

OssDsign Catalyst® Bone Graft Substitute Achieves Early Complete 360 Degree Healing (XLIF/PLF) in a Smoker with Degenerative Spondylolisthesis

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ARTICLE INFO

Received:  September 30, 2025

Published:  October 10, 2025

Citation: Zain Boghani and SM Czop. OssDsign Catalyst® Bone Graft Substitute Achieves Early Complete 360 Degree Healing (XLIF/PLF) in a Smoker with Degenerative Spondylolisthesis. Biomed J Sci & Tech Res 63(3)-2025. BJSTR. MS.ID.009905.

ABSTRACT

Circumferential fusion can be advantageous for selected patients by enhancing stability and maintaining symptom relief through longer follow-up periods. Recent publications highlighting the use of Catalyst Bone Graft Substitute fusion success in a variety of difficult and challenging patients has led to increased interest among spine surgeons, hospital administrators, and third-party payers. The following case demonstrates that the performance characteristics of Catalyst® (nanoscale surface technology, selective silicate ionic substitution, and dual pathways for endochondral and intramembranous ossification) are particularly advantageous for patients who are at higher risk for fusion failure.

Keywords: Catalyst; Synthetic Bone Graft; Silicate; Calcium Phosphate; Interbody Fusion; Circumferential Fusion; 360-Degree Fusion

Abbreviations: VAS: Visual Analog Scale; XLIF: Extreme Lateral Interbody Fusion; PLF: Posterolateral Fusion; ICBG: Iliac Crest Bone Graft; ODI: Oswestry Disability Index

Introduction

When indicated for the appropriate patient, the addition of posterior fusion to an interbody construct such as XLIF, TLIF, or PLIF, (i.e., circumferential or 360-degree fusion) may offer several advantages to posterior instrumentation alone. [1] These include the opportunity for more robust posterior decompression and enhanced lumbar stabilization. Recent publications have shown reduced compressive stresses on the interbody cage, better maintenance of overall lumbar stability, and increasing symptom relief and maintenance through much longer follow-up periods. [2-4] The use of ICBG and related morbidity has been well documented, and the use of local bone graft alone, obtained through decompression surgery, has been shown to result in lower fusion rates. [5] Patients with one or more risk factors for fusion failure have led spine surgeons to search for alternative bone graft options. [6,7] Recently the 12-month results of the first 108 patients in a multicenter registry using Catalyst® Bone Graft Substitute

(OssDsign Inc, Columbia, MD) have been reported. [8] The publication generated interest among spine surgeons, hospital administrators, and third-party payers due to its “real world” cohort of patients (no restrictive inclusion or exclusion criteria, more reflective of a typical spine surgery practice). The results indicate that the performance characteristics of Catalyst® (nanoscale surface technology, selective silicate ionic substitution, and dual pathways for endochondral and intramembranous ossification) are particularly advantageous for patients who are at higher risk for fusion failure [8-10].

Case Description

The patient was a 54-year-old overweight female (BMI 29.8) presenting with unrelenting back and leg pain (VAS Back-6.6/10, VAS Right Leg-6.5/10, VAS Left Leg-2.5/10, ODI 48% - severe disability) after conservative treatment, including immobilization and bed rest, spinal injections, physical therapy, and anti-inflammatory medications were unsuccessful. The patient had no previous spinal

surgery but did have a history of hypertension, multiple joint disorder, an unspecified immunological disorder, and a history of mental disorder. The patient was a current smoker (cigarettes at 5 per day, number of years not given). Radiographic assessment revealed complete disc height collapse with nerve root compression secondary to degenerative spondylolisthesis at L3-L4 (Figure 1). Based on the spinal pathology and patient risk factors the surgeon determined that both interbody fusion and posterior decompression and fusion would be needed to address the patient's symptoms. After discussing

potential benefits and risks of surgery thoroughly, the patient chose to undergo surgery. The surgery consisted of a L3-L4 XLIF with a titanium cage (ATEC, Carlsbad CA) followed by posterior laminectomy and posterolateral fusion. The interbody cage was filled with 7 ccs of Catalyst Bone Graft with an additional 8 ccs placed in the bilateral gutters posteriorly along with rigid rod and pedicle screw fixation (ATEC, Carlsbad CA). Operative time was 319 minutes. There were no intraoperative or post-operative complications.



Figure 1: Pre-Op X-Rays show degenerative spondylolisthesis with disc height collapse at L3-L4.

At the 3-month follow-up radiographs showed the instrumentation intact and in good position (Figure 2). Clinically the patients' pain symptoms had improved dramatically (VAS Back-1.4/10, VAS Right Leg-0.4/10, VAS Left Leg-0.9/10, ODI -50%) and the patient continued physical therapy. CT scans were obtained at the next follow-up (8.2 months) due to a moderate increase in pain symptoms (VAS Back-6.0/10, VAS Right Leg-7.6/10, VAS Left Leg-1.0/10, ODI-34%) as a result of increased activity and reduction of pain medication however the ODI had improved to moderate disability. The CT

scans exhibited early and complete interbody and posterolateral fusion success (Figure 3). By the 1-year follow-up the symptoms had mostly resolved with minor residual back pain and complete resolution of radicular pain (VAS Back-2.0/10, VAS Right Leg-0/10, VAS Left Leg-0/10, ODI-26%) with a clinically significant improvement of 22 points from pre-op in the ODI. CT Scans taken at 1 year confirm complete fusion in both the interbody and posterolateral constructs seen previously (Figure 4).

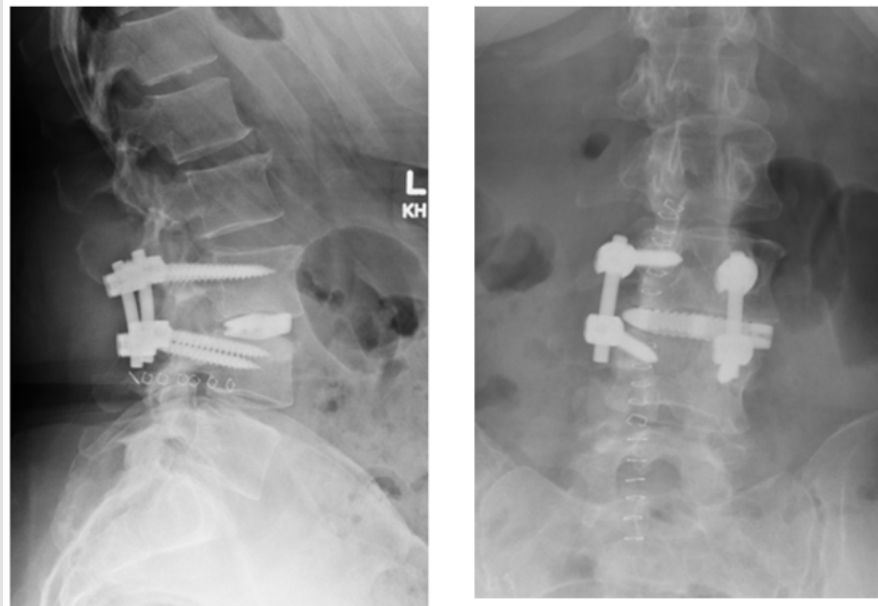


Figure 2: 3-month post-op X-Rays show instrumentation intact and in good position.

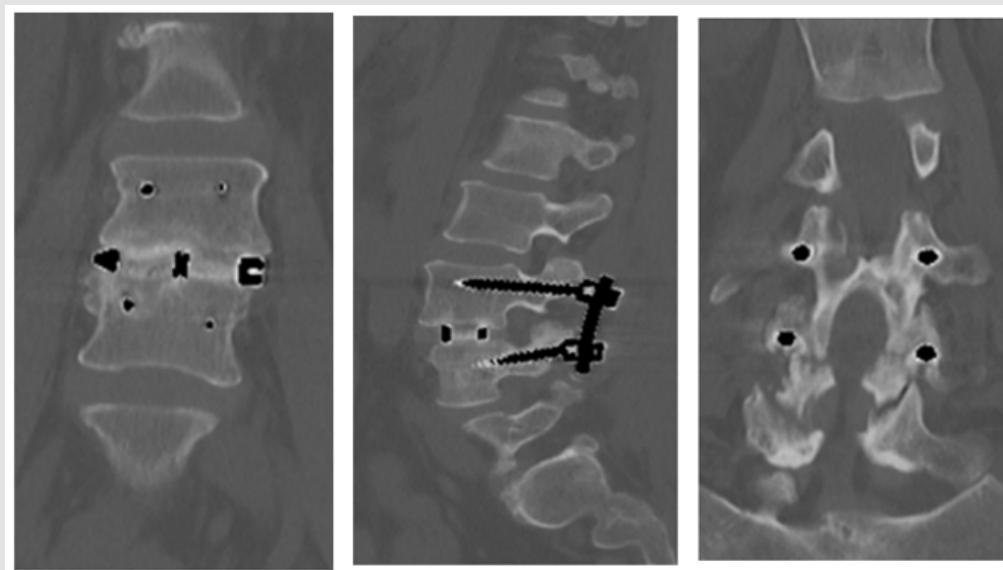


Figure 3: 8-month post-op CT Scans show early interbody and posterolateral fusion success.

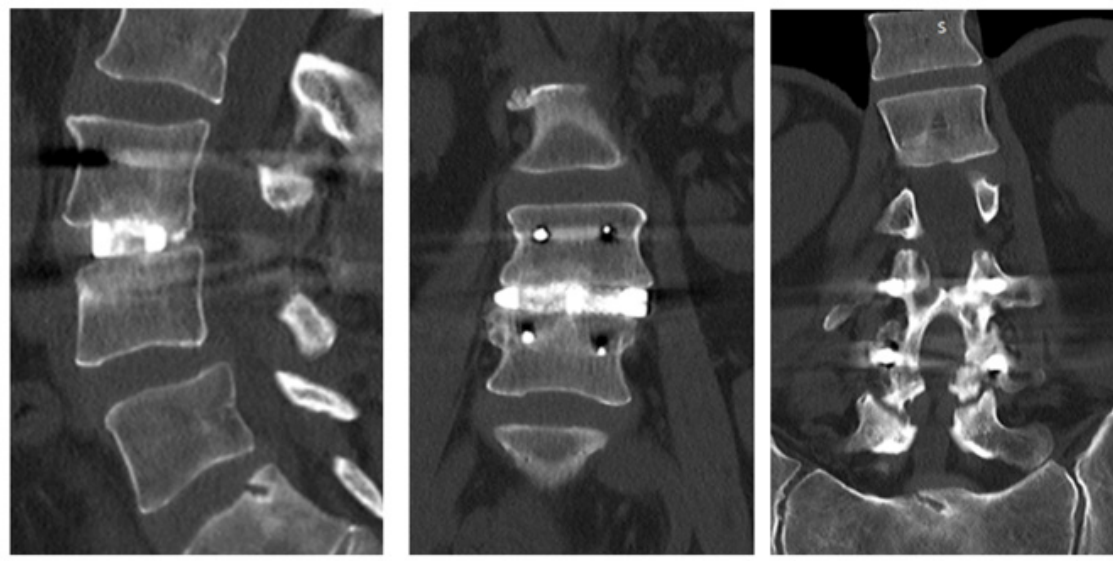


Figure 4: 12-month CT Scans confirm complete interbody and posterolateral fusion.

Discussion

The bone graft used for this case (Catalyst) was selected based on its handling and performance characteristics in a wide range of patients, most of which had multiple risk factors for failure. [11-13] Of particular interest with this case was fusion success in both the interbody and posterolateral constructs at 8 months in an active smoker, demonstrating rapid bone formation consistent with the dual pathways of both endochondral and intramembranous ossification. [9,10] This supports the versatility of Catalyst Bone Graft as an effective bone graft substitute in challenging patients. The combination of surgeon skill and experience in selecting the most appropriate and effective surgical procedures and adjuncts, including the choice of bone graft, resulted in a positive clinical outcome in this patient.

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ISSN: 2574-1241

DOI: [10.26717/BJSTR.2025.63.009905](https://doi.org/10.26717/BJSTR.2025.63.009905)

SM Czop. Biomed J Sci & Tech Res



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