Minimally Invasive Lateral Approach for Hybrid Pedicle Subtraction Osteotomy: A Technical Note

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Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the indications for pedicle subtraction osteotomy; 2) Describe the potential advantages, disadvantages, and technical challenges of the lateral approach for PSO.

Introduction

Pedicle subtraction osteotomy (PSO) has been described for correction of fixed sagittal imbalance, typically allowing up to 30 degrees of correction of lumbar lordosis. This procedure is typically done in the prone position using a bipedicular approach. However, it can be associated with significant morbidity, including major operative blood loss. Minimally invasive lateral approaches have increasingly been used for the treatment of degenerative disease and spinal deformity. These have included thoracolumbar interbody fusions, corpectomies, and thoracic discectomies. In this technical note, we present the first report of a novel application of the minimally invasive lateral approach for a hybrid PSO.

Methods

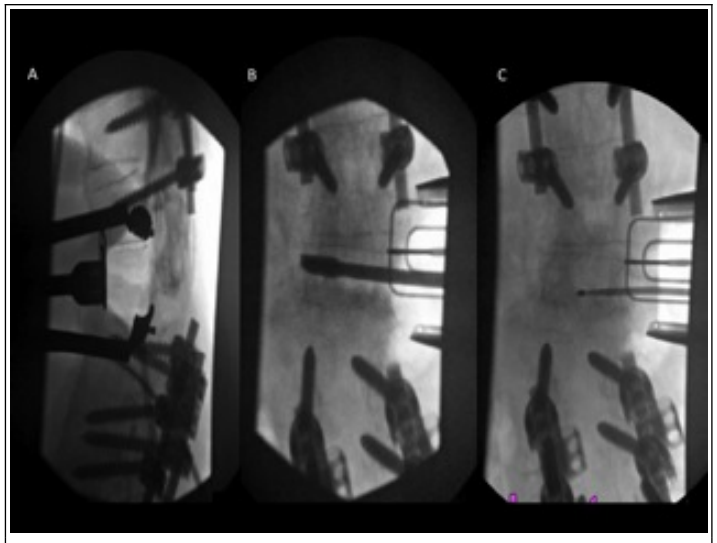
A 69 year-old male with multiple previous thoracolumbar operations, ultimately with a T10 – S1 instrumentation and fusion, presented with gluteal and thigh pain with a crouching gait secondary to compensating for a positive sagittal balance. In a staged procedure, anterior wedge resection of the L1 vertebral body was performed using the minimally invasive retroperitoneal lateral approach. The patient was then placed prone for the completion of the pediculectomies, closure of the PSO, and definitive posterior rod instrumentation.

Results

Preoperatively, he had 8 cm of positive sagittal imbalance and 10 degrees of lumbar lordosis, with anterior wedging of the L1 vertebral body. Postoperatively, the patient had 35 degrees of lumbar lordosis for a gain of 25 degrees. Blood loss was minimal. He was discharged home four days after the completion of the procedure and remains neurologically intact 6 months after the procedure.

Conclusions

This case displays the technical feasibility of using a minimally invasive lateral approach for PSO. While additional experience and follow up is required to further characterize the technical challenges and potential complications, our novel application for the minimally invasive lateral approach demonstrates its viability in achieving correction for sagittal imbalance via a hybrid PSO.



Intraoperative fluoroscopy of the lateral PSO: A. lateral projection demonstrating retractor placement at the posterior L1 VB; B. & C. AP projections demonstrating PSO using osteotome (B) and drill (C)

References

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[3] Cho KJ, Bridwell KH, Lenke LG, Berra A, Baldus C. (2005) Comparison of Smith-Petersen versus pedicle subtraction osteotomy for the correction of fixed sagittal imbalance. *Spine* **30** (18): 2030-7.
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(A) Pre- & (B) 6-month post-operative lateral 36" standing scoliosis fiims demonstrating improved sagittal balance and lumbar lordosis