Fusion of L4–5 and/or L5–S1 is becoming more common as a treatment for spinal instability and low-back pain, particularly with the use of newer less-invasive surgical techniques. Many forms of spinal fusion have been described for the alleviation of lumbosacral pain and other symptoms of instability, and for many years these procedures were done exclusively using open anterior or posterior approaches. Compared with less-invasive approaches, however, open approaches have the potential to cause more muscular, neural, vascular, and visceral injury.10,11

To decrease the risks of open surgical techniques for spinal fusion, a push has been made toward minimally invasive approaches. One notable alternative is the axial lumbar interbody fusion technique described in 2004 by Cragg et al.4 The TranS1 corporation developed the AxiaLIF system as a percutaneous paracoccygeal approach to the sacrum through the presacral space to place a single transsacral rod fixation for either a single-level (L5–S1) or double-level (L4–S1) fusion. This approach has been proposed to potentially decrease complications from open anterior and posterior surgery.2,7,8,12 The AxiaLIF procedure has been proposed as an alternative fusion technique for discogenic pathology from the L4–S1 levels.

Biomechanical studies of the single- and 2-level AxiaLIF systems have shown that the stand-alone transsacral rod significantly reduces range of motion and achieves indirect decompression of the disc spaces.1,6 However, both studies also showed that additional posterior fixation, such as facet screws or pedicle screws, is required to achieve better construct stability for successful fusion. Most surgeons opt to simultaneously place posterior facet or pedicle screws due to the potential for higher stability of the fusion.2

Rectocutaneous fistula and nonunion after TranS1 axial lumbar interbody fusion L5–S1 fixation

Case report

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The authors report a case of rectal injury, rectocutaneous fistula, and pseudarthrosis after a TranS1 axial lumbar interbody fusion (AxiaLIF) L5–S1 fixation. The TranS1 AxiaLIF procedure is a percutaneous minimally invasive approach to transsacral fusion of the L4–S1 vertebral levels. It is gaining popularity due to the ease of access to the sacrum through the presacral space, which is relatively free from intraabdominal and neurovascular structures.

This 35-year-old man had undergone the procedure for the treatment of degenerative disc disease. The patient subsequently presented with fever, syncope, and foul-smelling gas and bloody drainage from the surgical site. A CT fistulogram and flexible sigmoidoscopy showed evidence of rectocutaneous fistula, which was managed with intravenous antibiotic therapy and bowel rest with total parenteral nutrition. Subsequent studies performed 6 months postoperatively revealed evidence of pseudarthrosis. The patient’s rectocutaneous fistula symptoms gradually subsided, but his preoperative back pain recurred prompting a revision of his L5–S1 spinal fusion.

KEY WORDS • minimally invasive surgery • axial lumbar interbody fusion • rectocutaneous fistula • pseudarthrosis

Abbreviations used in this paper: IV = intravenous; TPN = total parenteral nutrition.

This article contains some figures that are displayed in color online but in black-and-white in the print edition.
A review of the literature has revealed only one case report of a serious complication that occurred after placement of the TranS1 AxiaLIF system, consisting of a high rectal injury.3 Here we report a case of rectocutaneous fistula and pseudarthrosis after TranS1 percutaneous axial lumbar interbody fusion of the L5–S1 segments, and discuss our medical and operative management of this complication.

Case Report

This 35-year-old obese male patient with no other significant medical history underwent a transsacral S-1 screw approach to axial lumbar interbody fusion (AxiaLIF, TranS1) at L5–S1 from a pericoccygeal retrosacral space approach, as well as having bilateral L5–S1 facet screws placed, in November 2008. The procedure was performed for degenerative disc disease and back pain at another institution. The patient worked as a technician at a warehouse, where he did heavy lifting. He denied tobacco, alcohol, and illicit drug use. According to the patient no intraoperative complications were noted, but we did not have access to the original operative report.

At his first postoperative checkup, the patient complained of intermittent episodes of bleeding from his parasacral incision. He was treated with a 4-week course of oral antibiotic therapy, and the issue resolved. Approximately 2.5 months postoperatively the patient noted another episode of significant bleeding along with gaseous discharge from his wound, and was again treated with oral antibiotic therapy, this time for 2 weeks. Again the bleeding resolved and the skin healed. At 4 months postoperatively, the patient became febrile (temperature up to 102°F) and had a syncopal episode, after which he presented to the emergency department at our institution.

The patient's workup included a CT fistulagram and flexible sigmoidoscopy, which showed a rectal cutaneous fistula and small internal hemorrhoids (Figs. 1 and 2A). Laboratory studies revealed a white blood cell count of 15,500 cells per µL, a C-reactive protein level of 152.0 mg/L, and erythrocyte sedimentation rate of 43 mm/hr. Blood cultures were positive for Enterococcus faecalis, and members of the infectious disease and general surgery services were consulted. Treatment was initiated with IV vancomycin and Zosyn (piperacillin and tazobactam). The CT fistulagram showed a small amount of lucency around the entry site of the transsacral screw, without lucency within the L-5 vertebral body. Many treatment options were discussed at this point, including removal of hardware, but due to the increased risk of sigmoid/rectal injury from redissection in this area, it was thought best to attempt treatment of the infection with nonoperative measures first. The patient continued to have 5/5 strength in both lower extremities and intact sensation throughout his ordeal. After stabilization, the patient had a peripherally inserted central catheter (PICC) placed and was discharged home on a regimen of Ertapenem (1 g IV daily for weeks) followed by Augmentin (500/125 mg orally 2 times daily for 1 year) as recommended by the infectious disease service due to the presence of retained hardware. He was also kept on a clear liquid diet and TPN cycled 12 hours per day, which he continued at home for a total of 6 weeks.

Within 4–6 weeks, his rectocutaneous fistula and infections had clinically resolved, but he was left with a moderate amount of back pain, which he described as equal to his state prior to surgery. He attempted to return to work after 6 weeks of TPN but was unable to continue after 2 months due to the pain, which he described as 4/10 in the morning and 9/10 at the end of his work day. A CT scan showed no evidence of disc endplate lysis or degeneration. The fusion did not appear to have any interbody growth. There was some lysis noted around the helical screw (Fig. 2B). Posterior facet screws showed some evidence of loosening. At this time, the patient had been treated with Augmentin for 3 months. He denied neurological deficits.
Rectocutaneous fistula and nonunion after AxiaLIF

Recent MRI showed fluid in the disc space (Fig. 2C); a bone scan showed no significant uptake; and the erythrocyte sedimentation rate, C-reactive protein level, and white blood cell count were near normal. The decision was made to proceed with a revision fusion.

The patient underwent revision surgery 9 months after his original AxiaLIF procedure. The decision was made preoperatively not to remove the TranS1 screw due to the risk of redevelopment of a rectocutaneous fistula associated with dissecting through the significant scar tissue. The patient and the consulting general surgery and infectious disease teams were in agreement with this plan. The revision procedure comprised L5–S1 posterolateral fusion with pedicle screw instrumentation, transformaminal lumbar interbody fusion with a polyetheretherketone cage, local bone graft, bone morphogenetic protein (Infuse, Medtronic), and demineralized bone matrix. A disc space biopsy and culture were also performed and showed no aerobic or anaerobic growth.

The patient tolerated this procedure well and was discharged home. Intravenous antibiotic therapy was continued for 1 month after discharge and was followed by 1 year of oral suppression therapy, as managed by infectious disease specialists. A CT scan obtained 10 months postoperatively (Figs. 3A–C) showed solid interbody and posterolateral fusion without any evidence of osteolysis.

The patient had a brief recurrence of back pain, and an MRI study of his lumbar spine was ordered by his primary care provider 20 months after his last surgery (Fig. 3D). The study showed no adjacent-level changes, no evidence of residual infection, and no central canal stenosis, and the patient’s back pain subsequently resolved spontaneously.

Discussion

Axial lumbar interbody fusion is a relatively new procedure, described for the first time in the literature by Cragg et al. in 2004. It is gaining popularity among spine surgeons due to its minimally invasive approach, decreased mean operative time and hospital stay, and satisfactory radiographic fusion rates. However, there are no long-term outcome results. To our knowledge, there is only one reported case of a severe complication during an AxiaLIF procedure. This complication was a high rectal perforation in a patient with history of diverticulitis and pelvic inflammatory disease. It was successfully treated with IV antibiotic therapy and a diverting ileostomy, which was reversed after 5 months. The spine implants were left in place. Here, we report a case of rectocutaneous fistula and pseudarthrosis after AxiaLIF of the L5–S1 segment.

Our patient had no intraabdominal risk factors for the approach. He had no past medical or surgical history suggestive of adhesions or scar tissue in either his abdominal or presacral space, which could increase the risk for colon injury. Moreover, he had no anatomical variants, such as an abnormal curved sacrum. Magnetic resonance imaging topography of the pelvis has shown significantly larger width of the presacral space in males than in females, and our patient was therefore at a statistically decreased risk of bowel injury.

Given the chronic, insidious nature of this patient’s presentation, we believe that a small injury to the rectum could have occurred intraoperatively, likely due to surgical technique. The rectocutaneous fistula tract then formed slowly over the ensuing weeks. It is surmised that the chronic infection and surrounding inflammation contributed to the pseudarthrosis. A high suspicion for rectal/visceral injury should be considered in any wound drainage or bleeding after an AxiaLIF procedure. Early diagnosis and treatment could potentially avert serious sequelae.

Pseudarthrosis is a known complication of all spinal fusion techniques. In the case of the AxiaLIF system, the TranS1 corporation has no specific recommendations for management of pseudarthrosis in the presence of infection. We believed that removal of the axial fixation rod through the same paracoccygeal presacral corridor was ill advised due to the likely scarring of the presacral space. DeVine et al. suggested an anterior paramedian approach for removal of the AxiaLIF system; however, as this patient was obese and had a nearby rectocutaneous fistula, and we anticipated a lot of scar tissue regardless of approach, we elected to leave the axial fixation rod in place. We performed instead a posterolateral and transformaminal lumbar interbody fusion of L5–S1 and treated the patient with long-term antibiotic suppression therapy. Should this have failed, the TranS1 screw would have had to be removed via an anterior approach to the retroperitoneal space with partial corpectomy, utilizing a bone window technique to cut a trough through the L5–S1 vertebral bodies in order to gain access to the implanted hardware.

In summary, we present a new complication with a
new technique that many spinal surgeons may not have encountered in the past, but are likely to see in the future. Accurate evaluation and a high and early index of suspicion for bowel injury is an important teaching point. We recommend high vigilance for this devastating complication with bowel rest and a multidisciplinary approach, including immediate consultations with general surgeons and infectious disease specialists.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Patel. Acquisition of data: all authors. Analysis and interpretation of data: all authors. Drafting the article: all authors. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Siegel. Study supervision: Patel.

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