CASE REPORT

Surgical Treatment of Andersson Lesion of the Lumbar Spine with Minimal Invasion: A Case Report

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Background: Andersson lesion (AL) refers to a destructive vertebral or disco-vertebral lesion of the spine in patients with ankylosing spondylitis (AS). Against the backdrop that the best surgical option for AL remains controversial, this work serves as the first case report of oblique lateral interbody fusion (OLIF) combined with posterior pedicle screw fixation to treat AL of the lumbar spine under minimal invasion.

Case presentation: In this case report, the patient involved was a female aged 37 diagnosed with AL (L3-L4). OLIF combined with pedicle screw fixation was carried out to achieve stabilization of the lumbar spine. It turned out that the patient experienced significant pain relief in her excellent post-operative recovery, with her post-surgical radiographs indicating good stability and bony fusion. The patient now remains disease-free with no low back pain or neurological deficit at the two-year follow-up.

Conclusion: OLIF combined with pedicle screw fixation thus has proven to be an ideal therapeutic option for treating AL of the lumbar spine.

Key words: Andersson lesion; Ankylosing spondylitis; Case report; Minimal invasion; Oblique lateral interbody fusion

Introduction

Andersson lesion (AL) refers to a destructive vertebral or disco-vertebral lesion of the spine in patients diagnosed with ankylosing spondylitis (AS). A wide variety of surgical treatments for AL have been proposed, including posterior fusion, anterior fusion, combined anterior, and posterior procedures. Anterior fusion has less surgical trauma but the fixation reliability might be insufficient. Posterior fusion can generate reliable fixation but might lead to major surgical trauma. Combined anterior and posterior fusion has reliable fixation but the overall operating time and the intraoperative blood loss increases, with higher probability for surgical complications. Debates over the best surgical option in patients with AL persist.

In this case report, the case analysis of a 37-year-old female patient with AL of the lumbar spine (L3-L4) treated by oblique lateral interbody fusion (OLIF) combined with pedicle screw fixation is presented, in conformity with CARE guidelines (provided as the supplementary file). To the best of our knowledge, no past relevant studies have been reported yet.

Case Report

The patient was a female aged 37 who presented with 17 years of back pain, who suffered from severe pain, and whose severity got aggravated by activity 1 year prior to being admitted to our hospital. Her medical records included no history of trauma but a 17-year history of AS, during which sulfasalazine and thalidomide were taken on a regular basis. Physical examination of the patient displayed conspicuous tenderness and percussion pain in her low back area. The preoperative visual analog scale (VAS) and Japanese Orthopaedic Association Scores (JOA) were 7 and 13, respectively.

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No sensory disturbance or motor weakness was identified in the lower extremities.

Test results of sedimentation rate, blood routine examination, C-reactive protein, procalcitonin, and electrolyte values of the patient were within the normal ranges, while the patient’s alkaline phosphate levels were higher than the normal range (108.9 U/L). Plain radiographs of the lumbar spine revealed a destructive lesion at the L3–L4 level presented with the erosion of the endplate as well as the abnormal radiodensity of the nearby vertebral body though without severe destruction. (Figure 1A,B). With reference to the CT sagittal reconstruction image, three-column fractures with irregular discovertebral osteolysis surrounded by reactive sclerosis were detected at the L3–L4 level (Figure 1C). The lesion demonstrated low signal intensity on T1-weighted images, high intensity on T2-weighted images and especially high intensity on short tau inversion recovery (STIR) sequences (Figure 1D) through MRI images.

To provide sufficient stability and enhance bony fusion with minimal invasion, OLIF combined with posterior pedicle screw implantation through the Wiltse paraspinal approach was performed (Figure 2).

Under Laryngeal mask airway general anesthesia, the patient was first placed in the lateral decubitus for the implementation of the oblique lateral approach. Then, after discectomy, the sclerotic area was abraded by curettes for bony fusion. A polyetheretherketone cage filled with allograft bone and recombinant human bone morphogenetic protein (BMP-2) got inserted into the L3–4 intervertebral space. Next, the patient was changed to a prone position, followed by pedicle screw fixation performed at L3–4 under O-arm navigation via the Wiltse paraspinal approach11,12. The operation lasted 5 h and 50 min, with a blood loss of 100 ml.
In this report, the pathological examination of the resections of the operative specimen has revealed that no inflammatory infiltrate is identified in calcified and degenerative intervertebral disc and fibrous tissues (Figure 2A), resembling the non-inflammatory type of AL as reported by Dihlmann.\textsuperscript{13}

The patient recovered well after the operation and was thus encouraged to mobilize using a waist brace for 1 day after the operation. Upon 1 month after surgery, the VAS score of the patient decreased to 2 and the JOA score increased to 16. Postoperative radiographs of the lumbar spine taken at the 1- and 4-month (Figure 2B,C) follow-ups showed good implant position and no fixation failure. CT images of the lumbar spine taken at the 6-month follow-up displayed fine bony fusion without endplate collapse (Figure 2D). At the 2-year follow-up, the patient reported significant pain relief and returned to her daily routine, with the VAS score being reduced to 1 and the JOA score increased to 17. CT images of the lumbar spine taken at the 2-year follow-up also showed good bony fusion without endplate collapse (Figure 3).

**Discussion**

First proposed by Andersson\textsuperscript{14} in 1937, AL is a destructive vertebral or discovertebral lesion that occurs as a late sequela in AS.\textsuperscript{15} The prevalence of the lesion ranges from 1% to 28% in AS patients.\textsuperscript{1,16,17} Various possibilities etiology of AL have been described. Traumatic or inflammatory causes are the most common hypothesis.\textsuperscript{1,16,18,19} The common clinical symptoms in AL cases include mechanical pain, deformity, and occasionally neurological deficit.\textsuperscript{1,19}

![Fig. 2](image-url) (A) Pathological examination of the operative specimen. Postoperative plain radiographs of the lumbar spine were taken at the 1-month follow-up (B) and 4-month (C) follow-up, respectively. (D-E) CT images of lumbar spine were taken at the 6-month follow-up.
instrumentation and fusion have deemed the principle of management in symptomatic AL in response to the failure of conservative treatment.\(^1\)\(^,\)\(^15\)

A large number of surgical techniques have been reported, such as instrumented and non-instrumented stabilization by anterior, posterior, or combined methods.\(^1\)\(^,\)\(^2\)\(^,\)\(^18\) However, the above-mentioned techniques all lead to major surgical trauma (Table 1). This case involved three columns of the spine at L3–L4.

According to the categorization by Cawley \(\text{et al.}\)\(^24\), type E is the most severe type with instability. To restore spinal stability and reduce the surgical invasion, OLIF combined with pedicle screw fixation was selected. In OLIF procedures, only a small incision is needed for access to the lumbar spine (L2–5) between the anterior vessels and psoas muscles without damaging the vessels and nerves.\(^25\) OLIF also enables the clearance of disc and insertion of a big cage, provides a large bony fusion area, and maintains the posterior column structure intact for the meantime. Extensive detachment of muscle from the spinal processes always incurs major bleeding because of the inflammation nature of AS.

Patients who have AL and also suffer from AS have limited feasibility of assessing stability by lumbar motion. Bony fusion and clinical symptoms (such as VAS and JOA score) could help evaluate lumbar stability, and this method is widely used in assessing lumbar stability in patients with AS.\(^26\)\(^,\)\(^27\) In this study, the patient reported significant pain relief and returned to her daily routine. At the 2-year follow-up, the VAS score was reduced to 1 and the JOA score increased to 17, respectively, from 7 and 13 before surgery. And postoperative plain radiographs and CT images showed good bony fusion without endplate collapse. These results indicate the patient recovered some lumbar stability.

Therefore, in this case, pedicle screw fixation was performed via the Wiltse paraspinal approach.\(^11\) Meanwhile, O-arm navigation was also used, as it’s difficult to identify pedicle screw insertion point in AS patients. The minimal surgical invasion resulted in good postoperative recovery and considerable pain relief in the patient.

### Conclusion

This report presents a case of AL involving L3–L4, in which the patient underwent a successful treatment by OLIF combined with pedicle screw fixation in a minimally invasive manner. As a result, this study suggests that OLIF with pedicle screw fixation may be a promising new

**Fig. 3** Postoperative CT images of lumbar spine were taken at the 2-year follow-up

| Surgical methods | Treatment effect and the problems faced | Study |
|------------------|----------------------------------------|-------|
| Anterior fusion  | Has less surgical trauma, but the fixation reliability might insufficient | Wang \(\text{et al.}\)\(^6\) |
| Posterior fusion | Has reliable fixation, might lead to major surgical trauma | Shaik \(\text{et al.}\)\(^7\) and Ling \(\text{et al.}\)\(^8\) |
| Combined anterior and posterior fusion | Has reliable fixation but the overall operating time and the intra-operative blood loss increases, with higher probability for surgical complications | Rajoli \(\text{et al.}\)\(^9\) |
| PSO              | Kyphotic deformity could benefit from a posterior wedge osteotomy, might lead to major surgical trauma | Liang \(\text{et al.}\)\(^20\), Zhang \(\text{et al.}\)\(^21\) and Wei \(\text{et al.}\)\(^22\) |
| Combined PSO and anterior fusion | Could decrease stress on the internal fixation, kyphotic deformity could benefit, might lead to major surgical trauma | Qian \(\text{et al.}\)\(^23\) |

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**Table 1** Surgical methods and treatment effects of AL patients with AS

Abbreviations: AL, Andersson lesion; AS, ankylosing spondylitis; PSO, pedicle subtraction osteotomy.
option for patients diagnosed with AL in the lumbar spine.

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**Author Contributions**

Hong Zhou: data curation; writing—original draft preparation; software. Xuefeng Li: visualization; investigation; validation. Yijie Liu: methodology, visualization. Heng Wang: writing—reviewing and editing; supervision. Weimin Jiang: conceptualization; methodology; software.

**Conflict of Interest**

The authors declare that there is no conflict of interest.

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