Technical Tips and Pearls of Biportal Endoscopic TLIF at L5-S1 for Isthmic Spondylolisthesis

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KEY MESSAGE

BE-TLIF at L5–S1 offers excellent visualization, enabling anterior cage placement to achieve both lordosis restoration and reduction in isthmic spondylolisthesis.

Why L5-S1 Matters in BE-TLIF (1)

Why is L5-S1 lordosis important?

- Growing interest in LDI (Lordosis Distribution Index) & APEX
- L5-S1 contributes 60-70% of total lumbar lordosis
- BE-TLIF: lordosis restoration + reduction in isthmic spondylolisthesis

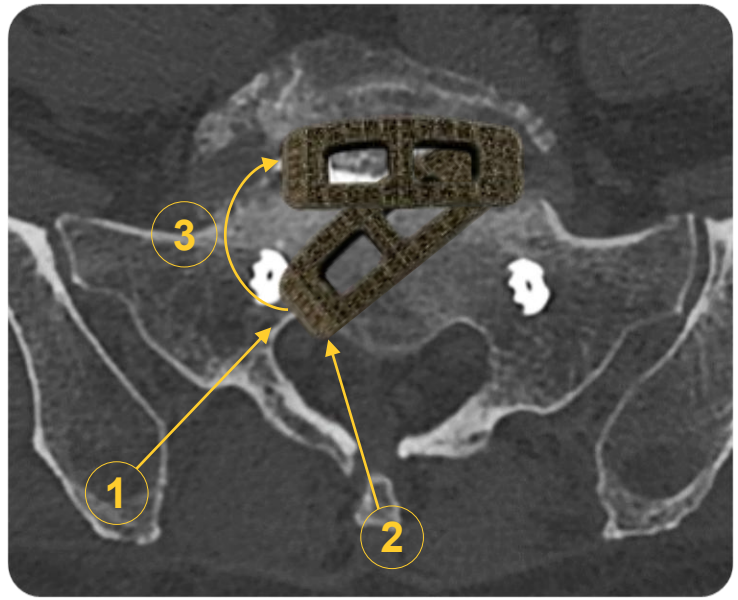
Why is L5-S1 isthmic spondylolisthesis challenging?

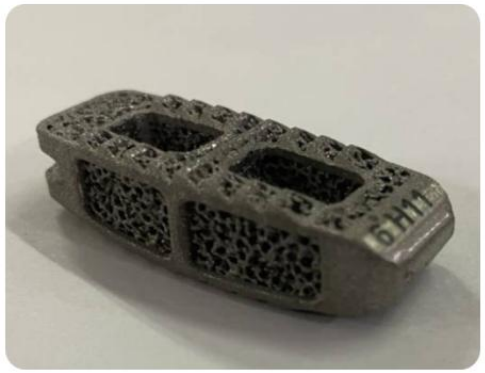
- High PI with iliac crest obstruction : Restricts cage trajectory & Limits screw angle and rod assembly
- Distorted anatomy : Level confusion and Higher risk of neural injury
- Lysis site stenosis : Often requires direct decompression

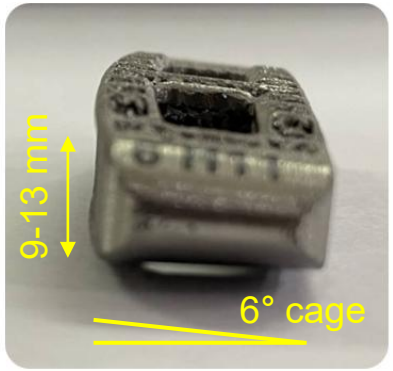
Why L5-S1 Matters in BE-TLIF (2)

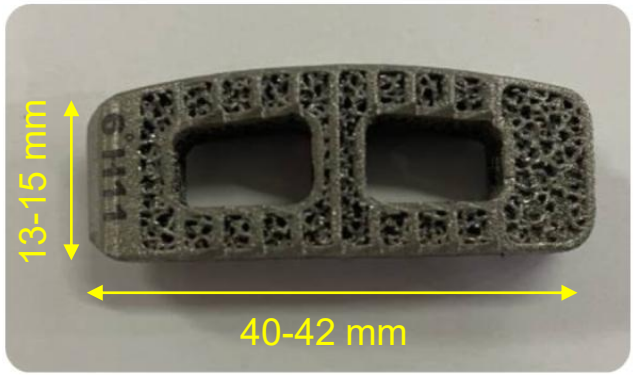
Why can BE-TLIF still work at L5-S1?

- **Wide lateral** disc space at L5-S1
- **Large cage** insertion through posterior route
- **Anterior seating** achievable with cage rotation





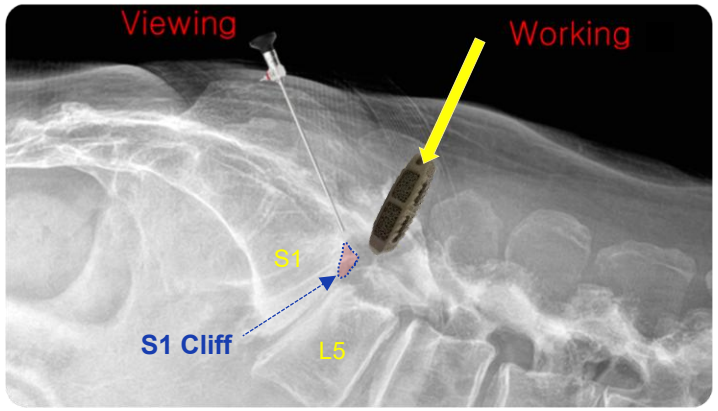


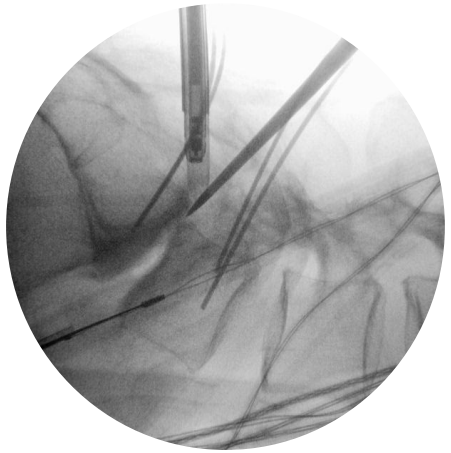


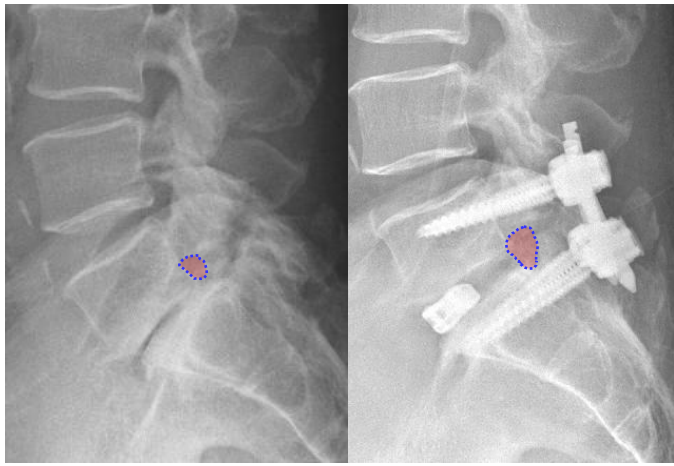
Why do we prefer right-sided working?

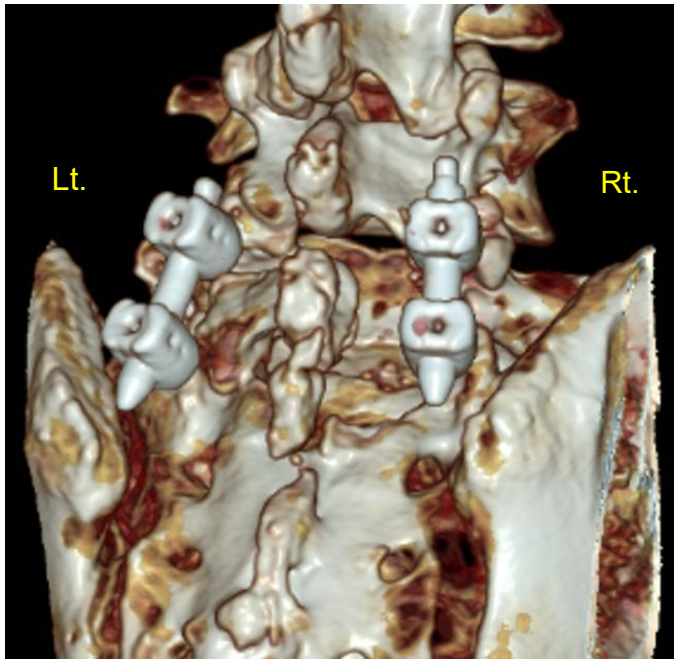
Approach

- **High PI favors Right-sided, better cage insertion trajectory**







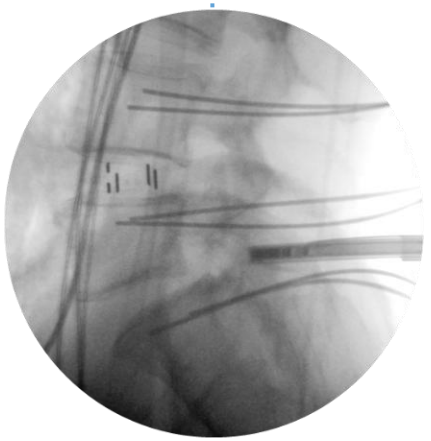


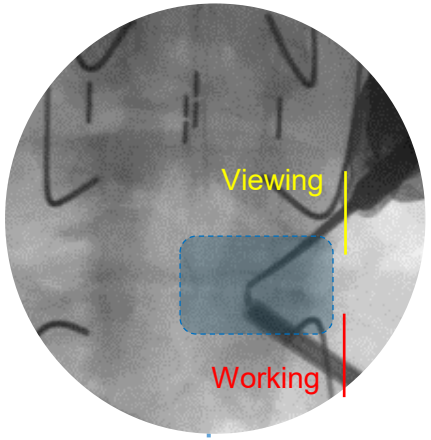
Decompression

- **Rt. : Direct decompression of exiting and traversing roots**
- **Lt. : Indirect via disc height restoration, direct added if needed**

Our preferred approach at L5-S1

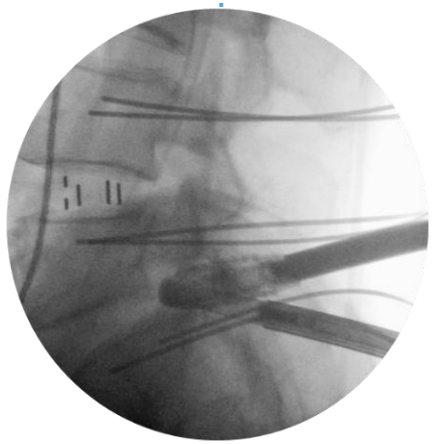
1. Guide pin-assisted level confirmation



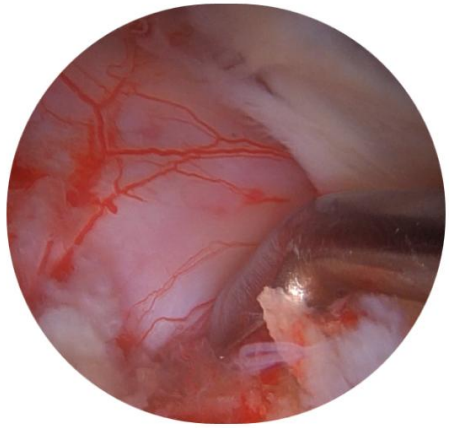


2. BE-TLIF, L5-S1

3. Cage rotation for anterior seating



4. Screw and rod assembly

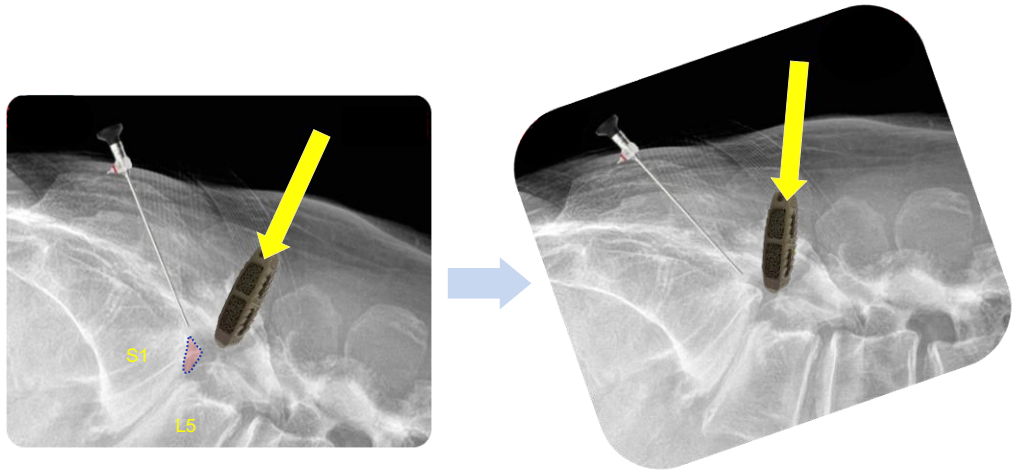


5. Exploration

Technical Tips and Pearls

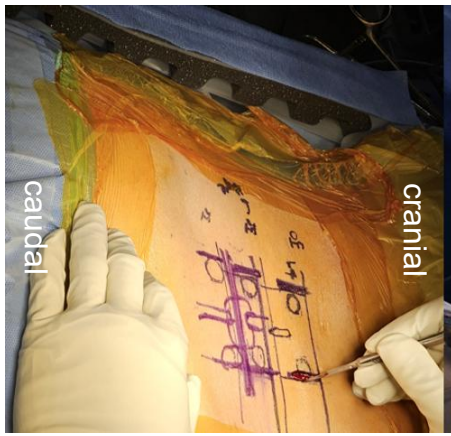
1 Reverse-Trendelenburg positioning

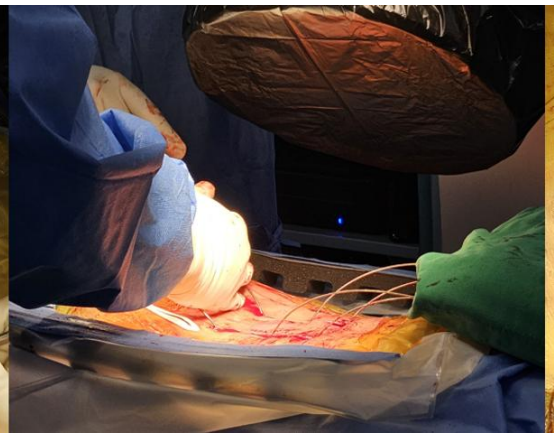
- Gr ≥ 2 : sacral endplate acts as cliff, to verticalize disc entry

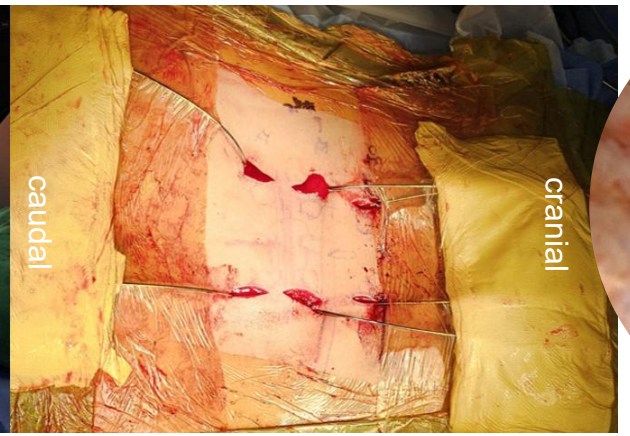


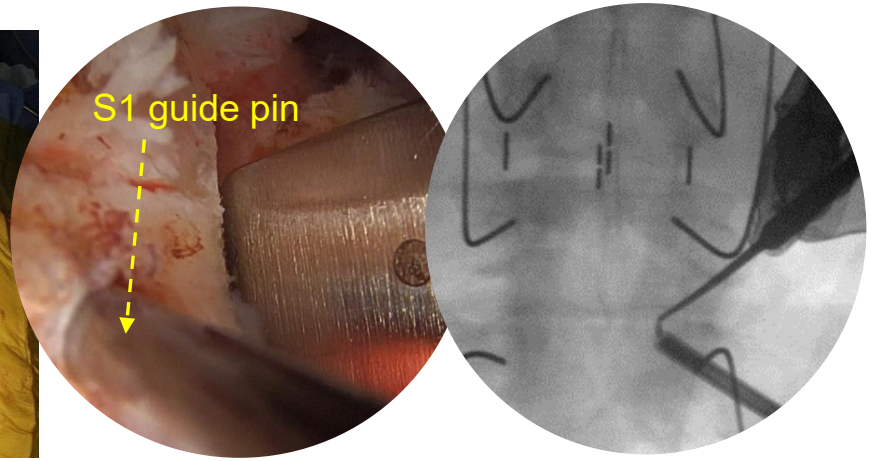
2 Guide-pin-first

- Anatomical landmark in distorted field + instrumentation backup

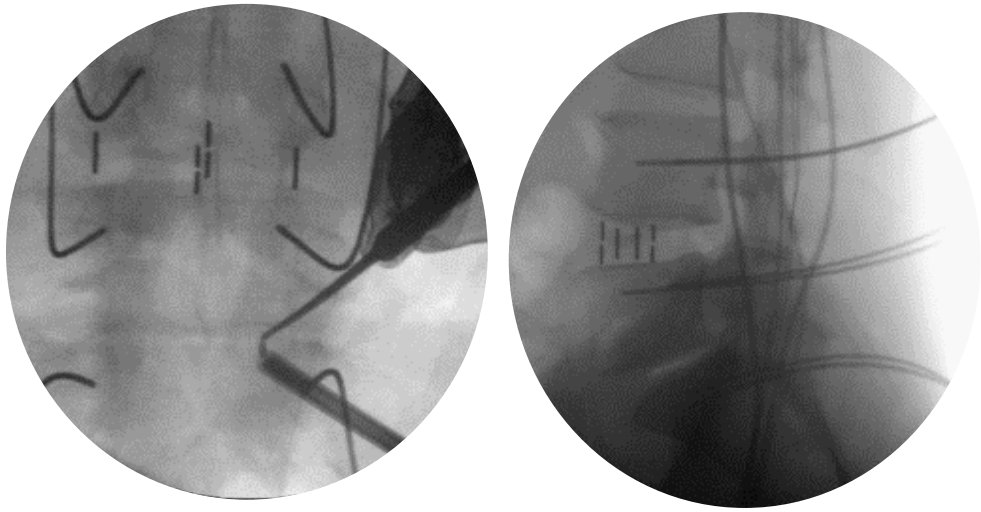






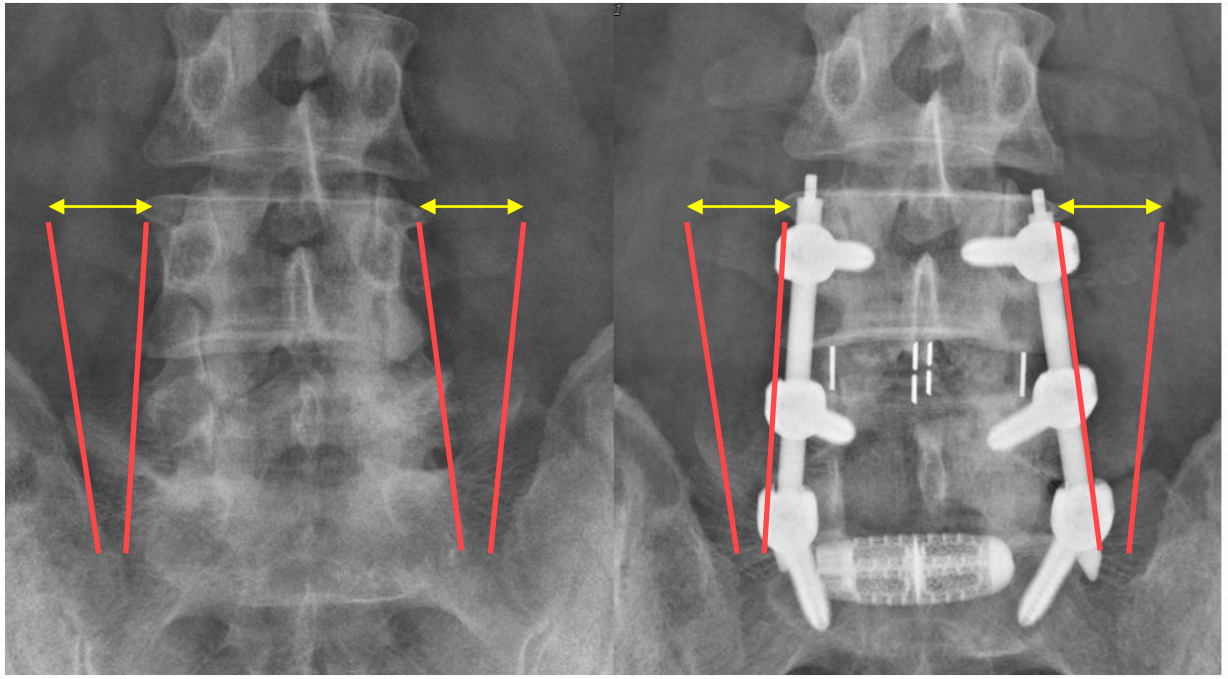


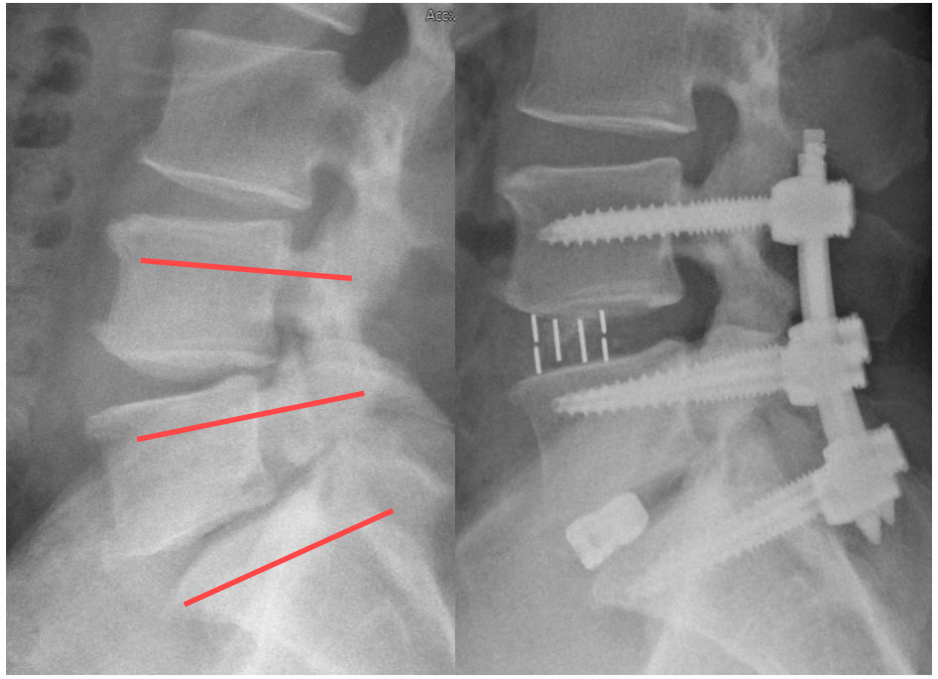
Technical Tips and Pearls



3 S1 screw as the reference

- S1 convergence first & adapt L4, 5 to avoid iliac conflict
- S1 start from sacral notch, aim toward promontory

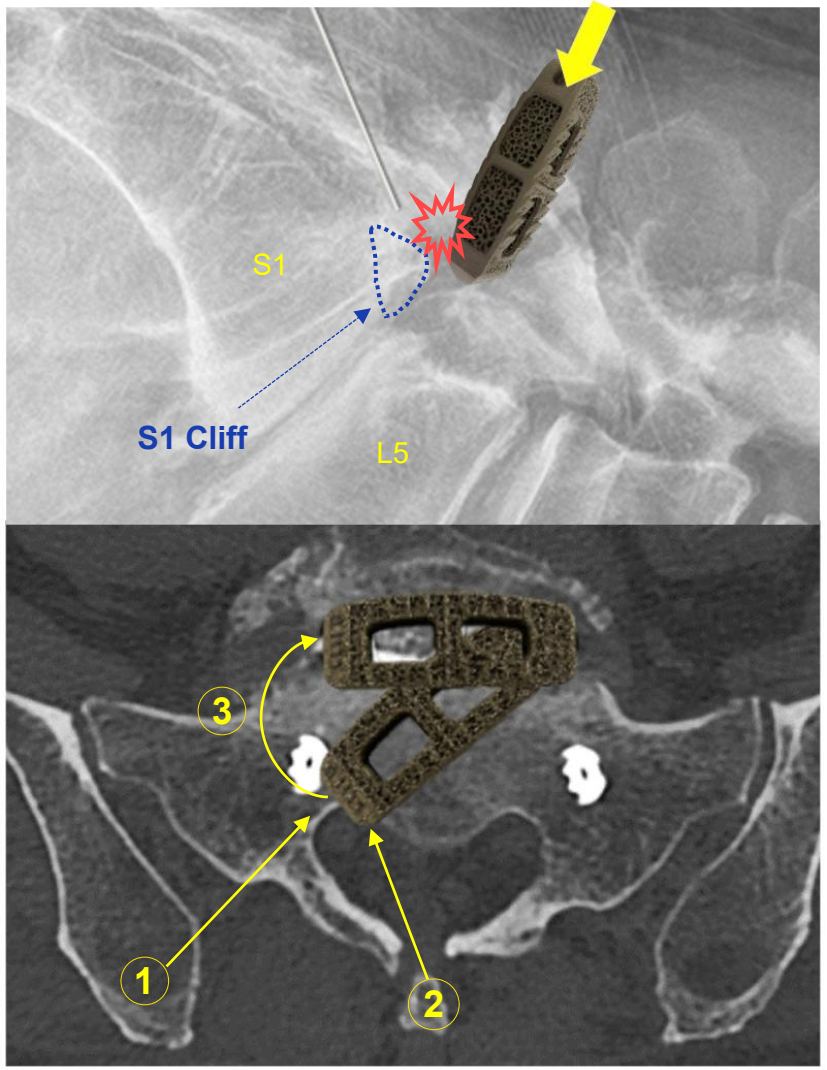




Technical Tips and Pearls

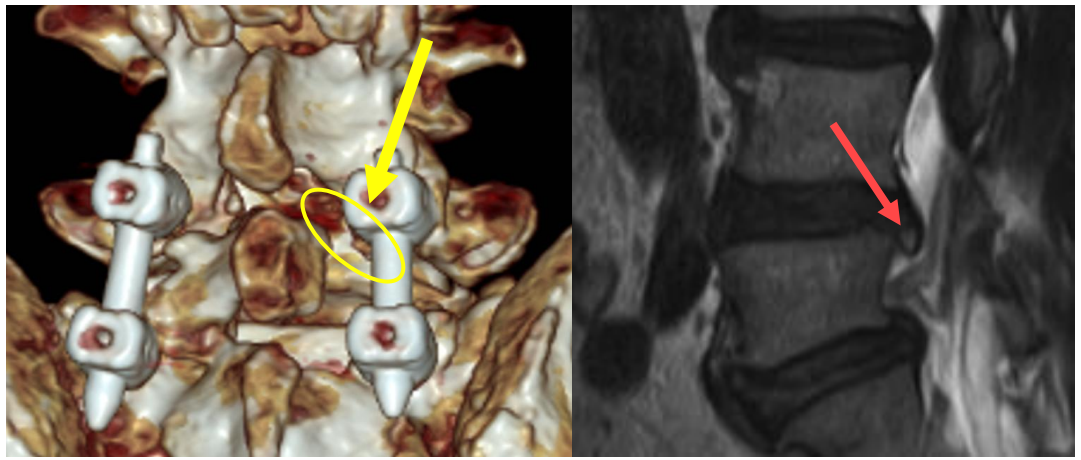
4 S1 cliff burring with cage rotation

- **Burring** removes posterior bony restraint, **Retropulsion risk** increases
- **Should** pair with **Cage rotation**



5 Check lysis stenotic zone

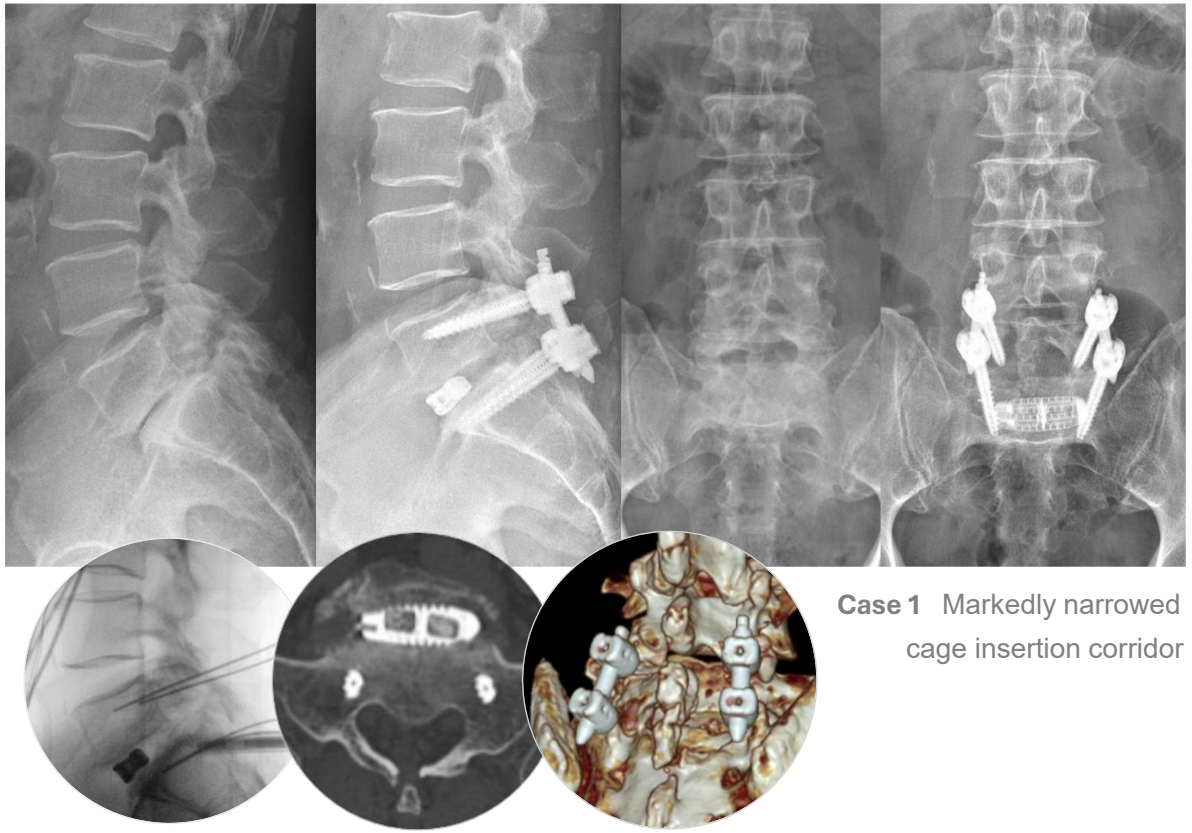
- Do not ignore, **decompress** if **symptomatic**



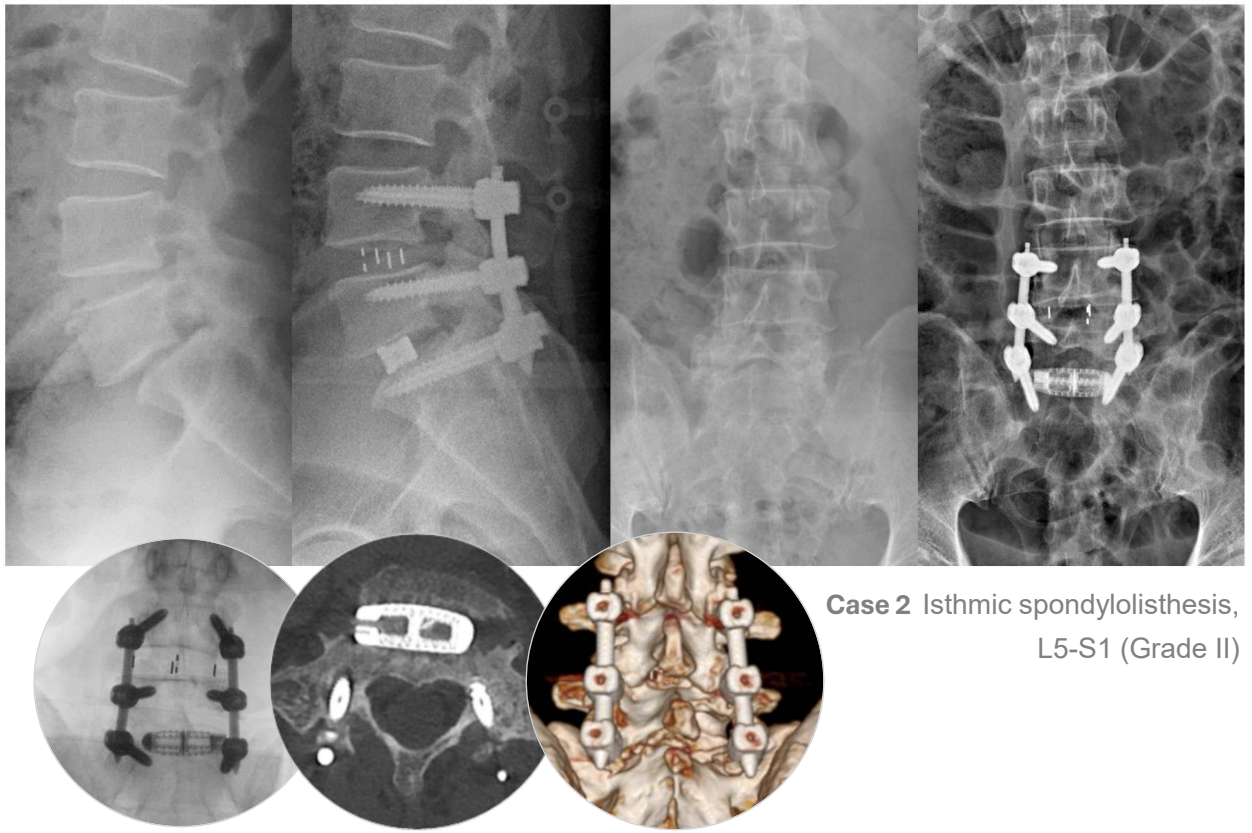
Technical Tips and Pearls

6 Stepwise reduction

- **Cage** sets height, **screw** fine-tunes
- **Forced reduction** risks L5 root injury



Case 1 Markedly narrowed cage insertion corridor



Case 2 Isthmic spondylolisthesis, L5-S1 (Grade II)

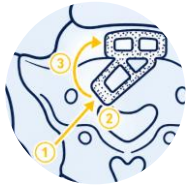
Take-home Message

- **Excellent visualization** enables **anterior cage placement** at L5-S1
- Helps **restore lordosis** and **achieve reduction**

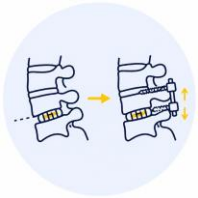
- **BE-TLIF** is a **viable option** for **L5-S1 Isthmic spondylolisthesis**
- With the proper strategies :

Guide-pin-first localization

S1-first construct planning



Cage rotation



Staged reduction

Thank you

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