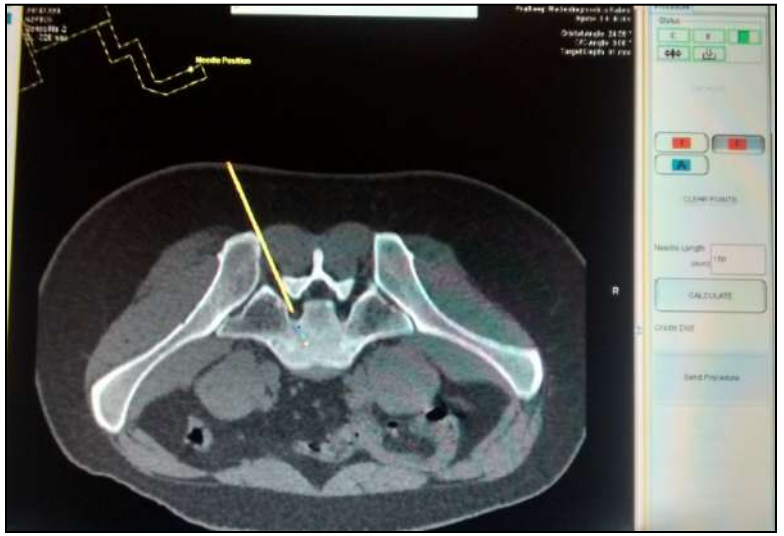
2 mL of 0.5% bupivacaine mixed with 80 mg of triamcinalone was injected .

observation for 45 mins discharged on the same day .

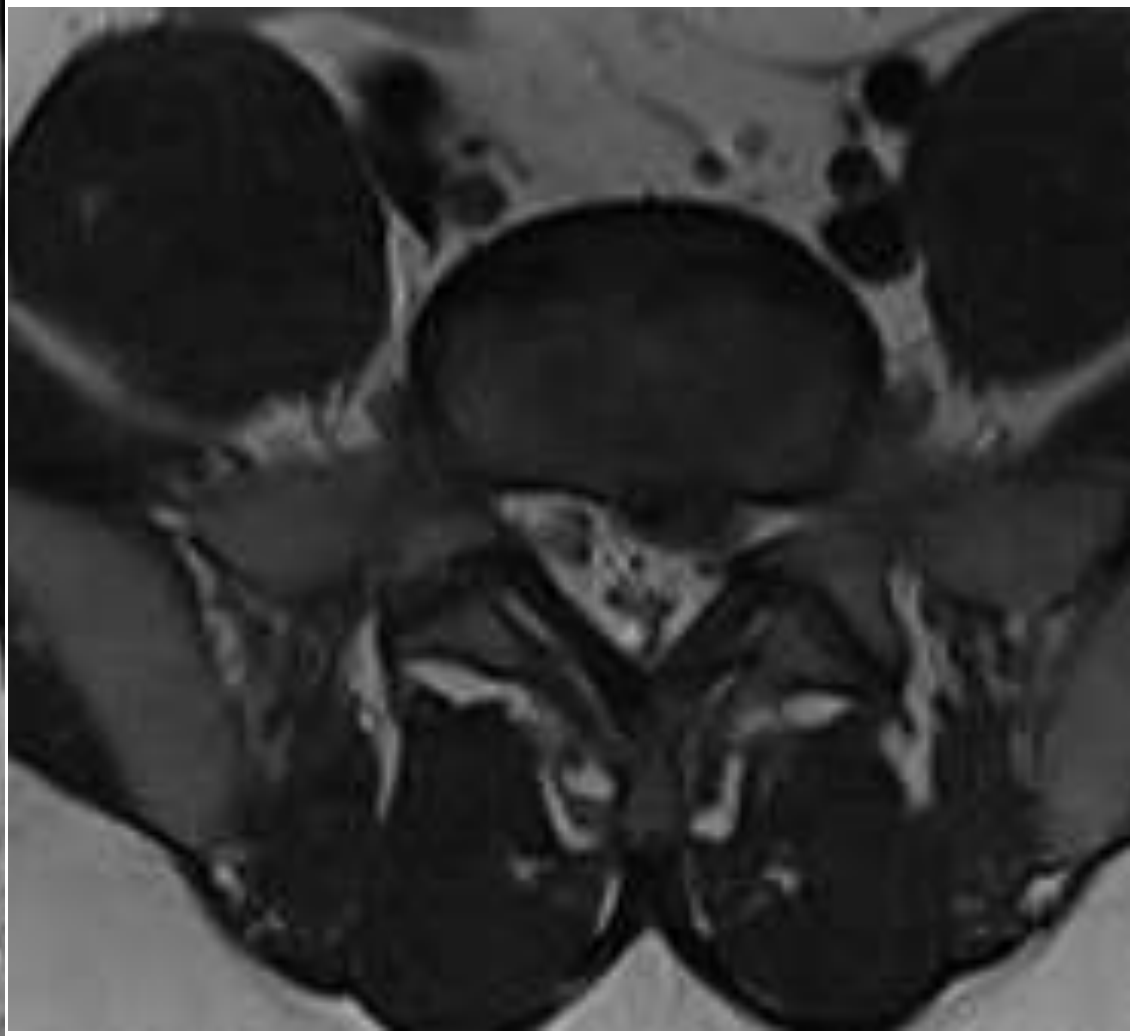
TARGET ORTHO
(C) www.targetortho.com

Robotic guided nerve root block

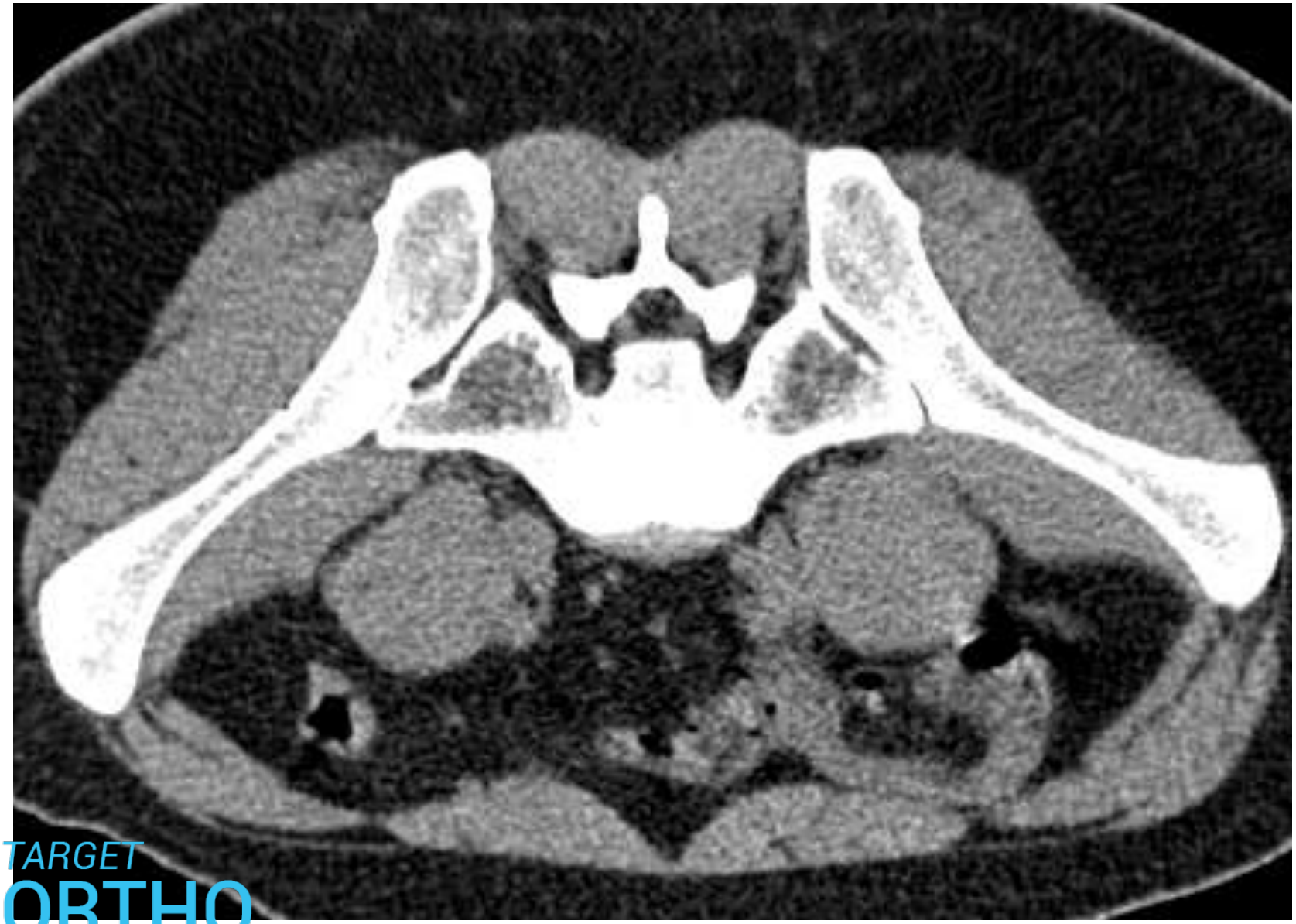




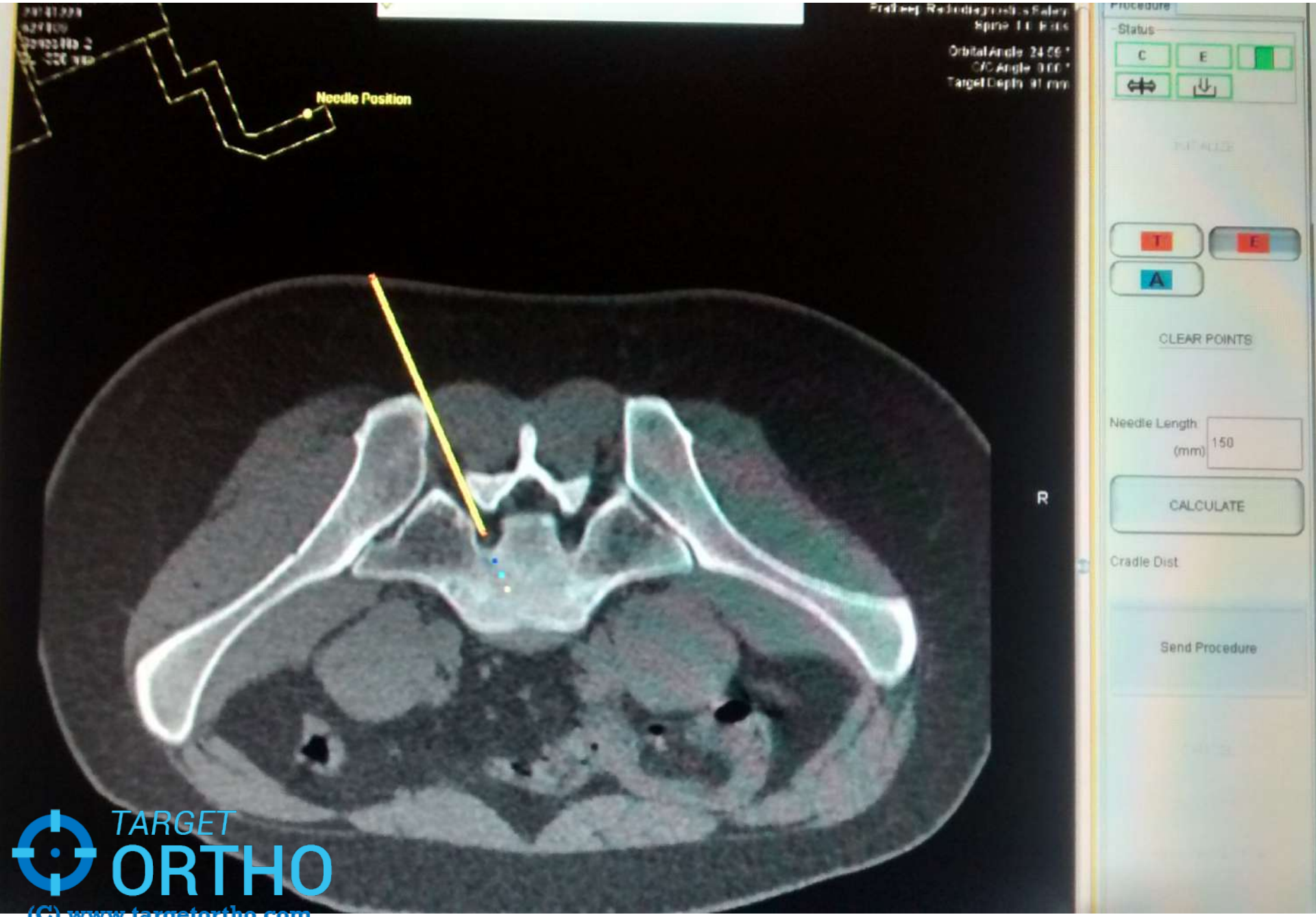
TARGET ORTHO
(C) www.targetortho.com



TARGET ORTHO
(C) www.targetortho.com

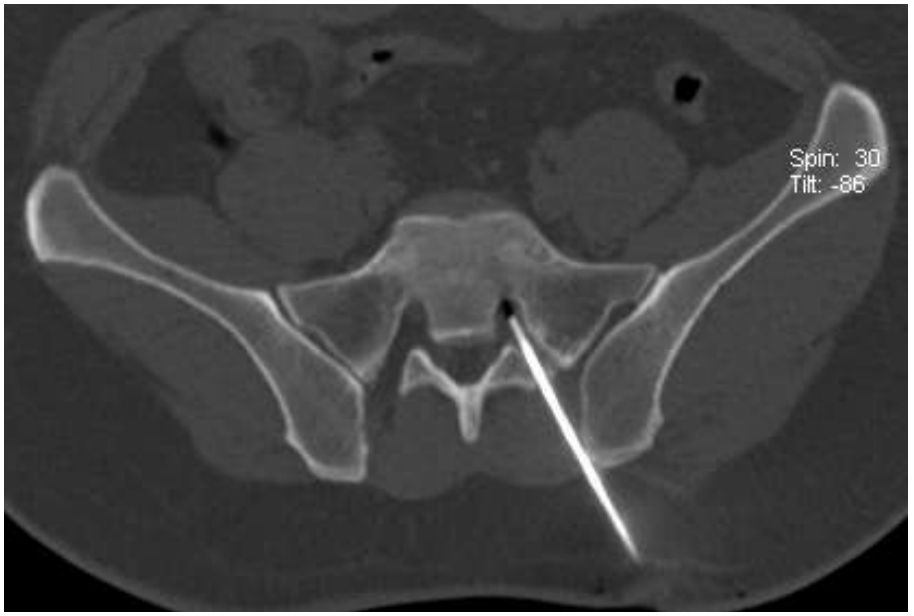


TARGET ORTHO
(C) www.targetortho.com

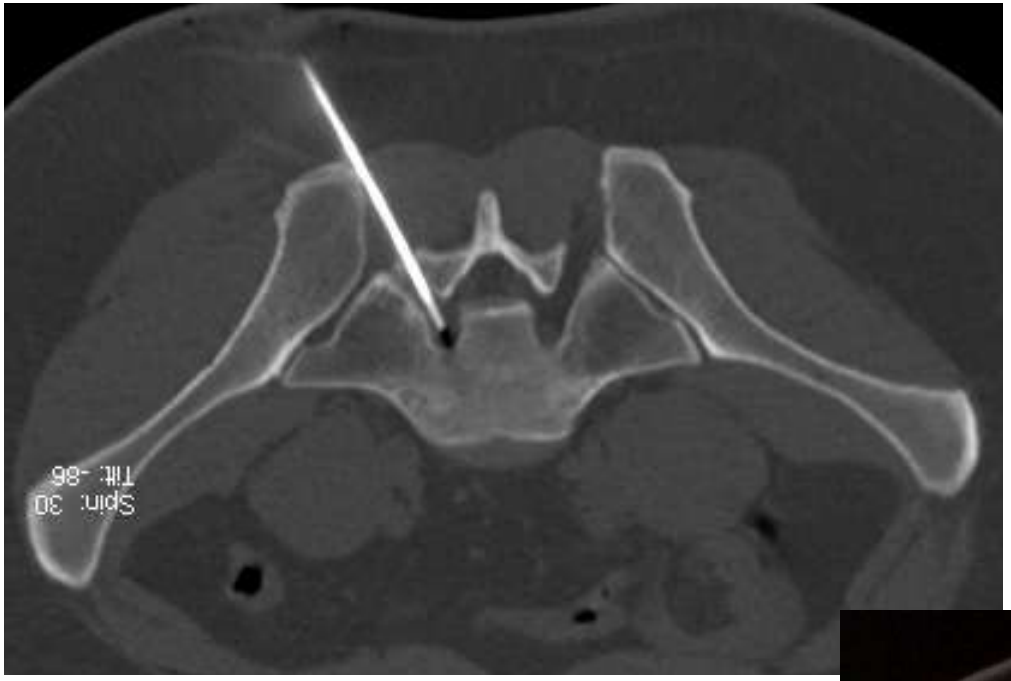


TARGET ORTHO
(C) www.targetortho.com

TARGET
ORTHO
(C) www.targetortho.com



TARGET ORTHO
(C) www.targetortho.com



TARGET ORTHO
(C) www.targetortho.com

Epidural injections

TARGET ORTHO
(C) www.targetortho.com

Epidural space

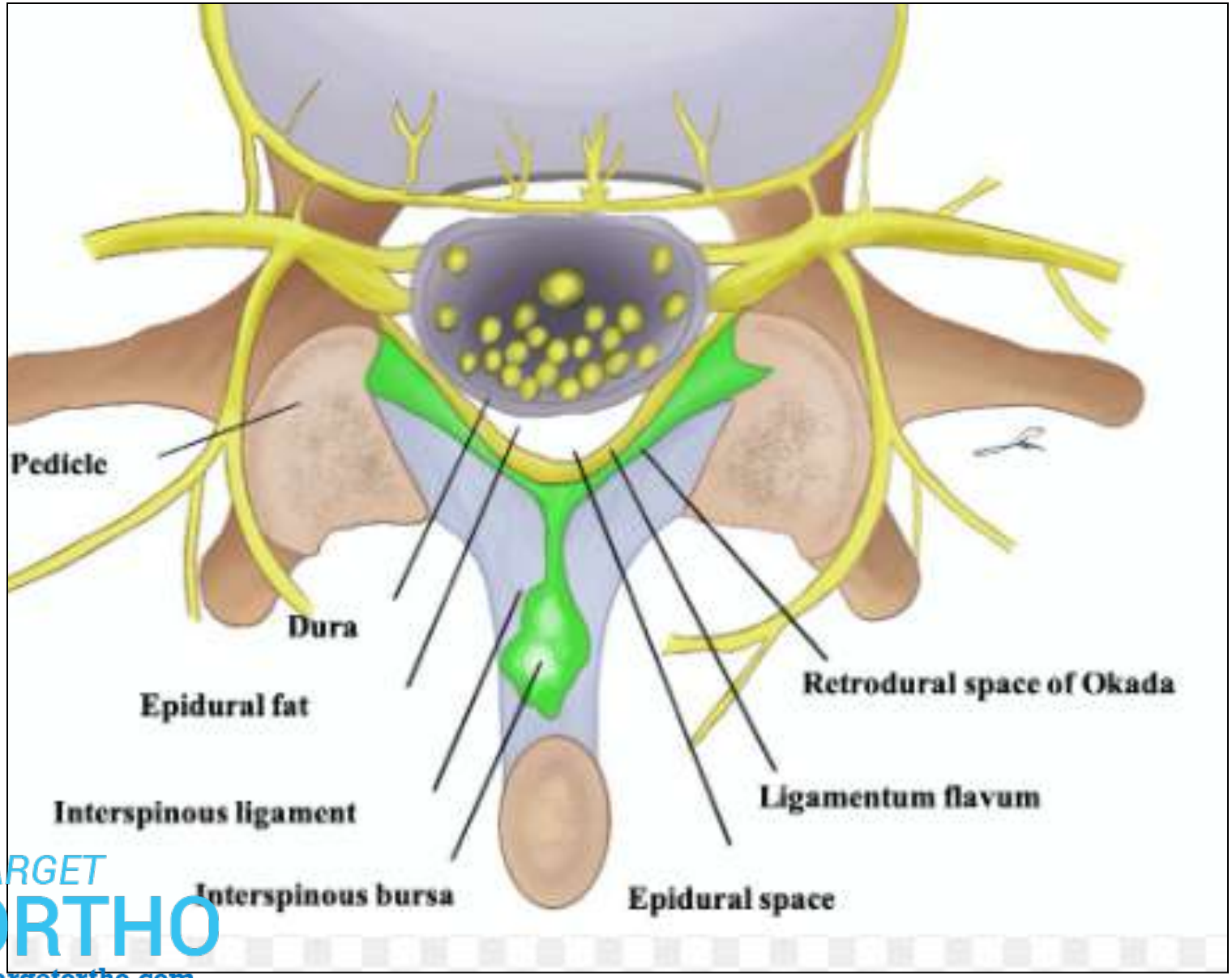
- The epidural space contains the

1. . dural sac
2. blood vessels
3. fat & connective tissue
4. Spinal nerves

- The spinal dura mater is critical to the peripheral nervous system - creates pathways (via dural sheaths) by surrounding exiting nerve roots from the spinal cord.

TARGET ORTHO
(C) www.targetortho.com

Epidural space



TARGET ORTHO
(C) www.targetortho.com

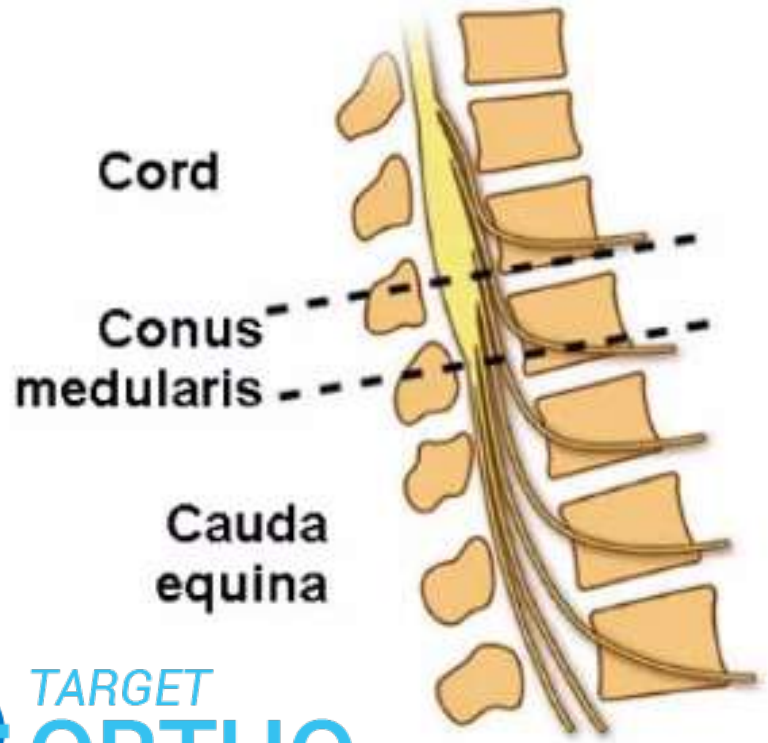
Epidural steroid injection how does it work?

- Irritation of spinal nerve roots by various pathologies – most common- disc pathologies
- Anti inflammatory effect of steroids
- Wash out of chemical mediators of pain
- LA- breaks the pain cycle
- Steroids decreases CNS sensitisation

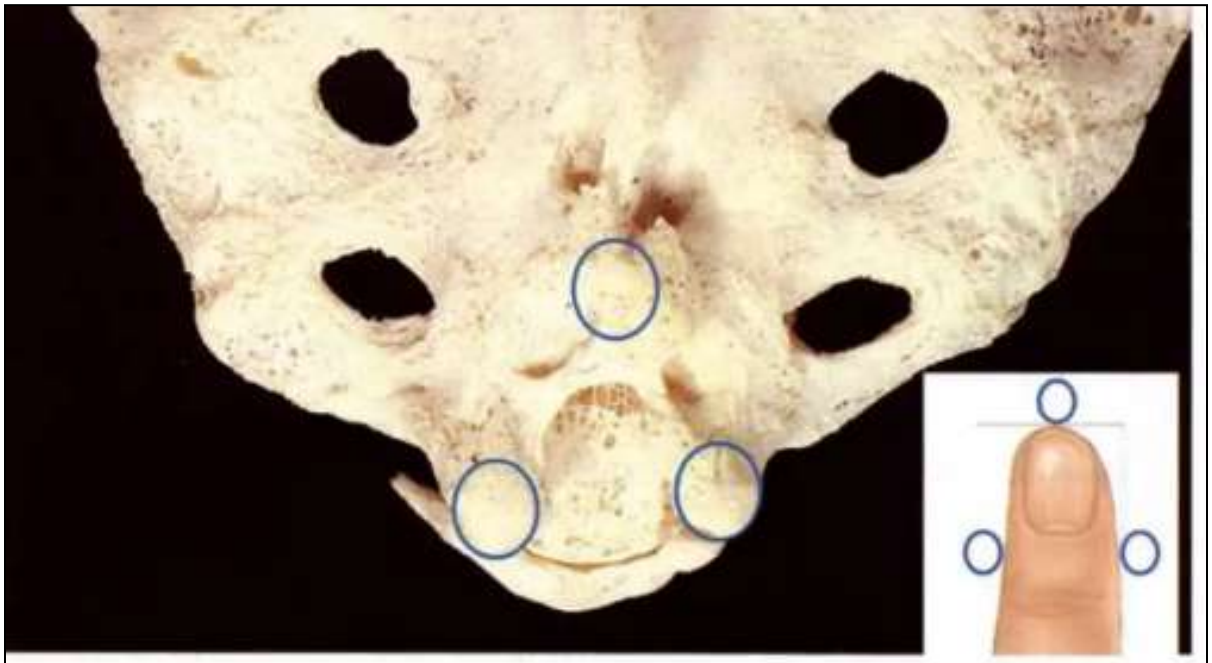
TARGET ORTHO
(C) www.targetortho.com

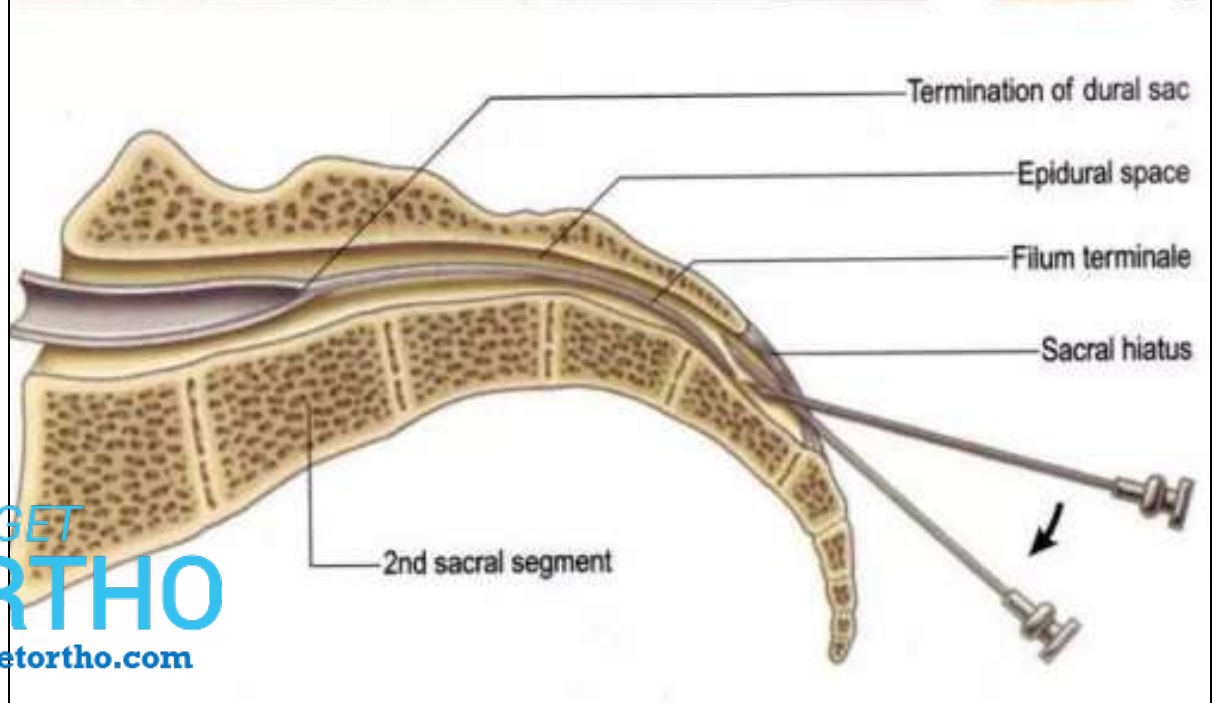
Epidural steroid – Caudal epidural

Injection of medication through sacral hiatus



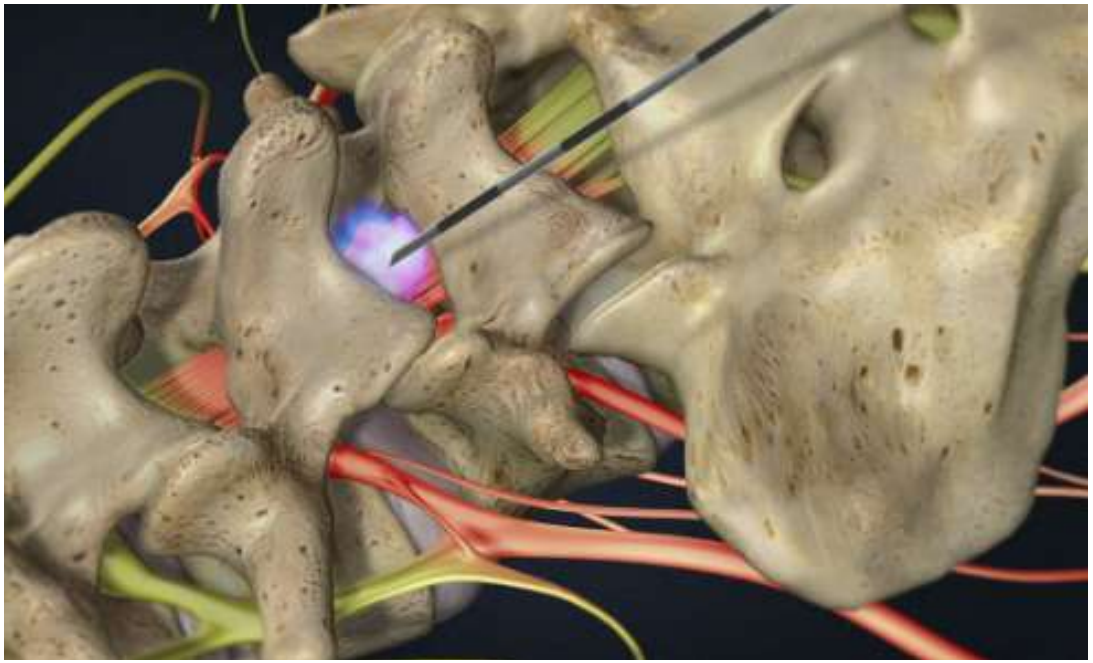
TARGET ORTHO
(C) www.targetortho.com



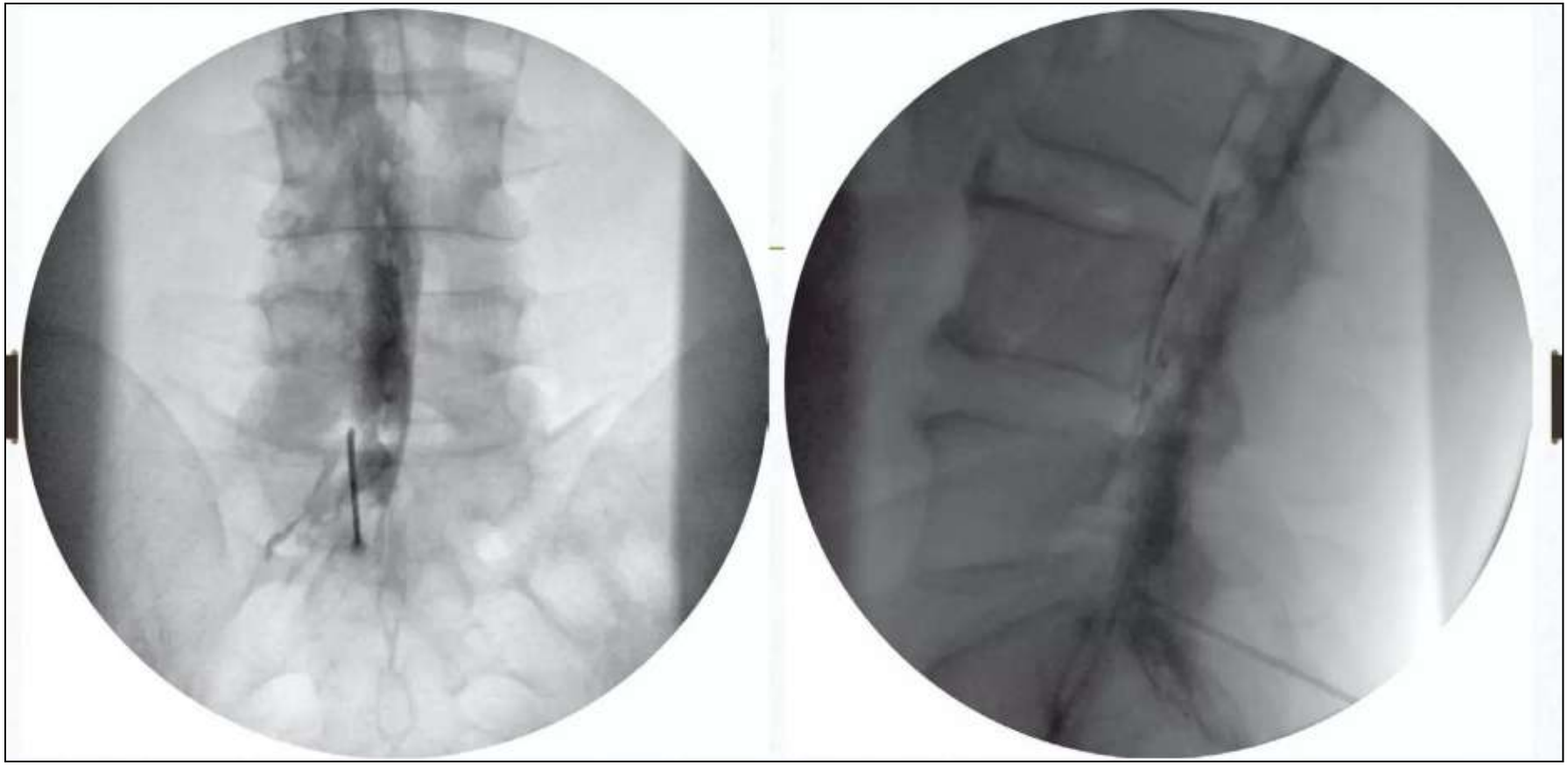


TARGET ORTHO
(C) www.targetortho.com

Epidural steroid
Translaminar approach

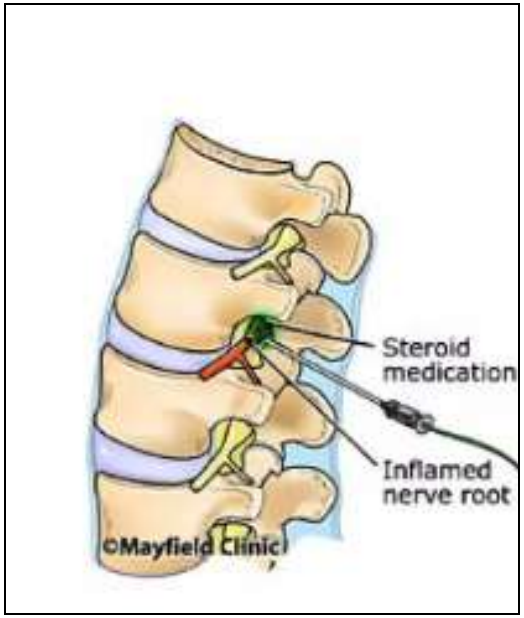


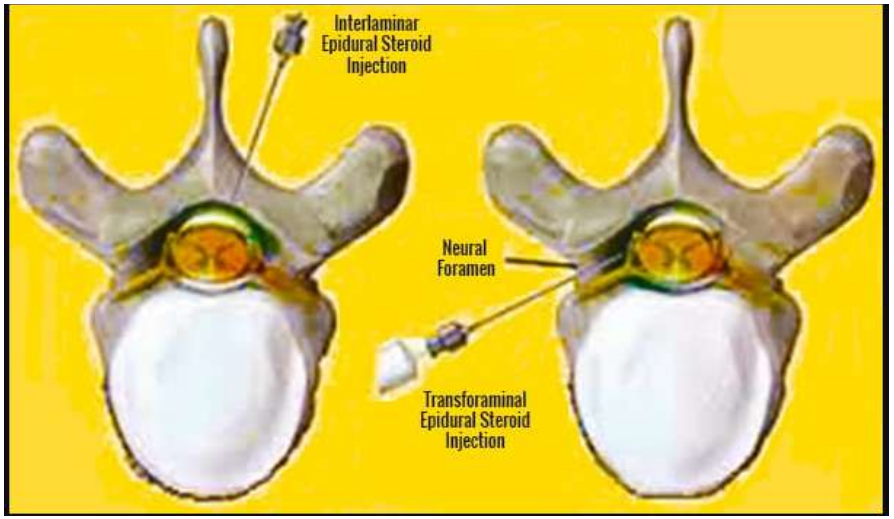
TARGET ORTHO
(C) www.targetortho.com

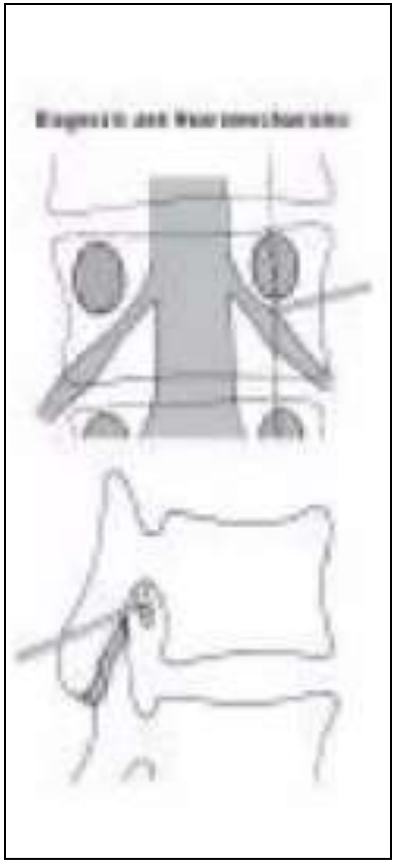


TARGET ORTHO
(C) www.targetortho.com

Epidural steroid
Transforaminal approach



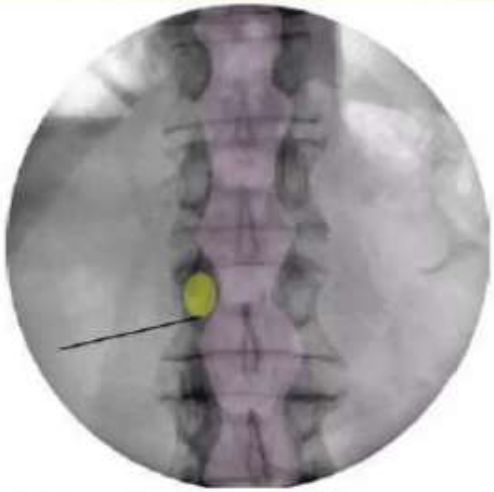




TARGET ORTHO
(C) www.targetortho.com

Transforaminal epidural injection

A. Illustration of lumbar nerve roots.



B. Illustrative anatomy for needle positioning.

C. Lateral view with illustration of epidural space.

TARGET ORTHO
(C) www.targetortho.com

What steroid to use?

- Local anesthetic - **Lidocaine / bupivacaine.**
- Steroids - **methylprednisolone acetate, triamcinolone acetate, betamethasone acetate**, and **dexamethasone phosphate.**

- **What we use :**
- Bupivacaine hydrochloride 0.5% (3 mL) + triamcinolone acetonide 80 mg (2 mL)

TARGET ORTHO
(C) www.targetortho.com

Epidural steroid – key points

Key points

1. Corticosteroid mechanisms of action: direct anti-inflammatory, neuro-membrane stabilization, and inhibition of nociceptor C-fiber conduction
2. Specific indications for lumbar IL ESI include radiculopathy, spinal stenosis, post laminectomy syndrome, and low back pain syndrome
3. Absolute contraindications: coagulopathy, anticoagulant medications, sepsis, pregnancy, and local infection
4. Fluoroscopic guidance ensures proper placement, and therefore, delivery of medications
5. Tuohy needles may decrease the risk of dural puncture because of their blunt tips

TARGET ORTHO
(C) www.targetortho.com

Epidural steroid – key points

6. Two different techniques: **loss of resistance technique** with air, saline, or the **hanging drop technique**

7. Basis of transforaminal ESI: To deliver corticosteroid close to the site of pathology, presumably onto an inflamed nerve root

8. Studies have demonstrated short-term benefits from interlaminar ESI, especially in patients with radicular pain

9. Evidence for therapeutic lumbar transforaminal ESI: strong for short-term and moderate for long-term in managing lumbar nerve root pain, limited in managing pain secondary to lumbar post laminectomy syndrome and spinal stenosis

TARGET ORTHO
(C) www.targetortho.com

Epidural steroid – key points

10. Evidence of effectiveness of caudal epidural steroid injections was strong for short-term relief and moderate for long-term relief

11. Complications related to needle placement: infection, hematoma formation, abscess formation, subdural injection, intracranial air injection, nerve damage, intravascular injection, vascular injury, and cerebral vascular or pulmonary embolus

12. Complications of corticosteroid administration include suppression of pituitary adrenal axis, Cushing's syndrome, osteoporosis, avascular necrosis of the bone, steroid myopathy, epidural lipomatosis, weight gain, fluid retention, and hyperglycemia.

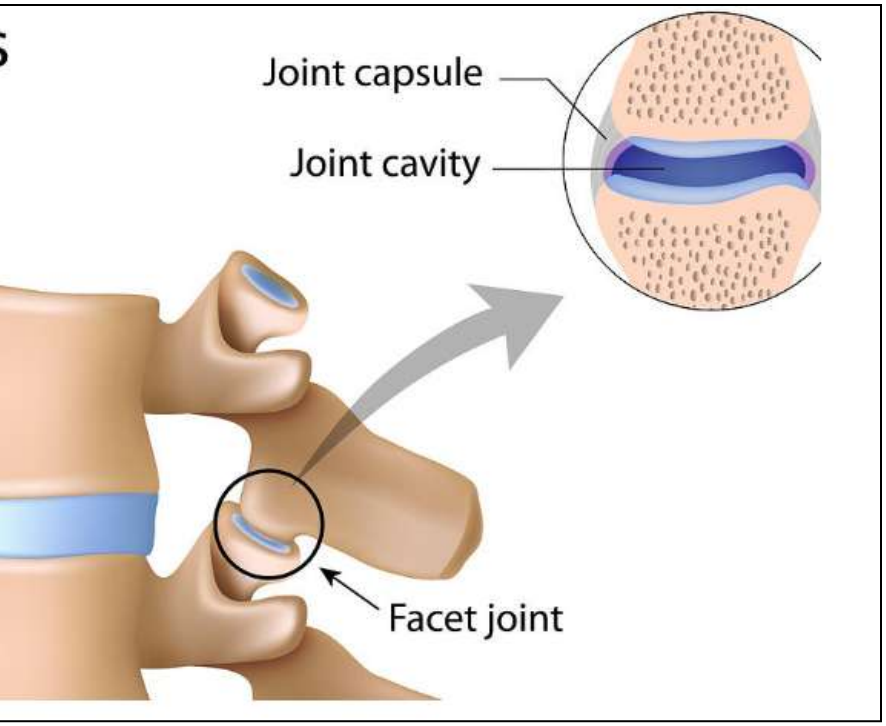
TARGET ORTHO
(C) www.targetortho.com

Epidural steroid injection

- ESIs seem to be effective in relieving symptoms in the short term and delaying surgery, while evidence of any long-terms benefits is still lacking.

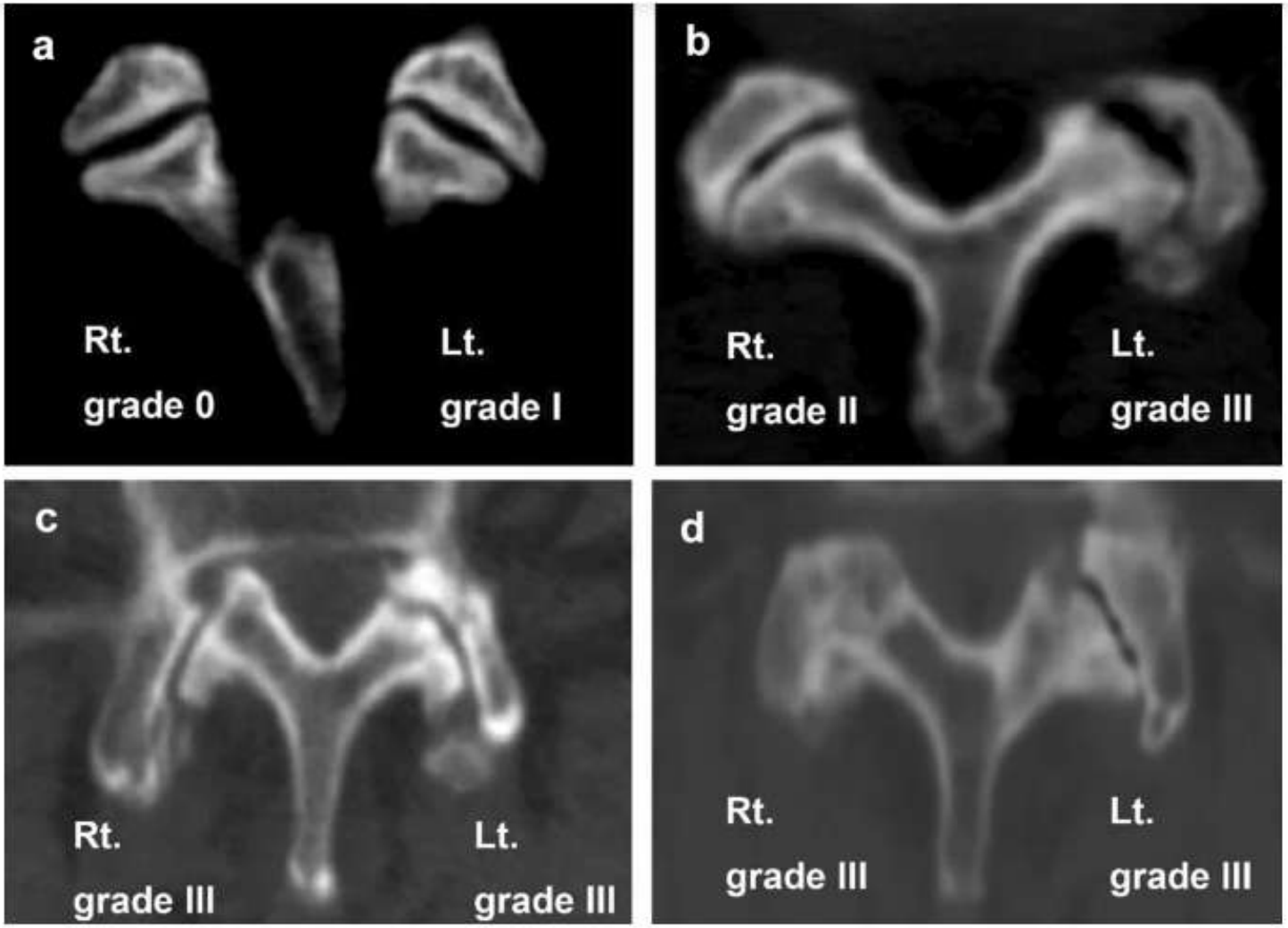
TARGET ORTHO
(C) www.targetortho.com

Facet joints



- One of most common source of pain in lumbar spine
- True synovial joint
- Formed by IAP pf superior vertebra & SAP of inferior vertebra
- Upper lumbar spine facets oriented sagitally to resist rotation
- Lower lumbar facets oriented coronally to resist forward displacement

TARGET ORTHO
(C) www.targetortho.com



Low back pain – facet joint arthritis
Radiating pain
Radicular pain

TARGET ORTHO
(C) www.targetortho.com

Facet joint injections
Indications

- Clinical suspicion of the facet syndrome
- focal tenderness over the facet joints
- low back pain with normal radiological findings
- post-laminectomy syndrome with no evidence of arachnoiditis or recurrent disc disease
- Persistent low back pain after spinal fusion.

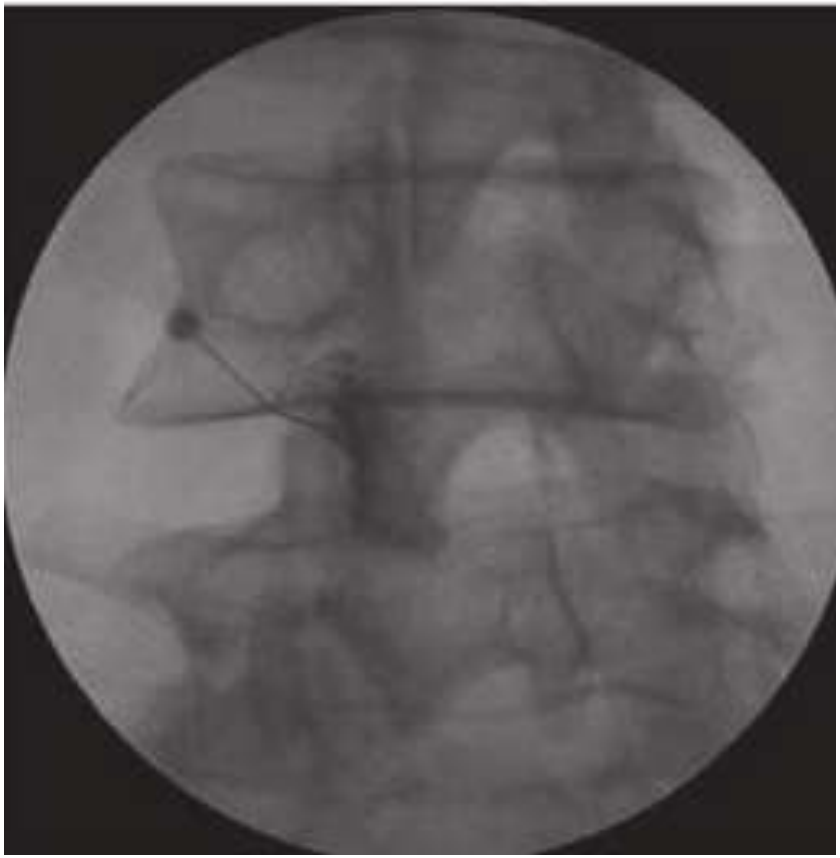
TARGET ORTHO
(C) www.targetortho.com

Facet joint injection

- Synovial joint degeneration / inflammation and injury
- Pain on motion
- vicious cycle of physical deconditioning, irritation of facet innervations and muscle spasm.
- Image-guided injection of local anesthetic and steroid into or around the facet joint - break this vicious cycle and thereby provide pain relief.

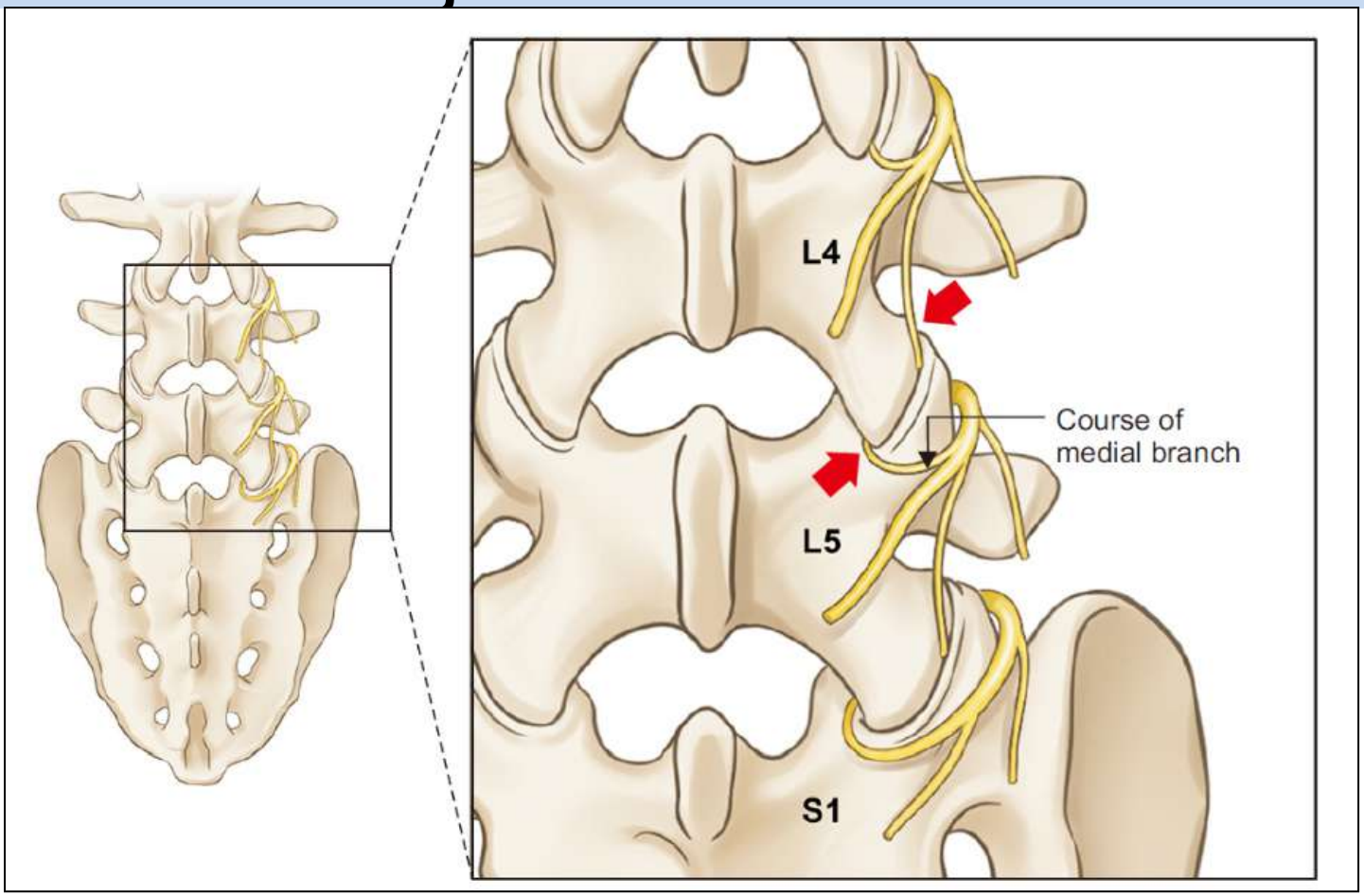
TARGET ORTHO
(C) www.targetortho.com

Facet joints



TARGET ORTHO
(C) www.targetortho.com

Facet joint innervation



The lumbar facet joint is innervated by the medial branch from the posterior ramus of the lumbar spinal nerve.

The medial branches from the posterior rami of L1 to L4 lumbar spinal nerves assume a constant and similar course. Each branch emerges from its intervertebral foramen and enters the posterior compartment of the back by coursing around the superior articular process below the foramen

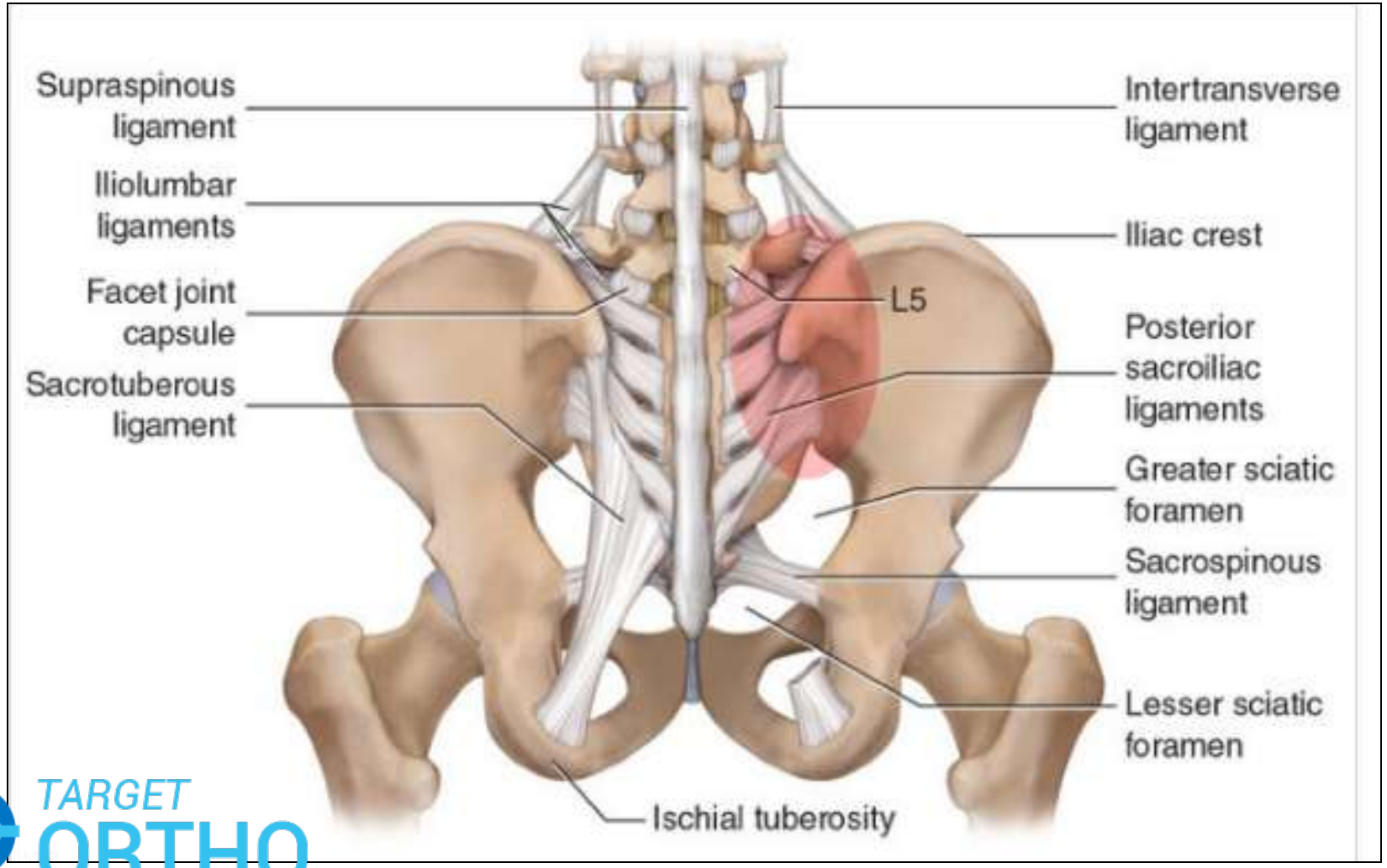
TARGET ORTHO
(C) www.targetortho.com

Medial branch blocks

- Target- junction of SAP & TP
- To block 1 facet joint – MBB at the level and level above
- MB-RFA

TARGET ORTHO
(C) www.targetortho.com

Sacroiliac joint



TARGET ORTHO
(C) www.targetortho.com

Sacroiliac joint

- Mainly a support structure
- Biomechanical studies- some motion
- Upper 2/3rd- fibrocartilagenous
- Lower 1/3rd – true joint.
- Innervation – dorsal primary rami of L5-S3

TARGET ORTHO
(C) www.targetortho.com

Sacroilitis

SI joint dysfunction

Mechanical dysfunction
Inflammation
Infection
Trauma
Degeneration

Symptoms

LBA
Radiation to gluteal region
Exacerbation by prolonged sitting/standing

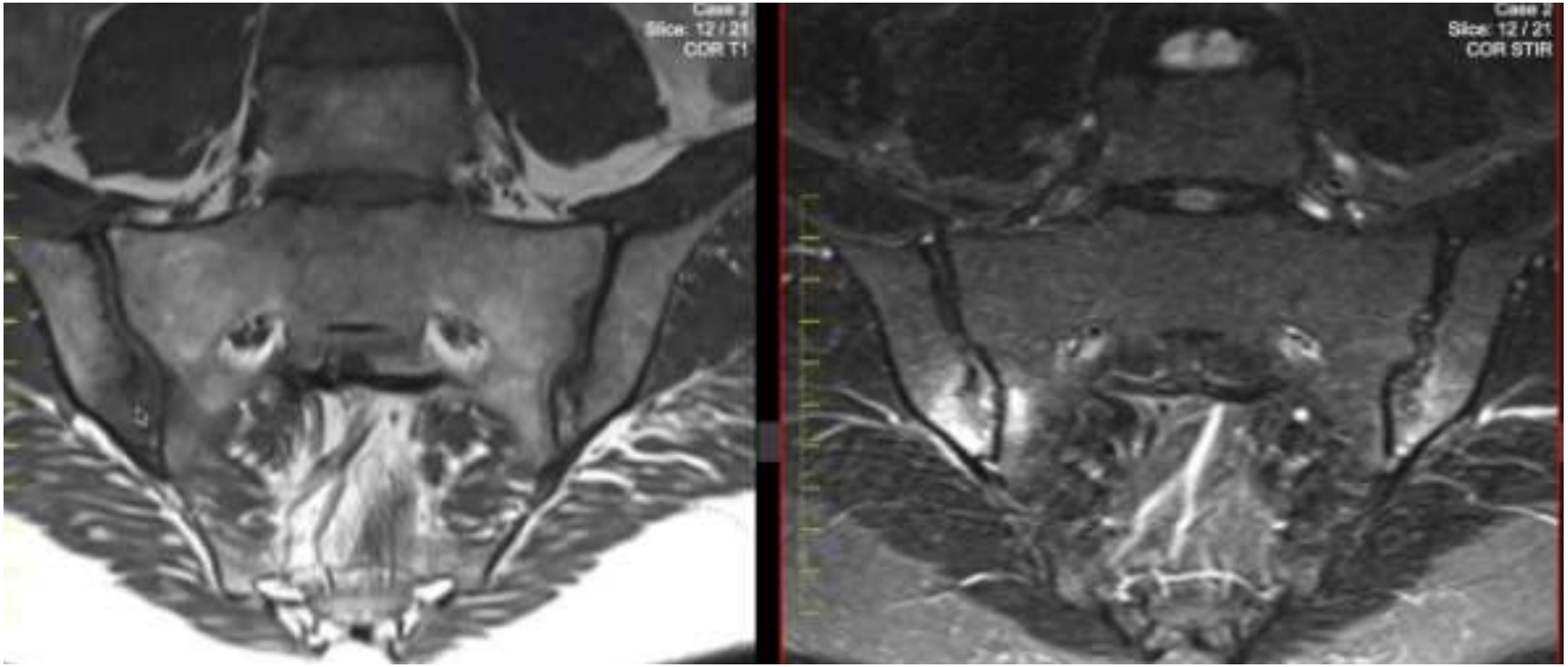
TARGET ORTHO
(C) www.targetortho.com

Diagnosis

- History & physical examination
- Positive FABERS test/ Gaenslens test
- Imaging- MRI

TARGET ORTHO
(C) www.targetortho.com

Sacroiliac joint



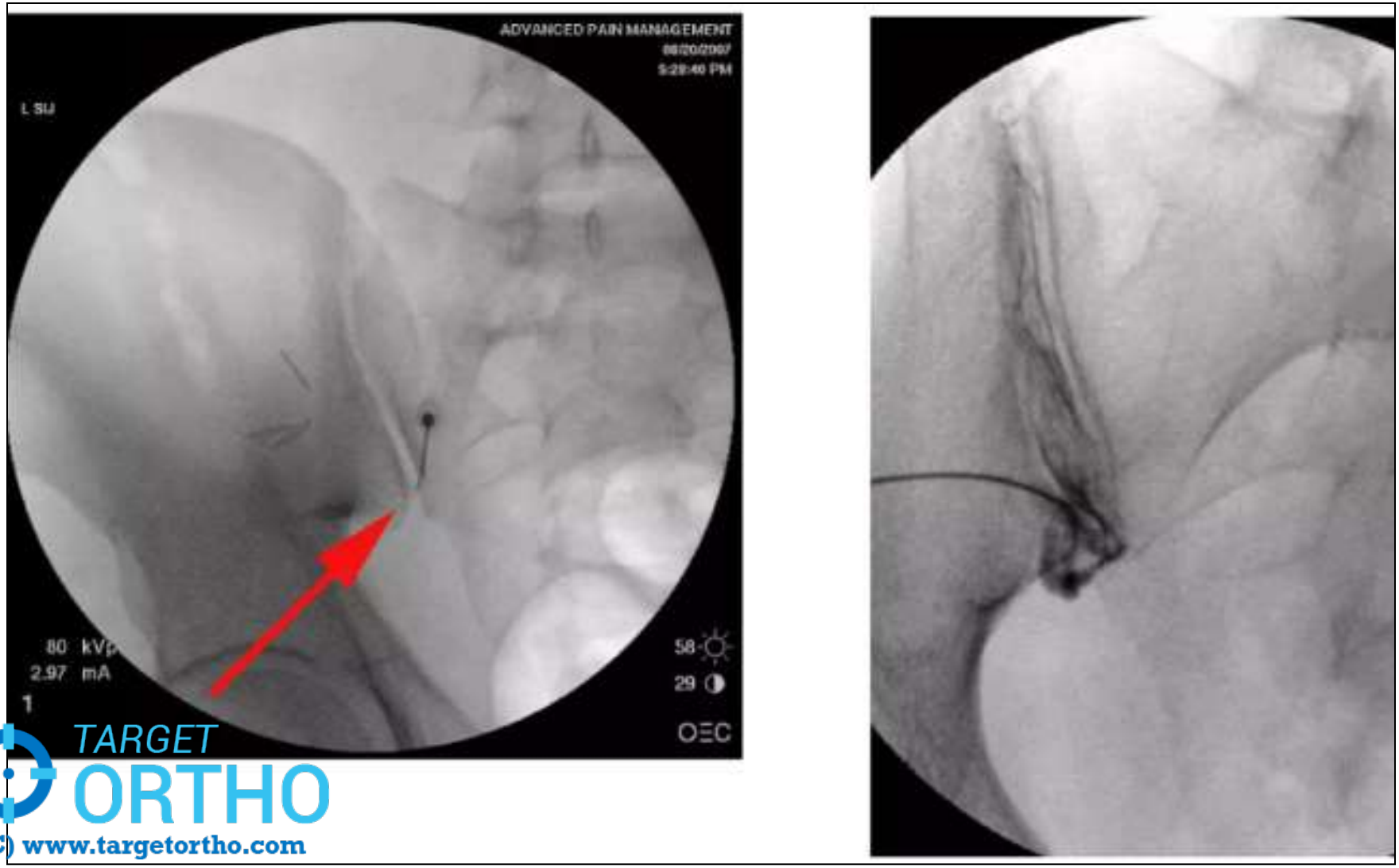
TARGET ORTHO
(C) www.targetortho.com

SI joint injection

- Prone position
- C-arm- 20deg caudal & oblique angulation away from the affected joint
- Spinal needle – inferior 1/3rd of the joint
- Walk off into the joint
- Periarticular injection

TARGET ORTHO
(C) www.targetortho.com

SI joint injection

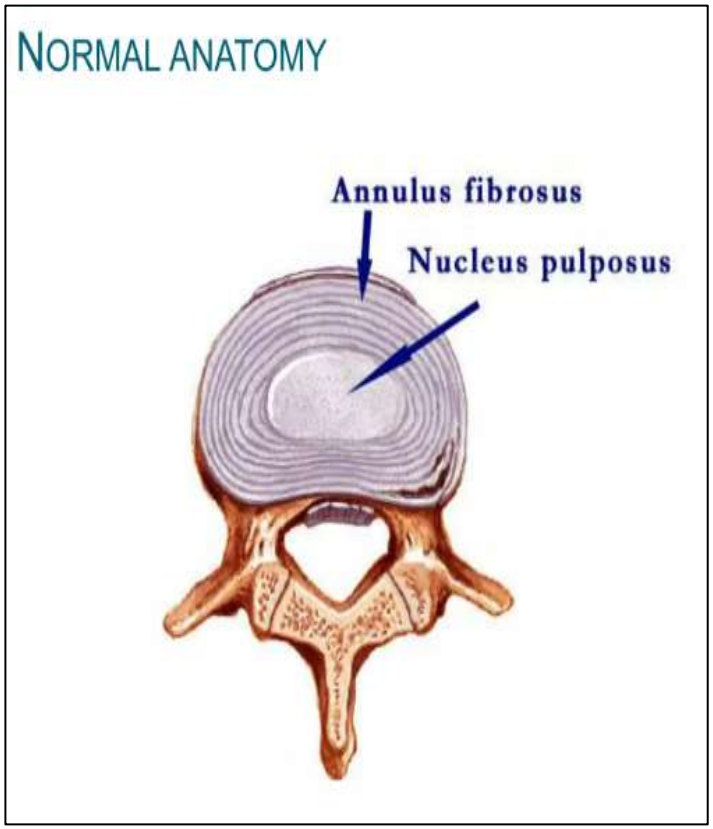


TARGET ORTHO
(C) www.targetortho.com

Discography

TARGET ORTHO
(C) www.targetortho.com

TARGET ORTHO
(C) www.targetortho.com



- Provocative testing for concordant pain

  i.e., pain that corresponds to a patient's usual pain

- Provide information regarding the clinical significance of the disc abnormality.

TARGET ORTHO
(C) www.targetortho.com

Indication for discography

Indications for discography [53–56]

Discography should be considered when	
ALL of the following is present	At least ONE of the following is present
If surgical management is a viable option[a]	A high index of suspicion for discogenic pain where the pain is severe enough to consider surgical intervention
Pain is not responding to conservative treatment measures	Failed back surgery[b]
Pain persists for an extended period of time (i.e., at least 3 months)	
There is no evidence of contraindications such as severe spinal stenosis resulting in intraspinal obstruction, infection, or predominantly psychogenic pain	

TARGET ORTHO
(C) www.targetortho.com

Contraindication for discography

Contraindications for discography

Specific contraindications for discography include, but are not limited to [57]

Systemic contraindications

(1) Patients with a known bleeding disorder and those on anticoagulation therapy

(2) Pregnancy

(3) Systemic infection or skin infection over the puncture site

(4) Allergy to contrast precludes testing with Omnipaque contrast; however, the test can be performed by Gadolinium contrast

(5) Psychiatric conditions such as PTSD or schizophrenia

Localized contraindications

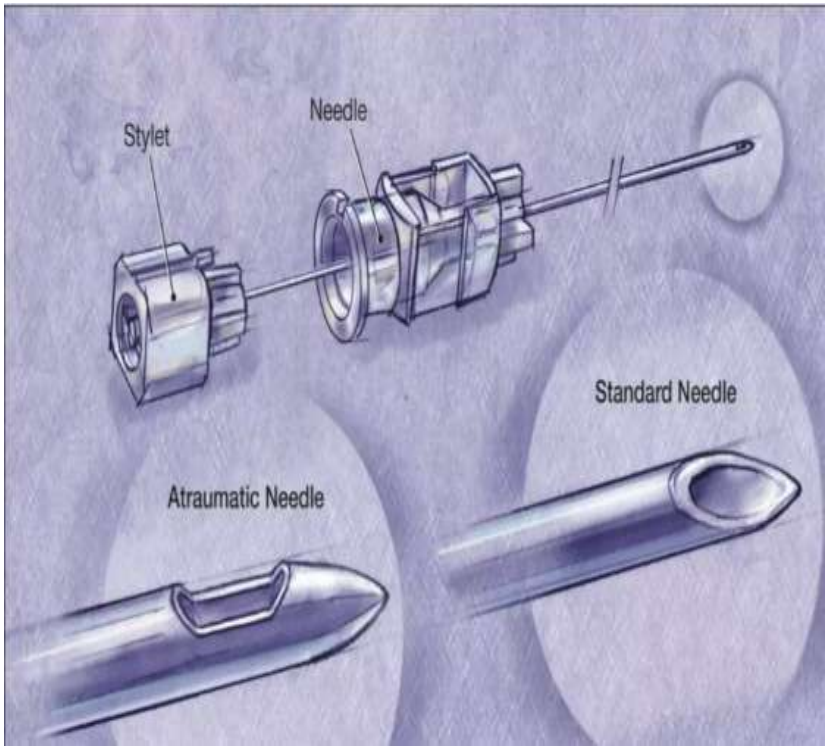
(1) Solid bone fusion that does not allow access to the disc

(2) Severe spinal canal compromise at disc level to be investigated [58, 59]

TARGET ORTHO
(C) www.targetortho.com

Equipment:

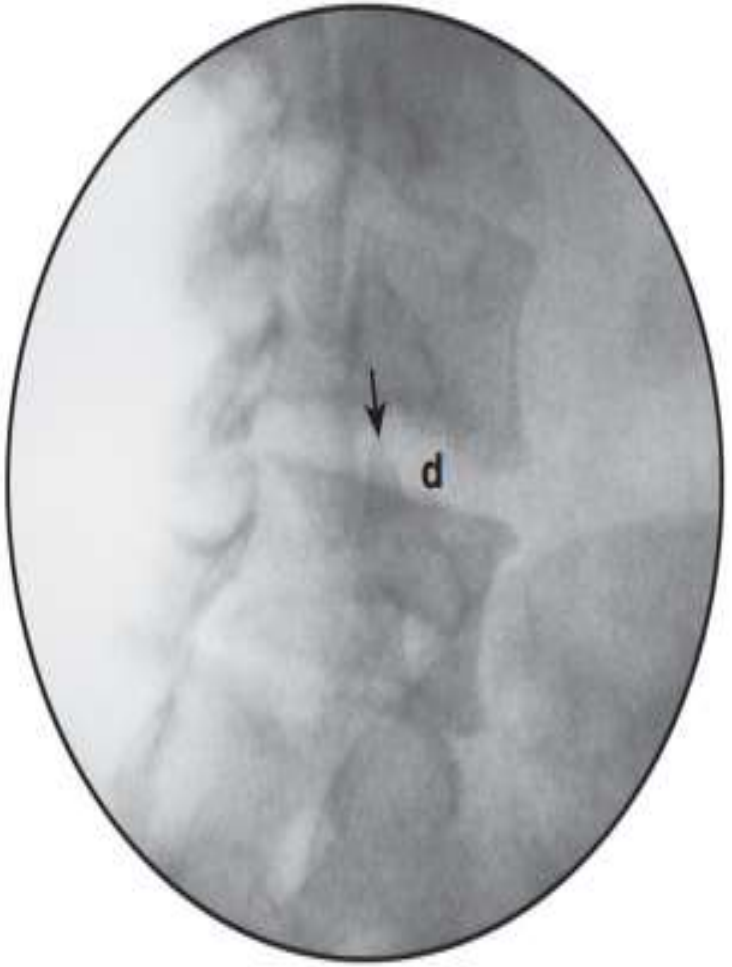
- Radio lucent table
- Discographic needles – 2 needles for each level
  - Outer needle- 21G
  - Inner needle – 26G
- 2% Lignocaine with Adrenaline
- 0.5% Bupivacaine
- Sterile tray
- Dye – nonionic : Iohexol



TARGET ORTHO
(C) www.targetortho.com

- Intravenous antibiotics to prevent discitis.
- Sedate the patient with a short-acting agent.

- **Modified lateral decubitus position:**
  - Symptomatic side down - avoid confusion between pain caused by needle with actual pain on that same side.
  - Mobilizes the bowel away from the needle path.

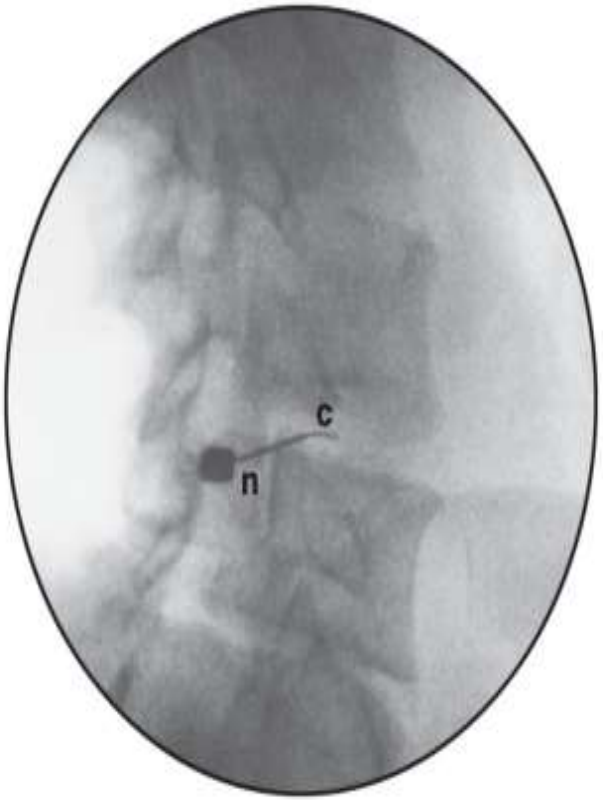


Oblique view with superior articular process dividing disc space in half

TARGET ORTHO
(C) www.targetortho.com

- Anesthetize the skin overlying the superior articular process
- Advance a single 6-inch spinal needle to outer annulus

Disc entry point: just anterior to the base of the superior articular process and just above the superior endplate of the vertebral body, which allows the needle to pass safely by the exiting nerve root.



TARGET ORTHO
(C) www.targetortho.com

Discographic pain provocation & corresponding interpretations

VAS score	Significance
P0	No pain on injection this also includes a perceived sensation of pressure
P1	Partial concordant pain (pain provoked partially covers the area of the usual pain)
P2	Discordant pain (pain provoked in a different area than the usual pain)
P3	Concordant back pain (pain provoked covers the same distribution of the usual pain)

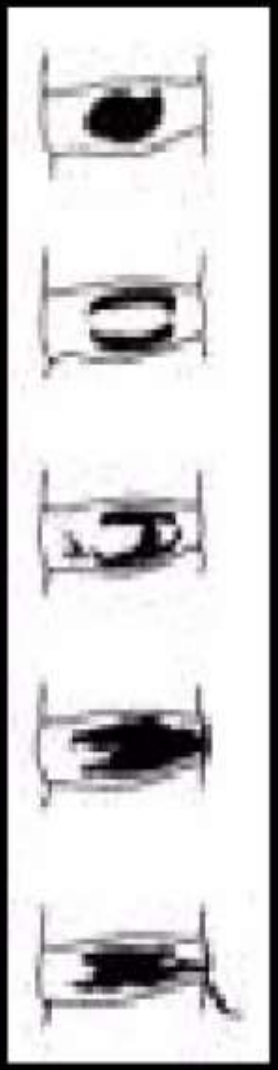
TARGET ORTHO
(C) www.targetortho.com

Discographic patterns

TARGET ORTHO
(C) www.targetortho.com

Contrast distribution

- **Cotton Ball**
  No signs of degeneration, Soft white amorphous nucleus
- **Lobular**
  Mature disk with nucleus starting to degenerate into fibrous lumps
- **Irregular**
  Degenerated disk with fissures and clefts in the nucleus and inner annulus
- **Fissured**
  Degenerated disk with radio fissure leading to the outer edge of the annulus
- **Ruptured**
  Disk has a complete radio fissure that allows injected fluid to escape. Can be in any stage of degeneration



TARGET ORTHO
(C) www.targetortho.com

Complications

- Discitis
- Nerve root injury
- Subarachnoid puncture
- Chemical meningitis
- Bleeding
- Allergic reactions

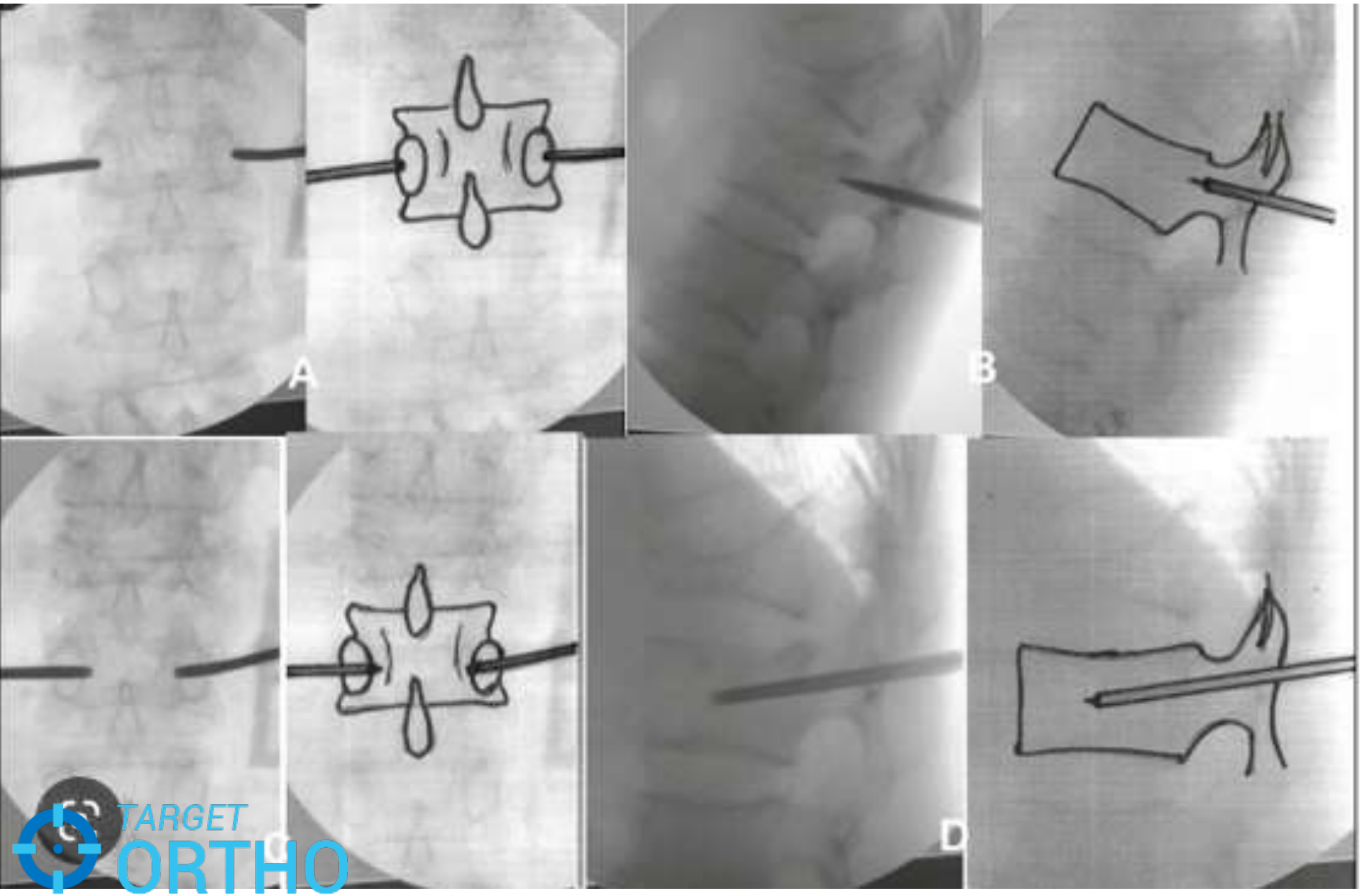
TARGET ORTHO
(C) www.targetortho.com

Osteoporotic compression fractures

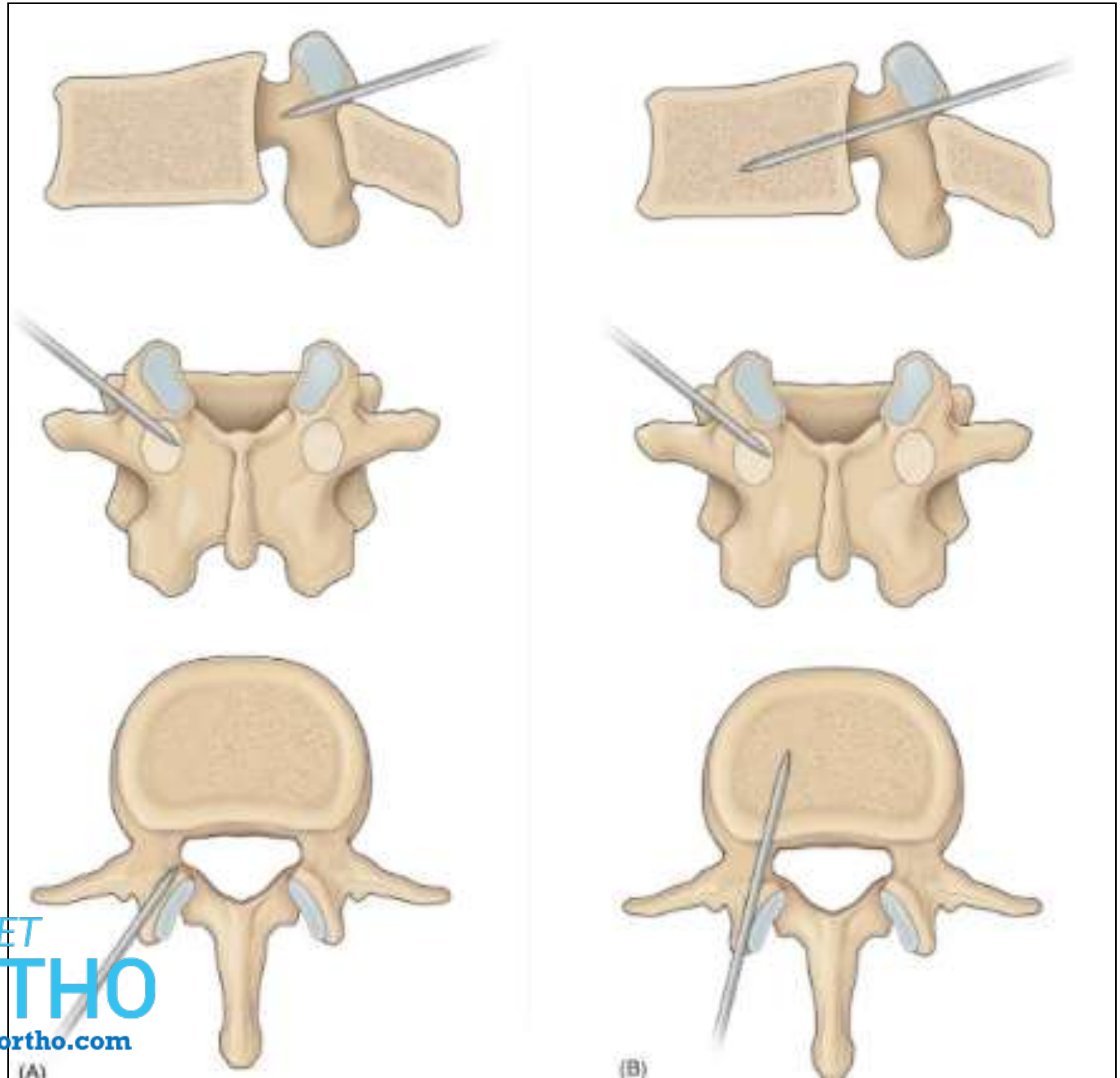
TARGET ORTHO
(C) www.targetortho.com

Osteoporotic compression fractures

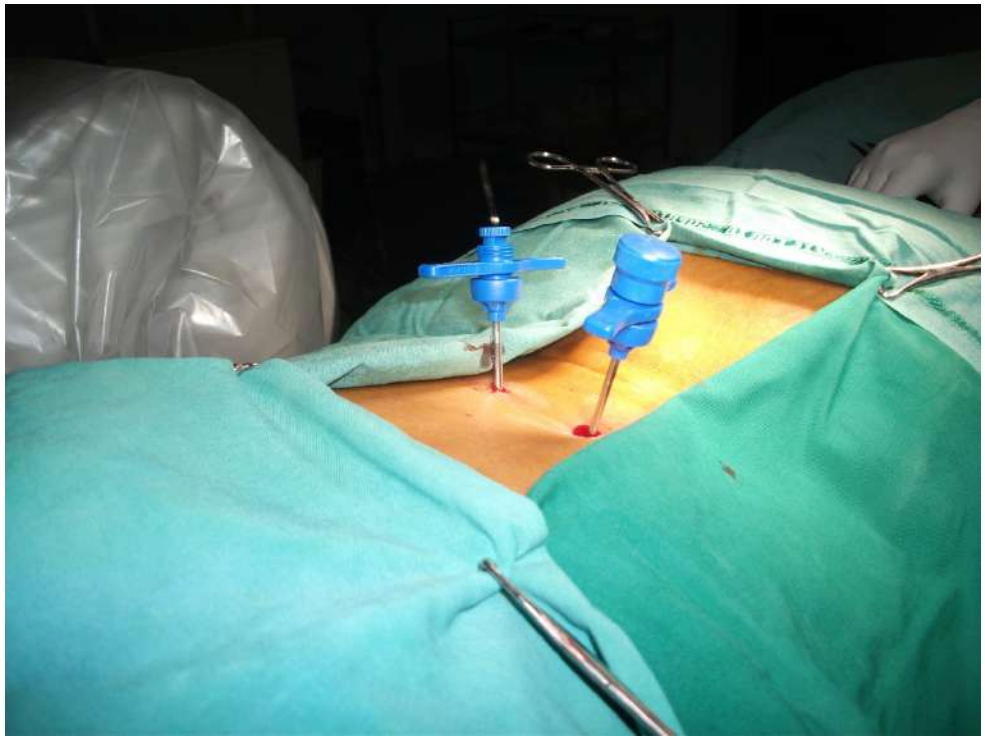
TARGET ORTHO
(C) www.targetortho.com

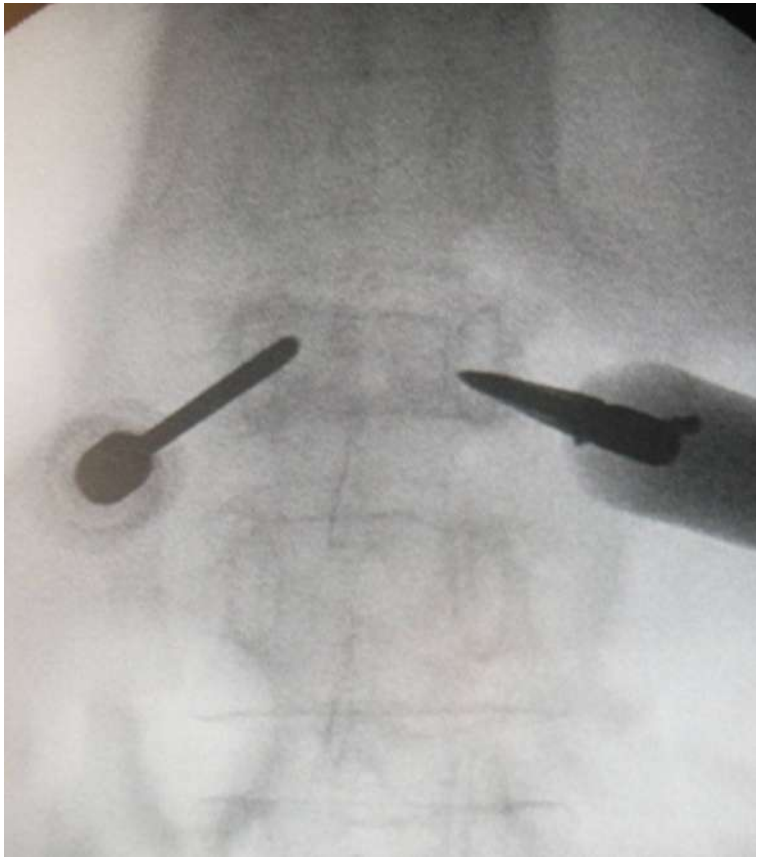


TARGET ORTHO
(C) www.targetortho.com



TARGET ORTHO
(C) www.targetortho.com

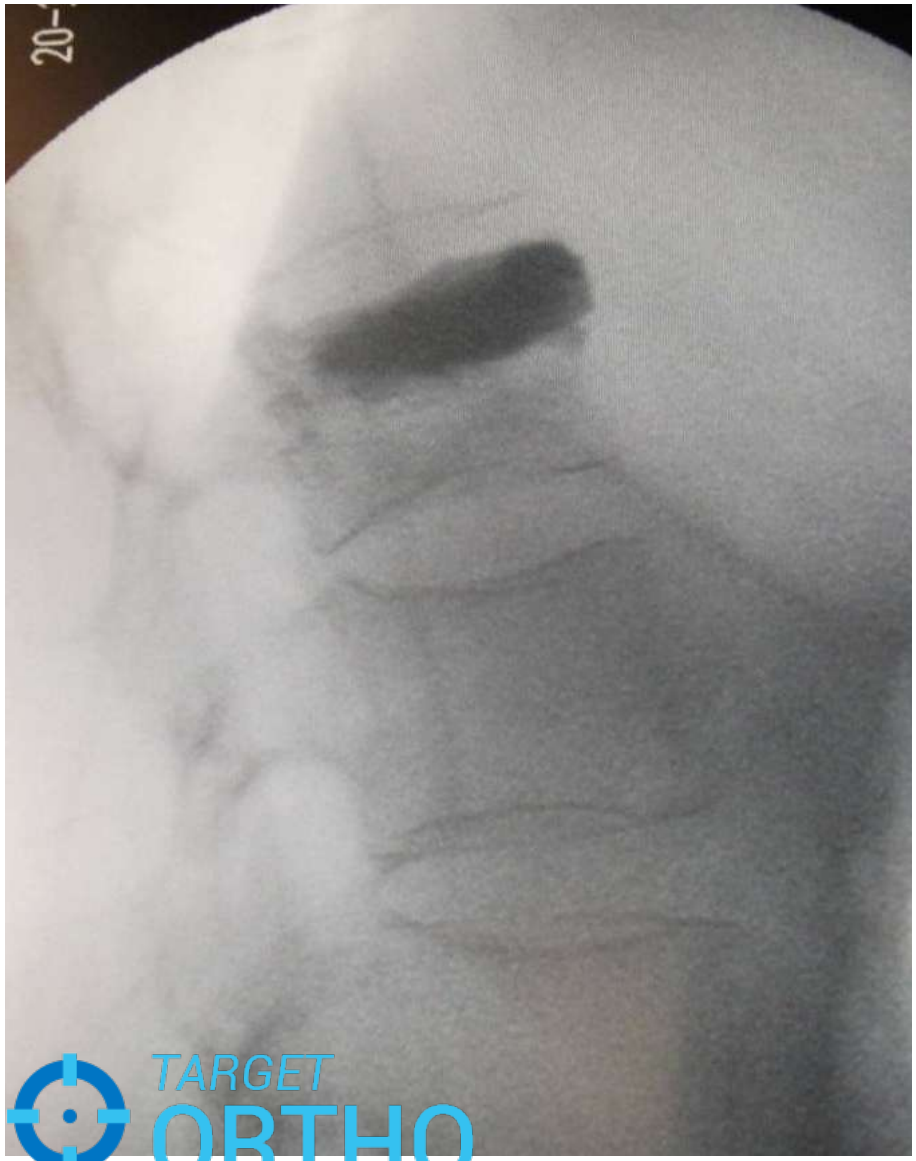




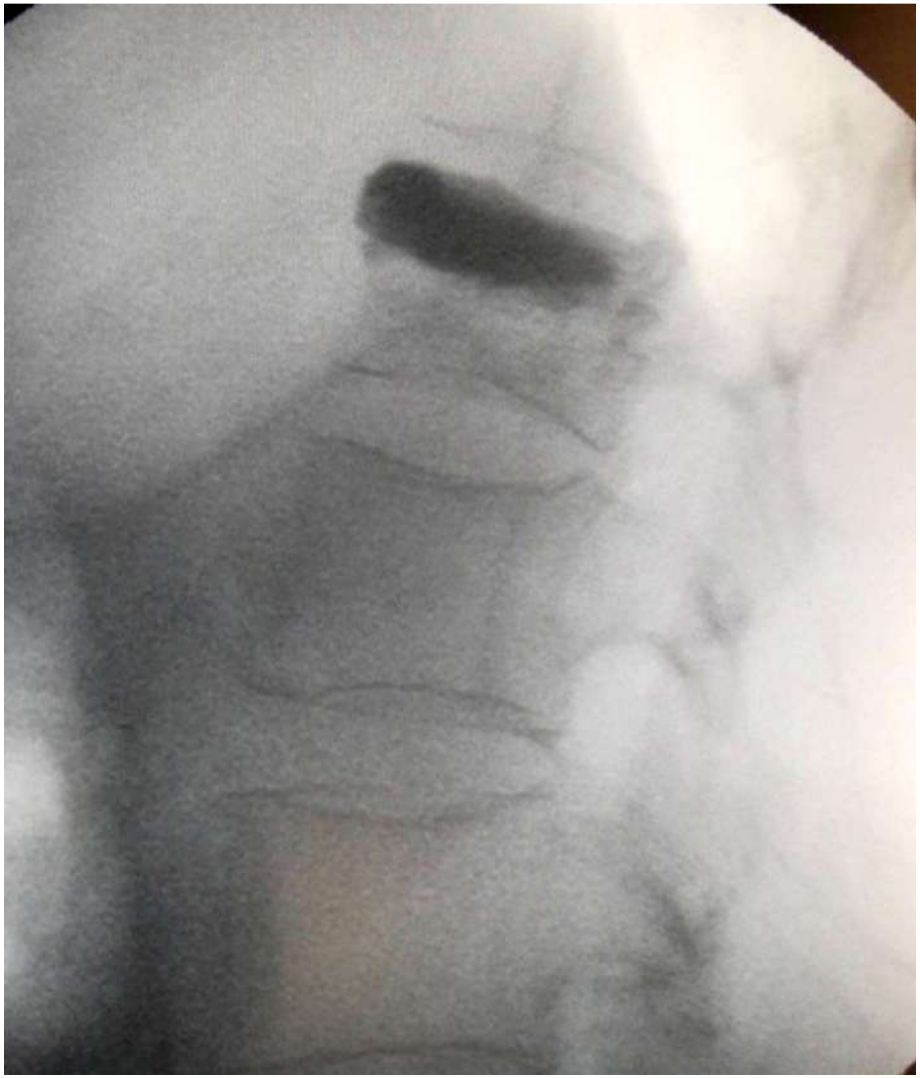
TARGET ORTHO
(C) www.targetortho.com

TARGET ORTHO
(C) www.targetortho.com

TARGET ORTHO
(C) www.targetortho.com

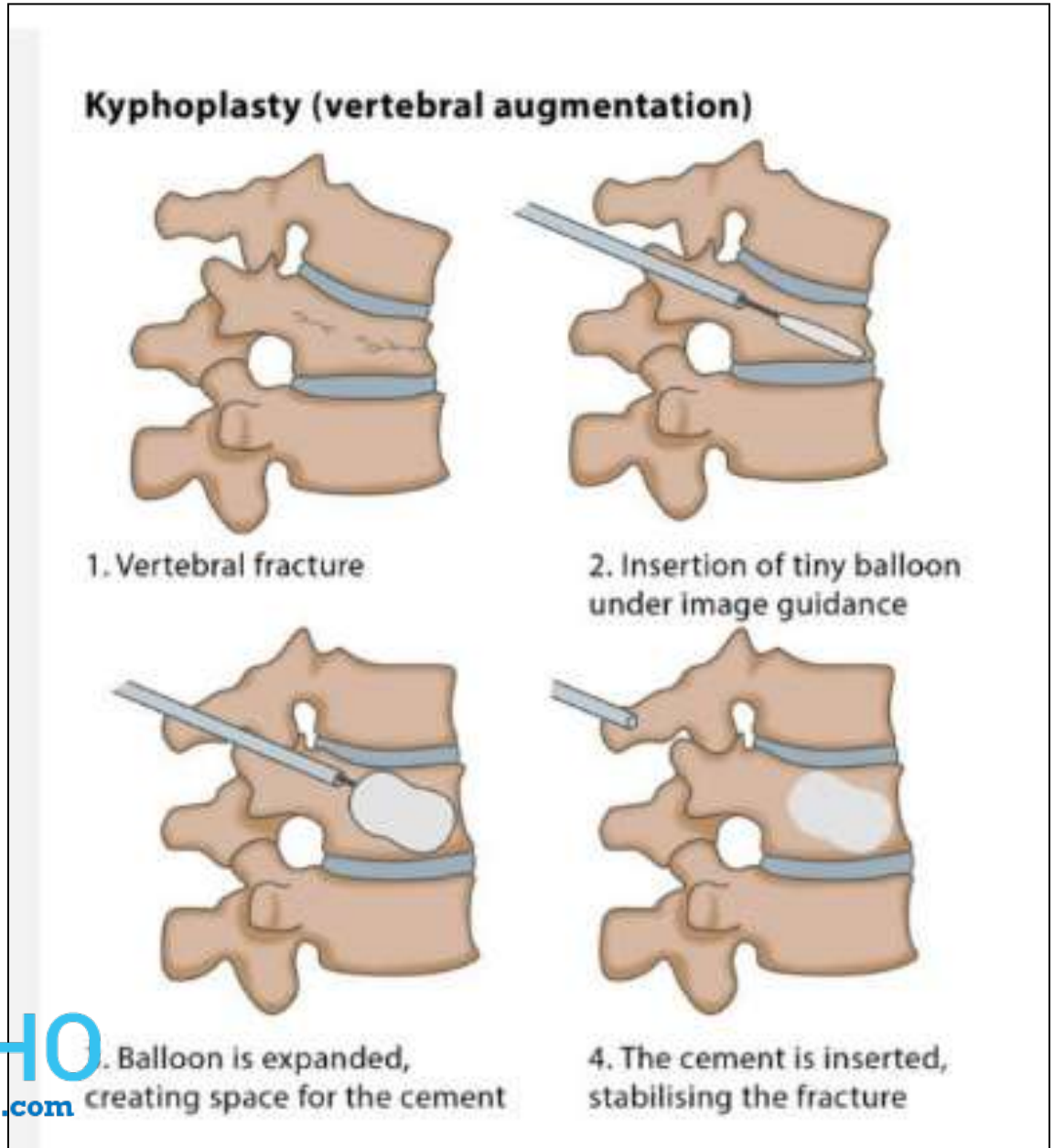


TARGET ORTHO
(C) www.targetortho.com



TARGET ORTHO
(C) www.targetortho.com

Kyphoplasty



TARGET ORTHO
(C) www.targetortho.com

Table 2

Differences Between Vertebroplasty and Kyphoplasty

Vertebroplasty	Kyphoplasty
Cement injected under higher pressure (cement is less viscous)	Cement injected under lower pressure (cement is more viscous)
No potential to correct vertebral deformity	Greater potential to reverse vertebral deformity
No bone tamp involved	Bone tamp used to increase space for cement
Greater potential risk of extravasation of cement	Limited potential risk of extravasation of cement

TARGET ORTHO
(C) www.targetortho.com

Thank you

TARGET ORTHO
(C) www.targetortho.com

TARGET ORTHO
(C) www.targetortho.com