Biportal Endoscopic Transforaminal Lumbar Interbody Fusion Using Double Cages for Degenerative Spondylolisthesis Grade 2 with Collapse Disk

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Introduction

Lumbar interbody fusion is an effective surgical treatment for degenerative lumbar spinal disorders, such as spondylolisthesis[1,2]

Among them, transforaminal lumbar interbody fusion (TLIF) was the most popular, but even using MIS, its still poses a great challenge for surgeon

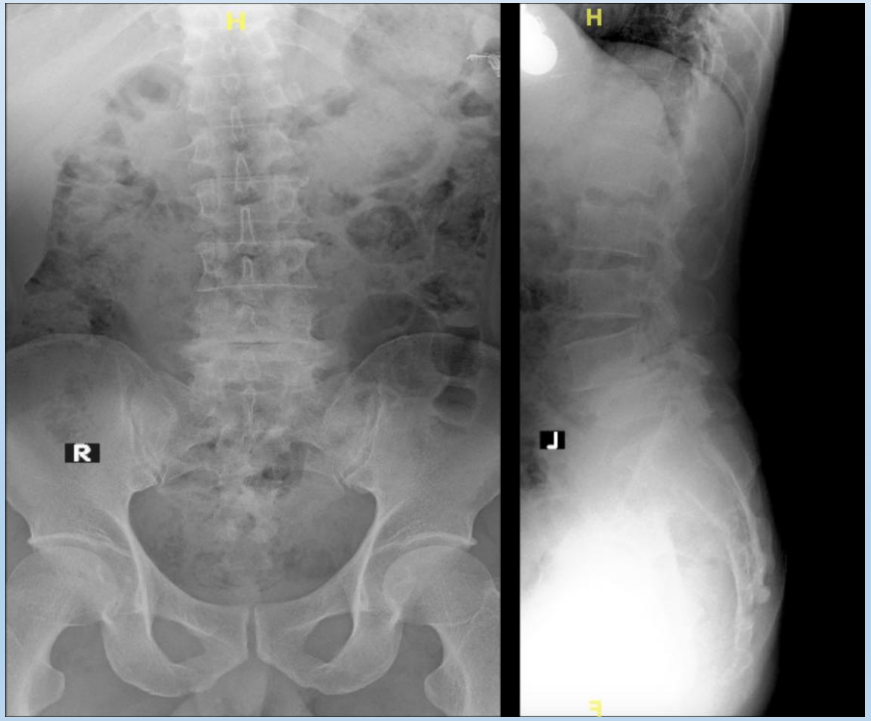
Nerve decompression and fusion using biportal endoscopic, introduced by Pao JL is new technique which can manage this problem[3]

In this case, we introduce the use of BETLIF using double PEEK cages for spondylolisthesis grade 2 with collapse disk

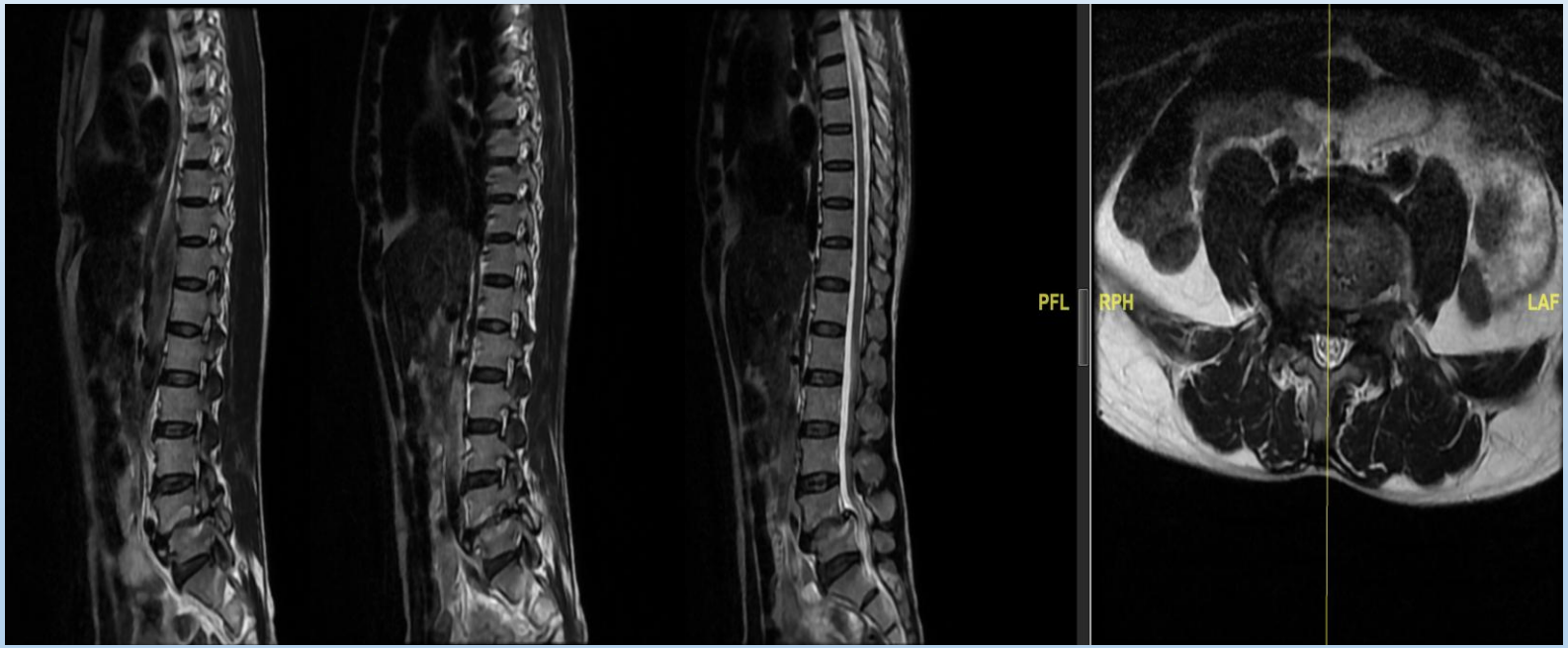
1. Bydon M, Alvi MA, Goyal A. Degenerative Lumbar Spondylolisthesis. Neurosurgery Clinics of North America. 2019 Jul;30(3):299–304
2. Mobbs RJ, Phan K, Malham G, Seex K, Rao PJ. Lumbar interbody fusion: techniques, indications and comparison of interbody fusion options including PLIF, TLIF, MI-TLIF, OLIF/ATP, LLIF and ALIF. Journal of Spine Surgery [Internet]. 2015 Dec 1;1(1):2–18.
3. Pao JL. Biportal Endoscopic Transforaminal Lumbar Interbody Fusion Using Double Cages: Surgical Techniques and Treatment Outcomes. Neurospine. 2023 Mar 31;20(1):80–91.

Case: Male, 53 y.o

- Incapacitating back and leg pain, hypesthesia (+) L4-L5 and weakness on both legs especially on the right side
- Unable to walk or stand due to pain, only bent his back and lying on the bed
- Pain VAS score 9, ODI score 92%



Listhesis L4-L5 Meyerding Grade 2
Bone to bone contact between L4-L5

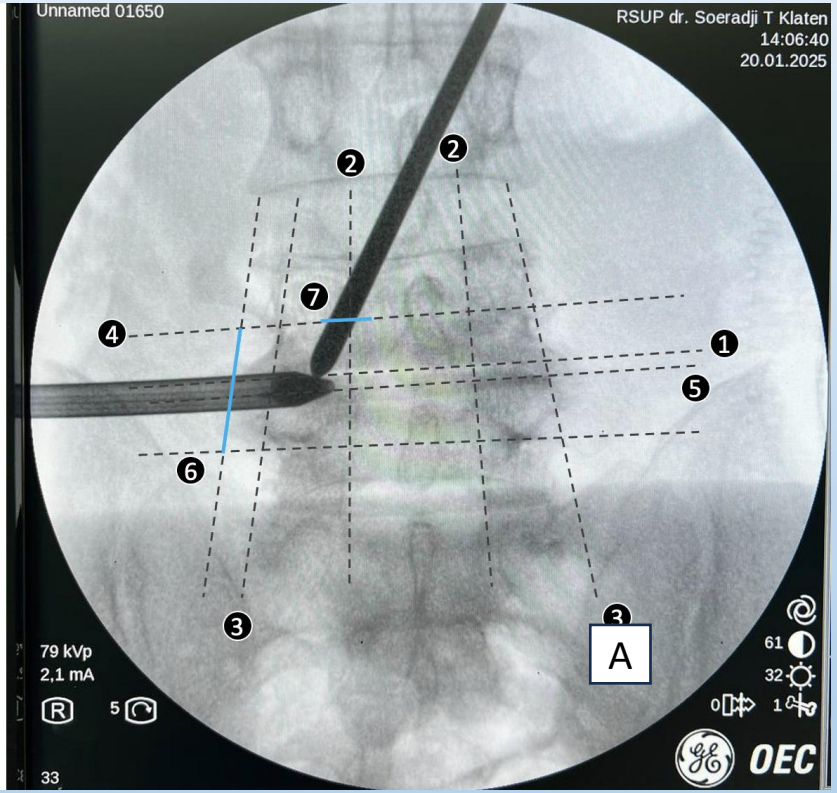


Left foramina Right foramina Central

Collapse disc with listhesis L4 over L5
Canal and foraminal stenosis

Surgical Technique
Patient Preparation and Approach

1. Disc Line
2. Medial pedicle line
3. Lateral pedicle line
4. Inferior pedicle line of upper vertebrae
5. Superior pedicle line of lower vertebrae
6. Working portal
7. Scope portal



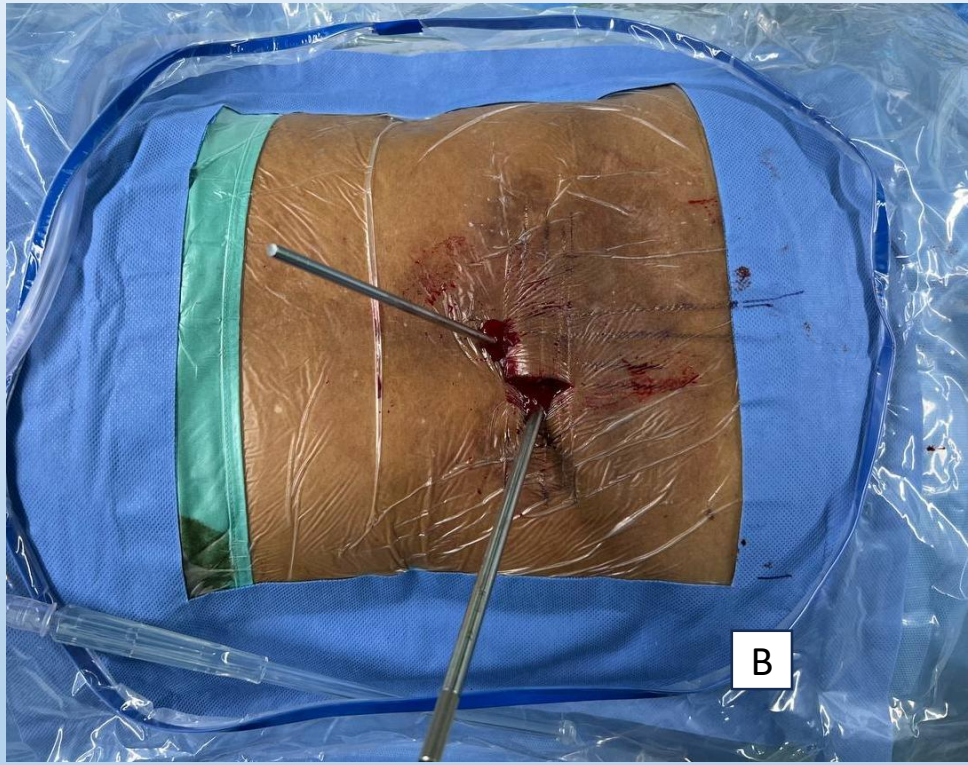


Figure 1. A) Landmark, B) Approach and Skin incision

Surgical Technique
Radical Discectomy and Endplate Preparation

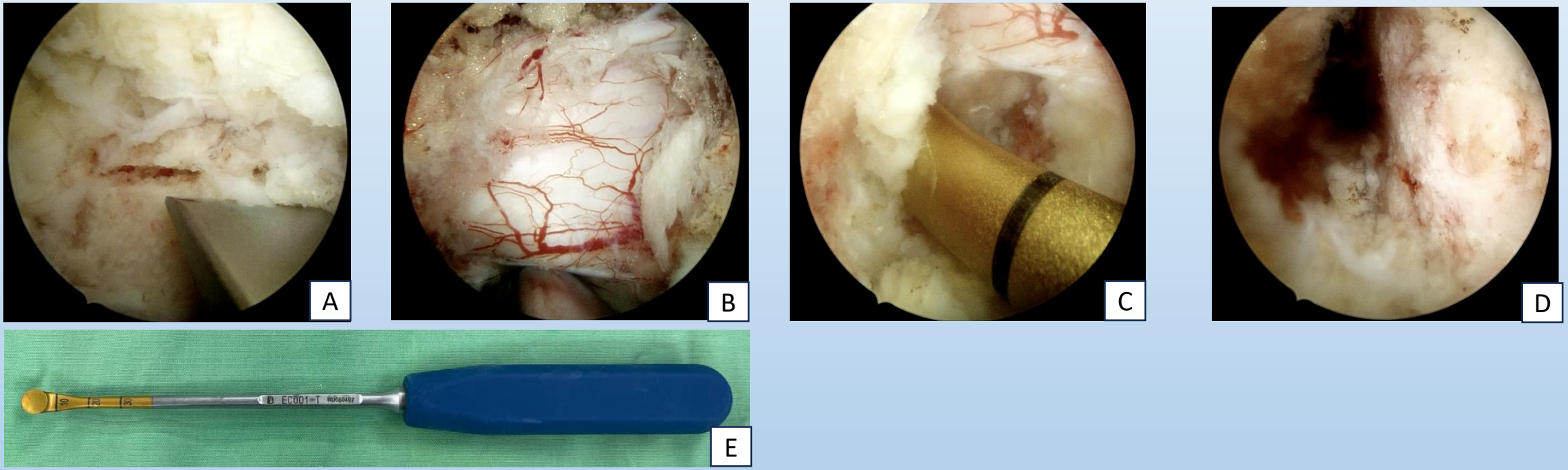
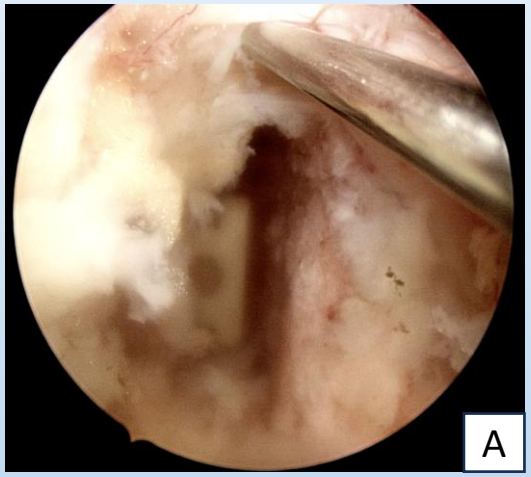


Figure 2. A) Laminotomy using high-speed-burr and resection of IAP and partial SAP, also the ligamentum flavum for decompression, B) After Decompression, C) Discectomy and big footprint preparation using endplate stripper to completely remove the cartilaginous part, D) Endplate footprint consisting only bony endplate, E) Endplate stripper

Surgical Technique
Cages and Bone Graft Insertion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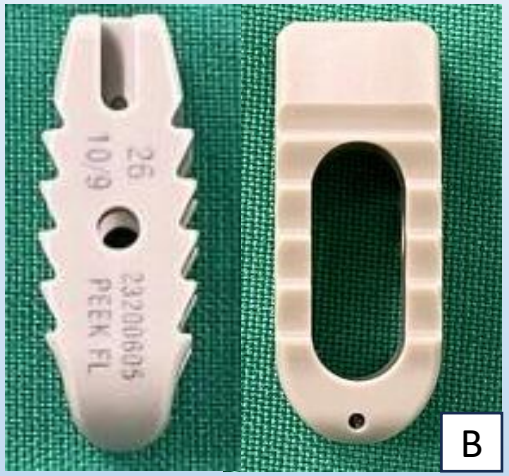

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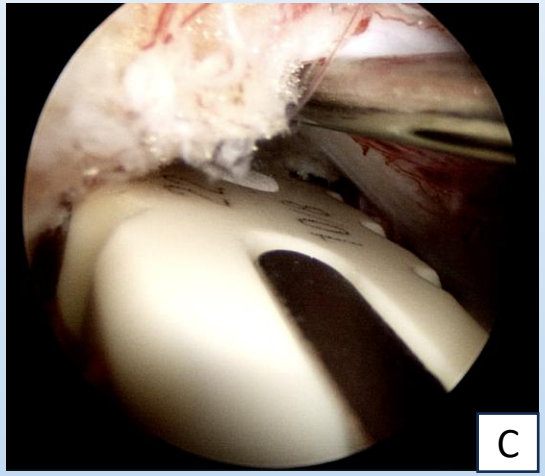
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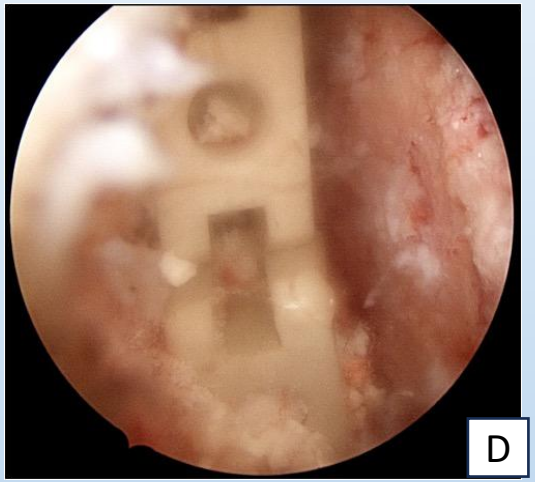
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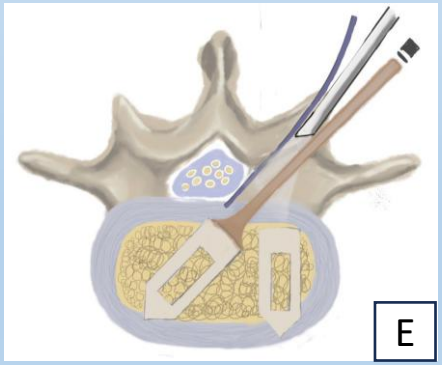

E

F


G

Figure 3. A) Insertion of the first cage in straight position and retract the dura using dura anchor, B) PEEK cage size 8mm length 26mm, C) Insertion of second PEEK cage accompanied with bone graft in oblique position, D) Position of the PEEK cage vertically and obliquely oriented, E) Illustration on double cage position, F) Cannulated Dura-retracting anchor, G) Bone graft injector

Final Construct

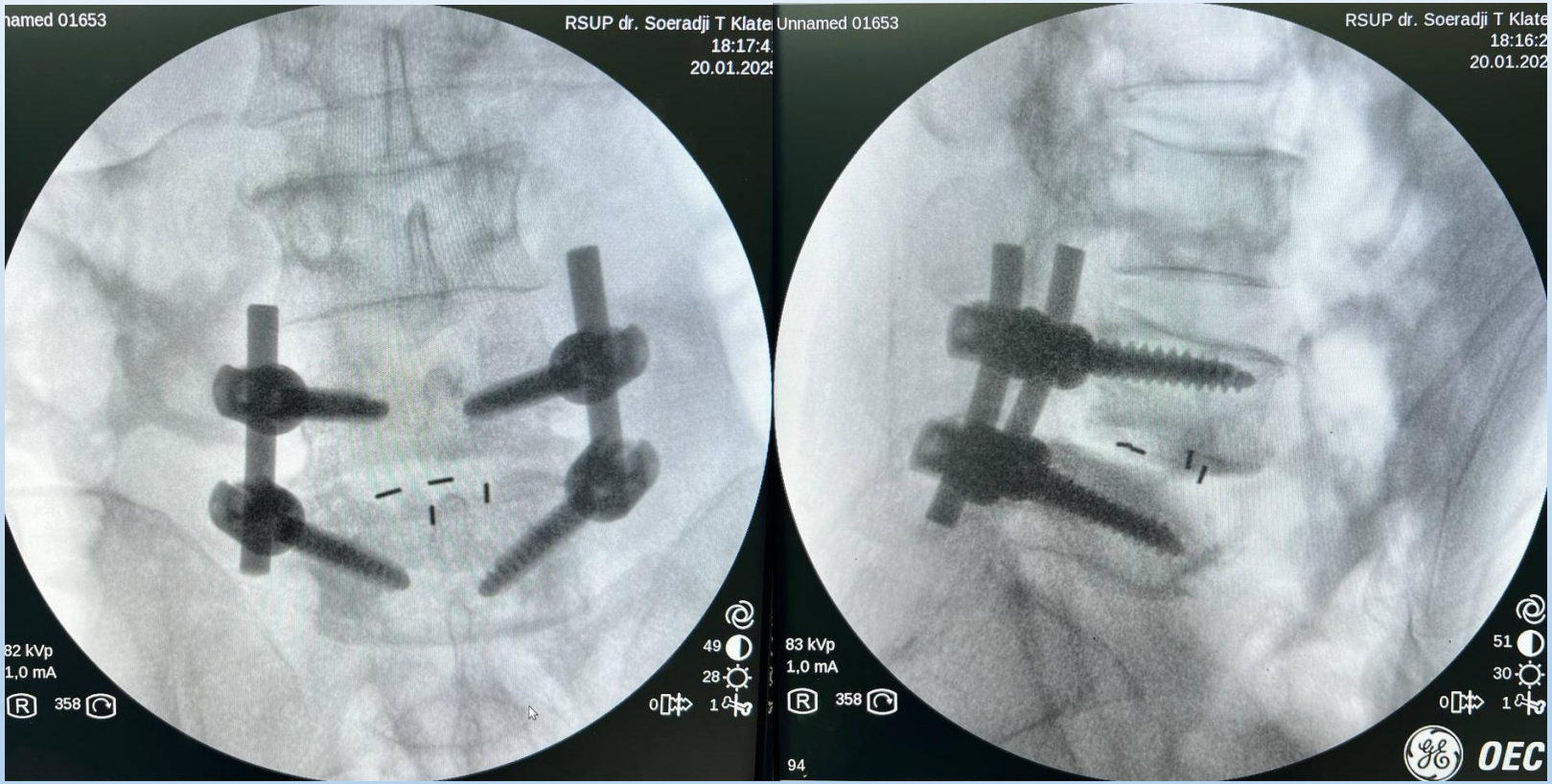
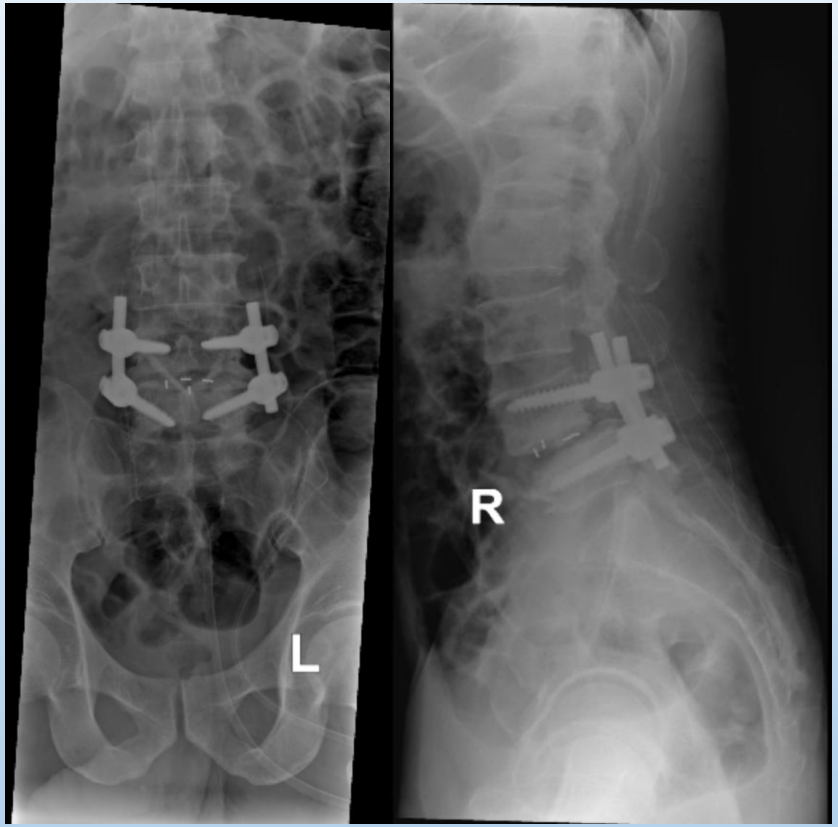


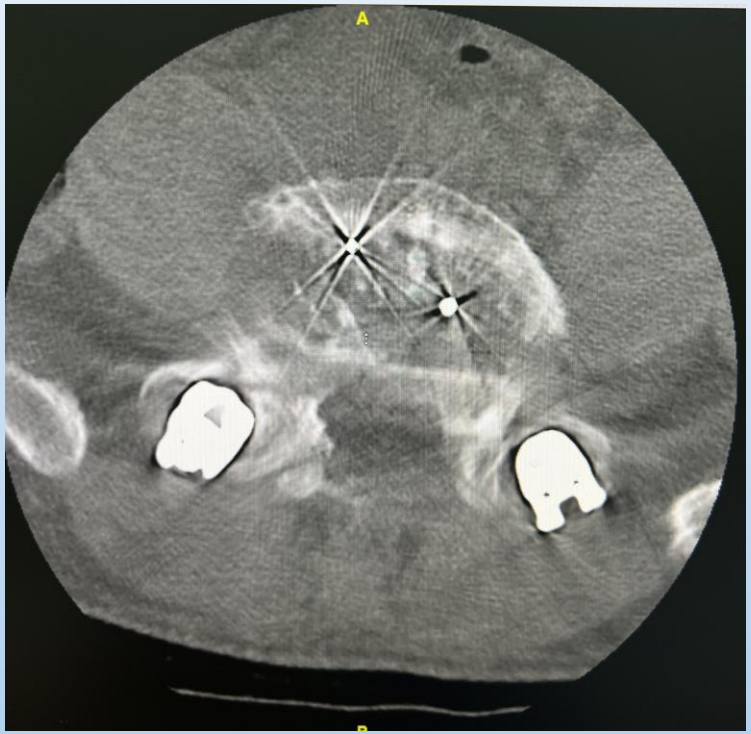
Figure 4. Final Construct. We insert the pedicle screw using the conventional one and achieve the reduction of the spondylolisthesis using Cantilever technique

Follow up Examination



One month post op

VAS score 1
ODI Score 24%
Can walk without aid



CT-scan **6 month** post op

Bridwell Grade II

Discussion

- TLIF leads to high fusion rate with minimal complication, compared with other interbody fusion
- By using biportal endoscopic, we can make sure the end plate preparation will only leave the **bony endplate**
- Biportal endoscopic allow us to perform **direct neural decompression** and disc removal by laminotomy, so the stability of the spine can be maintained
- Pao et al concludes that BETLIF using **double cage** results in significant improvement in clinical function and **high fusion rate**
- This because it can minimize tissue trauma and improve the fusion rate due to its ability to facilitate **better endplate preparation** and provide **big cage footprint**

Pao JL. Biportal Endoscopic Transforaminal Lumbar Interbody Fusion Using Double Cages: Surgical Techniques and Treatment Outcomes. Neurospine. 2023 Mar 31;20(1):80–91.

Conclusion

Advantages

- Minimal blood loss
- Low post operative pain and increase ODI score
- Cheaper → good for developing country
- Big cage footprint
- High fusion rate

Pitfall

- Technically demanding
- Longer duration of surgery