

Delayed cage retropulsion 15 years after posterior lumbar interbody fusion: a case report

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ABSTRACT

Cage retropulsion is a rare complication of lumbar interbody fusion and is typically reported in the early postoperative period. We present a case of delayed symptomatic cage retropulsion occurring 15 years after posterior lumbar interbody fusion (PLIF). The patient presented with progressive low back pain and radicular symptoms. Radiological evaluation demonstrated posterior migration of the intervertebral cage at the operated level. There was no history of early postoperative complications. Delayed retropulsion was considered to be related to long-term biomechanical changes and progressive loss of bone mineral density. This case emphasizes that cage retropulsion may occur many years after PLIF and should be considered in patients with late-onset symptoms following lumbar fusion surgery.

Keywords: Spinal fusion, posterior lumbar interbody fusion, tomography, X-Ray computed, retropulsion

INTRODUCTION

Posterior lumbar interbody fusion (PLIF) is a surgical technique in which a cage is inserted into the intervertebral space via a posterior approach. The procedure is designed to address segmental instability, restore disc height and foraminal dimensions, and achieve solid spinal fusion. Indications include degenerative disc disease, spondylolisthesis, recurrent disc herniation with associated instability, spinal stenosis with instability, traumatic disc injury, and stabilization following infection or tumor resection. PLIF is generally contraindicated in patients with severe osteoporosis or in cases requiring anterior column support due to significant spinal deformity.^{1,2}

PLIF offers several advantages, including increased foraminal height, improved mechanical stability, and the ability to achieve posterior decompression and fusion in a single surgical procedure. However, it is associated with potential complications such as dural injury, nerve root traction, epidural fibrosis, and cage retropulsion, particularly in patients with osteoporosis. Although PLIF aims to promote spinal fusion, the cage may become displaced for various reasons, especially during the early postoperative period. Such displacement can lead to a range of clinical symptoms and complications.³⁻⁵

This case report aims to describe a patient in whom the interbody fusion cage completely migrated posteriorly following a PLIF procedure performed approximately 15 years ago.

CASE

A 68-year-old female patient presented with progressively worsening severe low back and bilateral leg pain, numbness, difficulty walking more than 50 meters, and difficulty standing, with a duration of four months. She had not benefited from conservative managements. Her medical history revealed that she had undergone decompression and stabilization surgery for lumbar spinal stenosis approximately 15 years earlier. There was no history of trauma, such as a fall, and she had no sphincter dysfunction. Her medical history was notable for coronary artery bypass surgery three years ago, hysterectomy and cholecystectomy approximately 20 years ago, and surgical fixation of a right femur fracture three years ago. She also had a history of hypertension and goiter. Neurological examination revealed positive straight leg raise, Laseque, and femoral stretch tests. Sensory, motor, and reflex examinations were normal.

Due to the presence of spinal instrumentation in the patient, plain radiographs and computed tomography examinations of lumbar spine were performed. These studies demonstrated complete displacement of the PLIF material from its original position (**Figure 1, 2**). Magnetic resonance imaging did not reveal any additional compressive pathology that could explain the clinical findings, such as adjacent segment disease. The patient was operated on under general anesthesia. Through a left-sided approach, the existing laminectomy defect was enlarged to gain access to the PEEK (polyetheretherketone), non-cutting cage. The cage was

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removed without any complications, such as cerebrospinal fluid leakage or nerve root injury (Figure 3). The patient is being followed up with uneventful clinical outcomes.

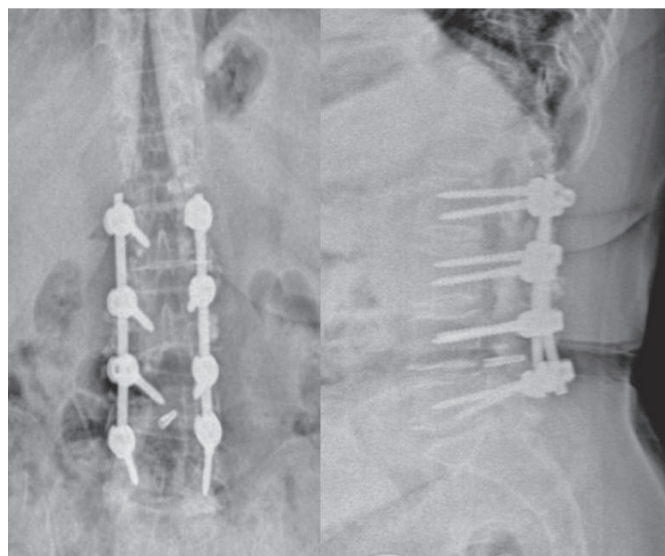


Figure 1. AP and lateral plain X-Ray of lumbar spine showing retropulsion of cage
AP: Anteroposterior



Figure 2. Computed tomography imaging on sagittal and axial planes showing retropulsion of cage

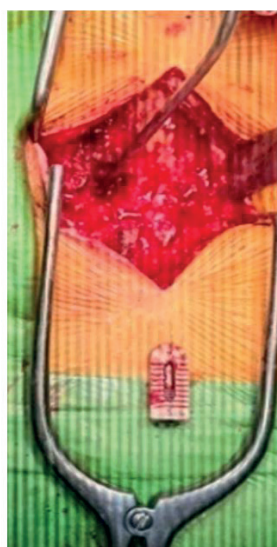


Figure 3. Intraoperative photograph demonstrating the removed interbody cage

DISCUSSION

PLIF has been widely used for many years in the surgical treatment of degenerative lumbar spine diseases. Cage retropulsion is a rare but clinically significant complication of PLIF surgery and most commonly occurs in the early postoperative period. In the literature, the majority of cases have been reported within the first 3-12 months after surgery, and several studies have analyzed risk factors and incidence rates of this complication. For example, large retrospective case series have documented cage retropulsion occurring predominantly in the early postoperative period following PLIF procedures.⁶⁻⁹ This case report is noteworthy because the cage retropulsion became symptomatic 15 years after surgery, highlighting both its rarity and exceptionally late presentation. The exceptionally late onset of symptomatic retropulsion far beyond the typical early postoperative period underscores the need for long-term vigilance in patients with a history of lumbar interbody fusion.

Early-onset cage retropulsion following PLIF is predominantly attributed to inadequate stabilization, end-plate injury, inappropriate cage size or positioning, and osteoporosis. These factors compromise the immediate mechanical environment required for stable interbody fusion and increase the risk of posterior migration of the cage.^{10,11} In contrast, the pathophysiology of late-onset cases is more closely related to gradual biomechanical changes that occur over time. Long-standing pseudoarthrosis, progressive bone resorption, advancing osteoporosis, and adjacent segment degeneration can undermine the initial postoperative stability and create conditions conducive to posterior migration of a cage that was radiographically stable in the early postoperative period. Such chronic alterations may reduce the structural support around the fusion site, facilitating delayed retropulsion.^{12,13}

The symptoms that developed long after surgery in this patient are most likely attributable to progressive loss of bone mineral density and weakening of the contact between the end plates and the cage surface. In particular, posteriorly positioned cages are known to be disadvantaged against long-term axial loading, which may predispose them to migration or retropulsion.^{6,14} These factors may lead to a gradual increase in posteriorly directed forces over time, resulting in late-onset retropulsion.

A review of the existing literature indicates that cases of cage retropulsion following PLIF are predominantly reported in the early or late-early postoperative period, with the reported follow-up duration generally limited to one year. In contrast, our comprehensive literature review did not identify any cases of cage retropulsion occurring beyond one year postoperatively. In this situation, patient gradually develops recurrent low back pain, radiculopathy, or neurological deterioration over time. This clinical pattern highlights the critical importance of maintaining long-term biomechanical stability following spinal fusion surgery.

This presenting case demonstrates that cage retropulsion following PLIF is not solely an early postoperative complication but may also manifest clinically in the very late postoperative period. Taken together, these findings underscore that, particularly in younger patients who undergo spinal surgery and will be exposed to lifelong spinal

loading, preservation of long-term bone health is as critical as the surgical technique itself.

CONCLUSION

As a result, cage retropulsion should be considered in the differential diagnosis when new-onset low back pain or radicular symptoms occur during long-term follow-up after PLIF application, even many years after surgery. This case highlights the clinical relevance of very late postoperative complications and underscores the need for prolonged clinical and radiological surveillance.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

Financial Disclosure

This case report did not receive any financial support.

Author Contributions

Concept: HA; Design: HA, SÖ; Control: HA, SÖ; Resources: HA, SÖ, EA; Materials: HA, EA; Data Collection and/or Processing: HA, SÖ, EA; Analysis and/or Interpretation: HA, SÖ; Literature Review: SÖ, EA; Writing the Article: SÖ, EA; Critical Review: HA, EA.

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We thank the patient for her cooperation and consent to share the clinical details for this report.

Data Availability

All relevant data supporting the findings of this case report are included in the manuscript. Additional data can be made available upon request.

Artificial Intelligence Usage Statement

ChatGPT was used to assist with English language translation.

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