

Nanotechnology Enhanced Spinal Fusion Devices for Bone Growth

Case Study – T7-T10 Pathologic Compression Fractures, T5-T12 with Pedicle Screw Fixation

Nanovis' Nano FortiFix Spinal Instrumentation



Surgeon Profile
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Case Highlights

- ✔ T7 & T10 CORPECTOMY
- ✔ PROGRESSIVE KYPHOSIS FROM 57 TO 75 DEGREES
- ✔ -2.4 SPINE BONE DENSITY
- ✔ NANOTECHNOLOGY ENHANCED PEDICLE SCREWS FOR BONE GROWTH

Clinical Presentation

71-year-old female presenting with progressive pain due to nontraumatic osteoporotic compression fractures. She had uptake on the MRI consistent with progressive fractures and was conservatively treated with bracing. Patient's pain became more severe despite conservative treatment, and the patient was unable to ambulate due to pain. Follow-up images showed progression of the deformity and the kyphotic angulation from 57 to 75 degrees over a 3-month timeframe. Conservative treatment included anti-resorptive therapy, pain medication, aquatic therapy, and bracing. Patient was not considered a candidate for injections due to osteoporosis. Due to the progressive loss of height and retraction of bone, kyphoplasty/vertebroplasty was not considered an option.

Pre-op Lateral and A/P X-Rays Noted Compression Fractures & Deformity at T7 & T10



Pre-op Sagittal MRI and Axial MRI Noted Compression Fractures at T7 & T10 with Bony Intrusion Into the Spinal Canal at T10



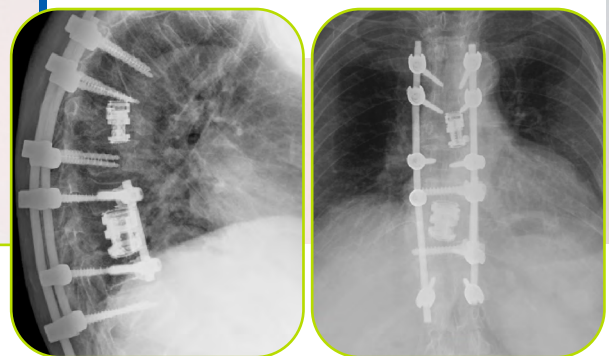
Surgical Procedure

After discussion of potential risk and benefits of the surgery, the patient consented to a two-stage procedure. Stage I was completed with a lateral T10 corpectomy consisting of an expandable titanium cage packed with a combination of autograft from the rib harvest and vertebral body removal. A small amount of Infuse was placed within the interbody cage with the autograft, along with lateral fixation.

Stage II occurred two days later with a posterior approach consisting of a costotransversectomy and transpedicular corpectomy followed by an expandable cage. The left T7 nerve root was sacrificed to make room for the cage.

Due to the overall poor bone quality, I elected to use nanotechnology enhanced pedicle screws via fixation from T5-T12. Navigation was utilized for pedicle screw placement as well as live fluoroscopy.

Post-op Lateral and A/P X-Rays at 6 Months Noted Sagittal Deformity Correction with Proper Screw Placement



Clinical Outcome





Excellent fixation from the pedicle screws along with the restoration of the anterior column contributed to the patient's baseline pain noticeably improved by the one-month follow-up. By month three, the patient was active in physical therapy and her pain was completely resolved. At the 6-month and one year follow-up, the patient was back to normal activity with hiking, walking, and working full-time.

Discussion

"I have been using Nanovis' nanotechnology enhanced cervical cages for several years. I have seen superior outcomes with the nano enhanced interbody cages with adherence of the bone generally within one month. In comparison to traditional PEEK cages, I see a definite improvement in the cages bonding into the bony endplates. I have not had to perform an additional fusion or revision on an anterior cervical since the introduction of Nanovis' nanotechnology enhanced cages.

In this case, I believe the nanotechnology enhanced pedicle screws assisted with early bone ongrowth, which in turn improved healing and stronger fixation. I preferred the nano enhanced pedicle screws over fenestrated screws with methyl methacrylate due to the significant hardening of the vertebral bodies with PMMA and risk of adjacent segment fracture. The Nanovis FortiFix pedicle screws functioned flawlessly, and I am very pleased with the outcome in this patient."

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