

## Case Report

# The Cage Migration and Subsidence after the Stand-Alone Oblique Lateral Interbody Fusion (OLIF)-A Case Report and Literature Review

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Received: March 16, 2018; Accepted: April 19, 2018;

Published: April 26, 2018

## Abstract

A 63-year-old male patient received the stand-alone Oblique Lateral Interbody Fusion (OLIF) surgery. Two months later, he accepted posterior laminectomy and pedicle screw fixation due to the cage migration and subsidence. The Visual Analogue Scale (VAS) scores decreased from first preoperative 6 to final follow-up 2. The Oswestry Disability Index (ODI) scores increased from 42 to 32. The patient acquired excellent clinical results in the end. Stand-alone OLIF could solve problems for degenerative lumbar diseases in elderly patients as one stage surgery. However, posterior decompression and pedicle screw fixation may be considered as remedial measure for patients whose cages migrate and subside during the follow-up.

**Keywords:** Oblique lateral interbody fusion; Lumbar interbody fusion; Numbness

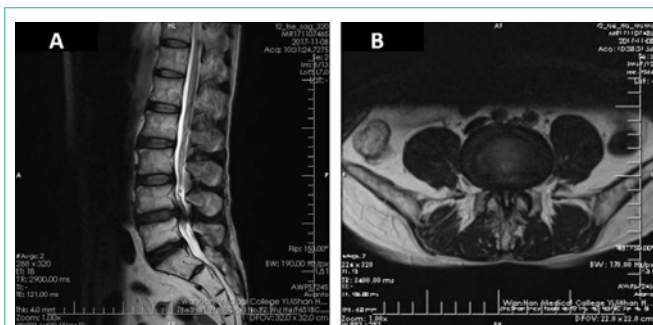
## Introduction

Lumbar Interbody Fusion (LIF) surgery has been widely used as a viable option for patients accompanying with low back pain and related neurological disorders who are failure to conservative treatment [1-3]. At present, several open and minimally invasive lumbar fusion approaches are available, including posterior/transforaminal lumbar interbody fusion (PLIF/TLIF), Anterior Lumbar Interbody Fusion (ALIF) and direct/extreme lateral lumbar interbody fusion (DLIF/XLIF). Comparing to the previous operations, Oblique Lateral Interbody Fusion (OLIF) is a kind of mini-open approach of direct psoas and retroperitoneal visualization, which can reduce the risk for severe procedural complications such as musculo ligamentous injury, nerve root injury, durotomy and major organs and blood vessels damage [4]. However, current studies are limited in terms of indications and clinical outcomes for stand-alone lumbar interbody fusion. Herein, we report a patient received second-stage posterior decompression and pedicle screw fixation as revision for the one-stage stand-alone OLIF surgery.

## Case Presentation

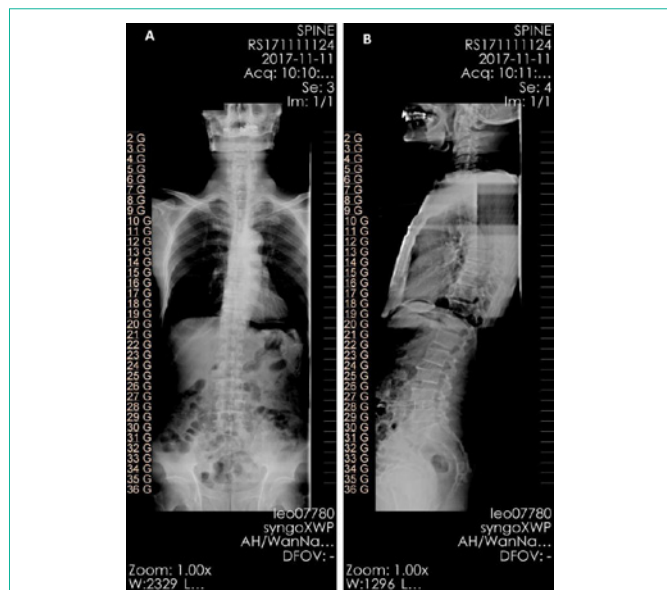
A 63-year-old male patient complained of numbness and weakness of the lower limbs for more than for ten years and aggravated for one year. The patient represented intermittent claudication with walking distance less than 100 meters and conservative treatment was not effective. Physical examination suggested tenderness in the lumbosacral process us spinosus and bilateral paravertebral muscle. The skin superficial feeling of bilateral lower limb decreased. Lumbar Magnetic Resonance Imaging (MRI) (Figure 1) indicated L4/5 intervertebral disc was obviously bulging with local dural sac and nerve root compressed, and the spinal canal was extremely narrow.

The patient was diagnosed as lumbar spinal stenosis and received L4/5 stand-alone oblique lateral interbody fusion under

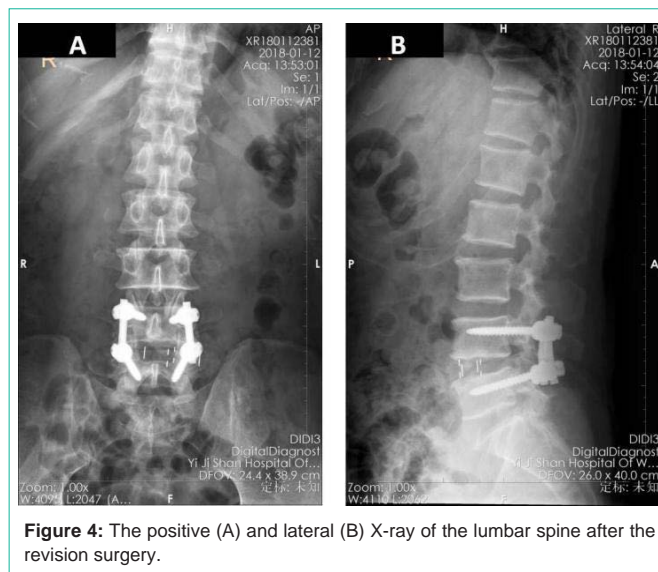


**Figure 1:** The sagittal (A) and traverse (B) fat-suppressed imaging MRI of the lumbar spine.

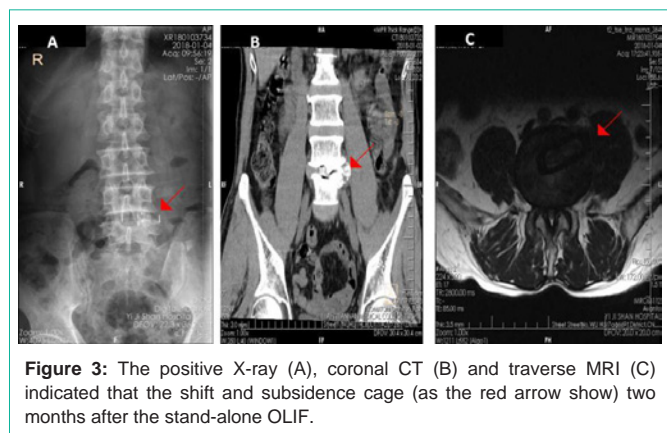
general anesthesia. Allograft bone graft was used in the 12\*50\*6 mm cage for the patient. The blood loss was about 30 ml. The patient began to practice walking three days after the operation in the waist protection with symptoms improved. The lumbar X-ray (Figure 2) after the surgery showed that the cage was located in the center and the intervertebral space increased significantly. Four days after the surgery, the patient were allowed to discharge from hospital with the guidance of wearing waist strictly and avoiding bending. Unfortunately, the patient came to our department again complaining of weakness in the lower extremities and serve low back pain two months after the first operation. After careful inquiry, the patient admitted that he walked and exercised frequently without the protection of waist after discharge. The lumbar X-ray, CT and MRI (Figure 3) revealed that the cage was migrated to the left side with a displacement distance of about 1cm. Luckily, there was no obvious compression on the nerve root. We decided to perform posterior laminectomy and pedicle screw fixation without moving the cage since the shifted cage had little impact on the fusion. The symptoms were alleviated with satisfactory post-operation X-ray (Figure 4) and he was discharged from the hospital seven days later.



**Figure 2:** The positive (A) and lateral (B) X-ray of the lumbar spine after the first surgery.



**Figure 4:** The positive (A) and lateral (B) X-ray of the lumbar spine after the revision surgery.



**Figure 3:** The positive X-ray (A), coronal CT (B) and transverse MRI (C) indicated that the shift and subsidence cage (as the red arrow show) two months after the stand-alone OLIF.

## Discussion

Lumbar interbody fusion is one of the main surgical methods for the treatment of degenerative lumbar diseases. Oblique Lateral Lumbar Interbody Fusion (OLIF) is a minimally invasive technique that has evolved from direct/extreme lateral lumbar interbody fusion (DLIF/XLIF) [5]. The OLIF directly exposes the anterior vertebral body and the anterior position of the disc through the natural gap between the psoas and abdominal aorta or iliac artery, thereby the surgeon could complete the discectomy and implantation of the cage in the minimally invasive way [5]. Unlike the DLIF/XLIF, it could effectively avoid the psoas and lumbosacral plexus injury and significantly reduce the related complications due to its oblique trajectory into the retroperitoneal space. What's more, the huge cage efficaciously distracted the intervertebral space, making the posterior longitudinal ligament stretching and intervertebral foramen enlarging so as to achieve the purpose of indirect decompression.

The common indications of OLIF were as follows: (1) degenerative scoliosis; (2) degenerative lumbar spondylolisthesis; (3) intervertebral disc pain; (4) revision for posterior decompression. However,

the patients with the dissociated intervertebral disc herniation and severe osteoporosis are not suitable for the stand-alone OLIF surgery. Posterior pedicle screw placement is advocated to provide the strongest and most subsidence resistant construct. In order to reduce the probability of displacement and subsidence of the cage, it is considered that the patients performed OLIF operation should be combined with posterior pedicle screw fixation. But in our opinion, patients without obvious lumbar instability and osteoporosis don't need pedicle screw fixation in a single stage in order to reduce the trauma and the financial burden of the patients. Up to now, only two of the 50 patients who received stand-alone OLIF surgery in our department had caused significant cage migration or subsidence due to early ambulation, and none of the remaining patients showed significant abnormalities during three months follow-up. In fact, previous studies proved that stand-alone MIS-LIF could also achieve satisfactory results. Ahmadian A conducted a multicenter chart review to identify patients who underwent stand-alone MIS-LIF and found that the fusion rate was 93% of patients (95% of levels) at 12 months. Seventy percent of patients had grade 0 subsidence while 30% had grade I and grade II subsidence. Amazingly only two patients required re-operation [6]. In general, the X-rays of the lumbar spine were reviewed on the one month and three months after the surgery and three-dimensional CT reconstruction of the lumbar spine were reviewed on the third month from which the cage location and fusion condition could be clearly observed. It is no late to for the patients with significant cage displacement and subsidence to be accepted posterior spinal decompression and pedicle screw fixation during the follow-up in the second stage.

In this case, the patient was a 63-year-old man with normal bone mineral density and no significant instability of the lumbar spine. He didn't receive posterior minimally invasive percutaneous pedicle screw fixation in the first operation. The patient did not follow the doctor's instructions after surgery and had a large amount of early activity. The migration of the cage occurred caused by the inappropriate movement. The symptoms were completely alleviated after the surgery of the posterior laminectomy and pedicle screw fixation. Similarly, Behrbalk's study revealed that higher subsidence

occurred in overweight patients who undergo stand-alone ALIF and suggested that posterior stabilization should be considered for these cases [7].

## Conclusion

As a new technique with shorter operative time and decreased intraoperative blood loss, the stand-alone OLIF surgery could have reliable clinical efficacy as long as the carefully selected patients reduce the amount of activity in the early postoperative period and exercise under the protection of the waist instead of the second-stage decompression and fixation.

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