

**Posterior Lumbar Interbody Fusion with
3D-Navigation Guided Cortical Bone Trajectory
Screws for L4/5 Degenerative
Spondylolisthesis:
1-Year Clinical and Radiographic Outcomes**

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Disclosures

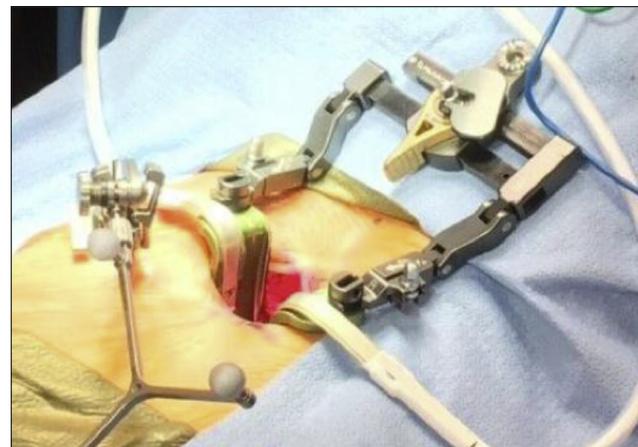
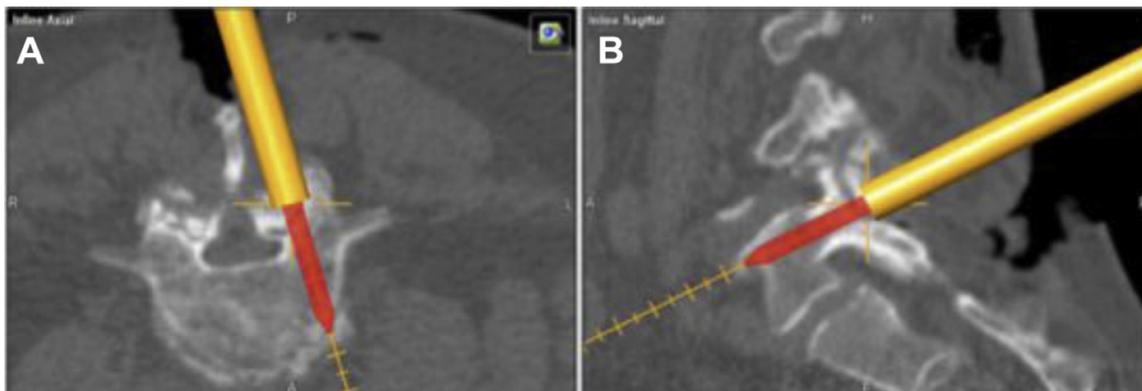
- **Eric Elowitz, MD receives honoraria from NuVasive**
- **All other authors have nothing to disclose**

Introduction

- **Posterior lumbar interbody fusion (PLIF) is a time-tested procedure for degenerative spondylolisthesis, but is associated with significant complications including high blood loss, CSF leak, and neurologic injury.**
- **Cortical bone trajectory (CBT) screws were first described by Santoni et al. in 2009 as an alternative to traditional trajectory pedicle screws and have been shown to have more strength in biomechanical studies than traditional trajectory pedicle screws.**
- **With a more inferomedial entry point and superolateral trajectory, CBT screws require a smaller incision and less tissue dissection to place instrumentation when performed with a modified PLIF (PLIF-CBT). This incorporates bilateral interbody cages which are placed with little to no dural/nerve root retraction.**
- **The objective of the study was to evaluate the clinical and radiographic outcomes of PLIF-CBT for L4/5 degenerative spondylolisthesis at a minimum of 1 year postoperatively.**

Methods

- Series of 18 patients undergoing PLIF-CBT for L4/5 degenerative spondylolisthesis (Grades 1 or 2) using an intraoperative CT (iCT) and 3D navigation guidance was prospectively collected and retrospectively analyzed.
- Pain and disability scores were collected preoperatively and at a minimum of 12 months postoperatively, including back and bilateral leg pain visual analog scores (VAS) and Oswestry Disability Index (ODI) scores.
- Radiographic fusion was assessed as complete, partial, or none based on the presence of bridging bones across the disc space, posterior elements, or both.

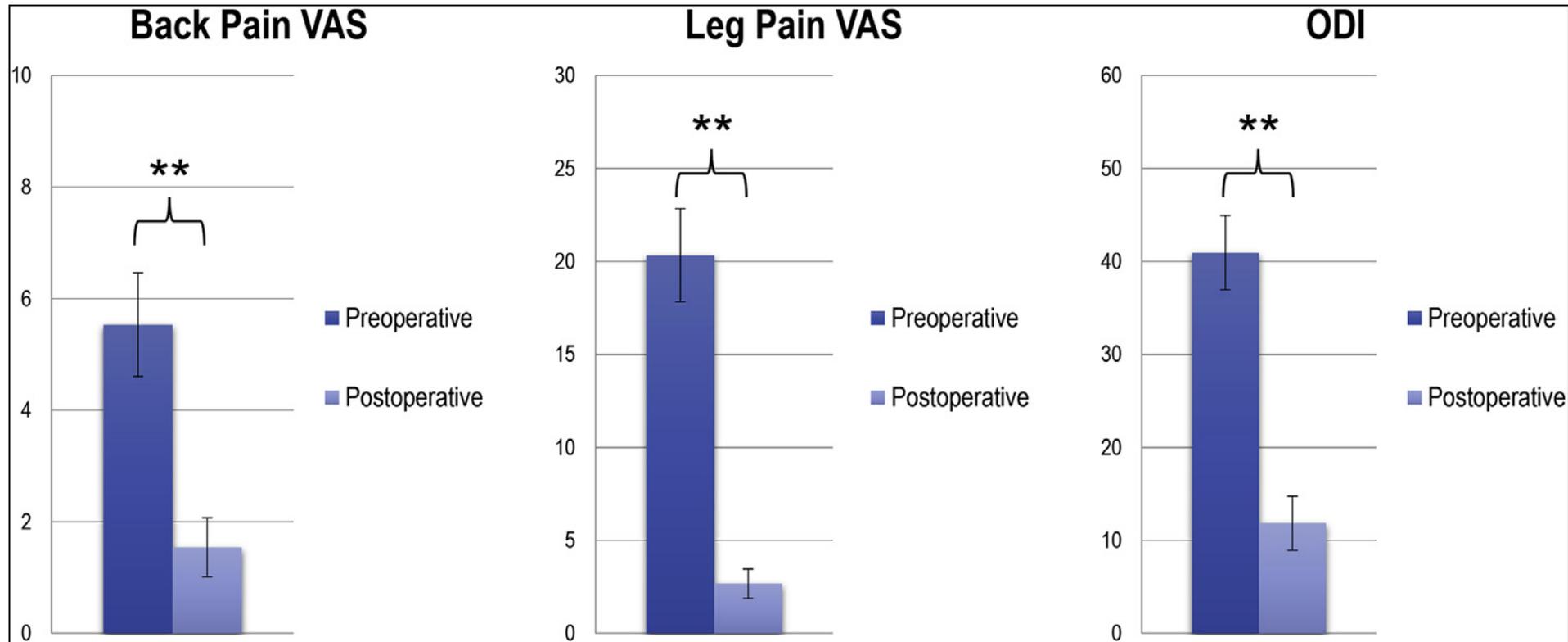


Results

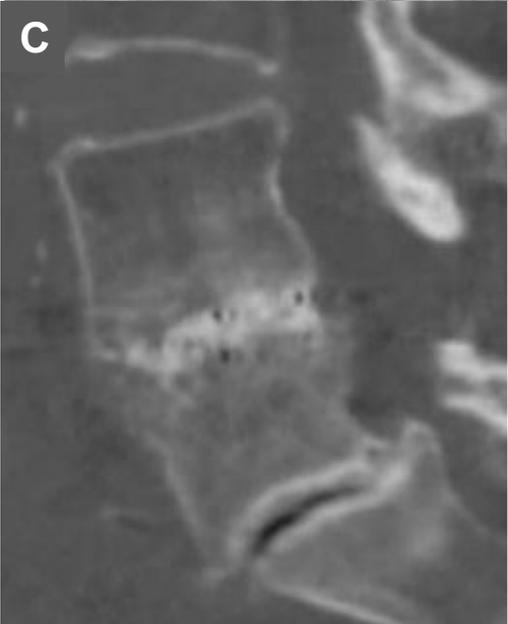
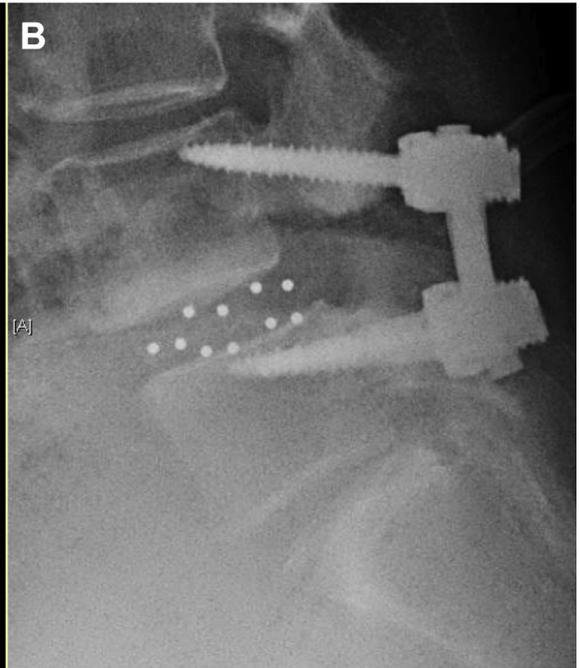
- **13 females, 5 males with an average age and BMI of 67.2 years and 28.9 kg/m², respectively.**
- **Average blood loss and operative time were 161.67 mL and 219.67 minutes, respectively.**
- **No patient required intraoperative or postoperative blood transfusion.**
- **All hardware was in satisfactory position at the conclusion of the case based on iCT imaging.**
- **Average hospital length of stay was 2.4 days.**

Results

- **Patients demonstrated statistically significant reductions in back pain VAS ($P = 0.0025$), leg pain VAS ($P < 0.0001$), and ODI ($P < 0.0001$) at a minimum of 12 months postoperatively.**
- **Radiographic fusion at an average of 14.9 months postoperatively was available for 16/18 patients, with 6 patients demonstrating fusion (4/6 with complete fusion; 2/6 with partial fusion).**
- **There were no instances of intraoperative complications or delayed complications requiring subsequent interventions.**



Mean preoperative and postoperative scores with standard errors bars for back pain visual analog scores (VAS), leg pain VAS, and Oswestry Disability Index (ODI) scores. All differences were statistically significant ().**



**A. Preoperative and
B. postoperative x-rays
after L4/5 posterior
lumbar interbody
fusion with cortical
bone trajectory
screws.**

**C. Sagittal and
D. coronal computed
tomographic images
depicting fusion
across the L4/5 disc
space.**

Discussion

- **Excellent clinical outcomes demonstrate non-inferiority to traditional PLIF, with significantly less blood loss, shorter hospital stay, and comparable operative time.**
- **Clinical outcomes did not correlate with fusion status, which was significantly lower than other PLIF studies but without hardware failure necessitating reoperations.**
- **These findings suggest a longer time frame for follow-up imaging is necessary to determine true fusion ability of this procedure.**
- **iCT with 3D navigation resulted in no misplaced screws requiring reinsertion while significantly reducing radiation exposure to surgeon and staff. However previous studies show that the patient receives 2.7x the radiation exposure.**

Summary

- **PLIF-CBT can be performed in a safe and reproducible fashion with excellent clinical outcomes at 1 year postoperatively.**
- **PLIF-CBT offers several perioperative advantages compared with traditional open PLIF.**
- **Further longer term studies are necessary to demonstrate PLIF-CBT's durability with regard to sustained improvement in clinical pain and radiographic endpoints, including fusion status, pseudarthrosis, and adjacent segment disease.**