



Use of the ProAxis® Surgical Table in Spine Surgery

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Intraoperative patient positioning can profoundly influence surgical outcomes

It is important, therefore, to provide surgeons with the ability to manipulate patient positioning during spinal surgery. Recently, patients undergoing surgery on the spine have been placed on a radiolucent frame, with the abdomen hanging free, but this has proven less than ideal. This static position may, in fact, hinder the surgeon's ability to effectively assess adequate neurologic decompression and may not sufficiently facilitate the preservation of lordosis, or the correction of sagittal deformity. A novel surgical table (ProAxis, Mizuho OSI®, Union City, CA) has been introduced to address these shortcomings.

Because sagittal balance is the most important predictor of patient satisfaction and favorable clinical outcome in spinal deformity surgery,¹⁻⁸ a surgeon's ability to properly position a patient intraoperatively may allow for greater long-term results.

Increasing Patient Satisfaction

It is not unusual to find that fixed sagittal imbalance or an inability to stand upright is due, in part, to an iatrogenic cause.⁹⁻¹¹ Oftentimes, inadequately lordotic prior fusions, each just a little bit less than ideal, cumulatively result in a long, hypo-lordotic fusion, and sagittal imbalance.

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Correcting significant sagittal imbalance often consists of spinal surgeries of varying degree and complexity.¹² These can be long and complex operations with considerable associated cost and risk. With the use of the ProAxis Surgical Table, however, it may well be possible to decrease the need for these invasive and aggressive operations by improving the alignment obtained at the time of initial, more limited procedures. This would allow for improved patient outcomes and satisfaction.

Because of the fact that even one and two level fusions may be technically demanding and the fact that patient bone quality and body habitus may make lordosis difficult to improve and to assess intraoperatively, an increased ability to manipulate patient positioning during surgery is required.

The ProAxis Surgical Table is a microprocessor-controlled, radiolucent platform that hinges in the middle. Instead of being static, this table allows for up to 20 degrees of flexion or extension to be applied during surgical procedures. The abdomen still hangs free, but there are multiple options to support and suspend the patient’s head and neck, as well as to position a patient’s arms and legs.

Benefits of ProAxis Table: Extension

Several case studies have proven the effectiveness of the ProAxis Surgical Table. One such case involved a 59-year old male with pseudoclaudication that had been slowly worsening over 18 months. He had participated in physical therapy and undergone several epidural injections, but showed no significant improvement. He had two MRI’s approximately 24 months apart, showing worsening stenosis from L2-L4. He underwent spinal surgery and after initially confirming the appropriate decompression, the ProAxis table was extended 20 degrees (Figure 1a, b), and the decompression was re-assessed. The re-assessment showed inadequacies in the first assessment and the proper revisions were made.

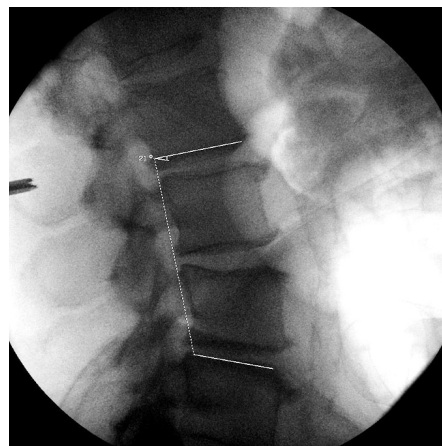
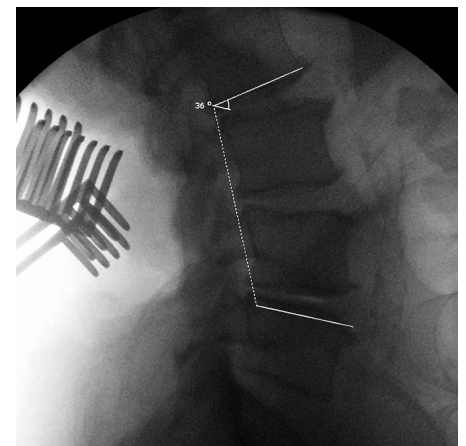


Figure 1A. Lateral fluoroscopic view for localization (a) with Kocher clamp on the spinous process of L2.



1B. Post-decompression and extension of ProAxis table. Note the increase in lordosis from 21deg to 36 deg, which demonstrated the need for additional decompression.

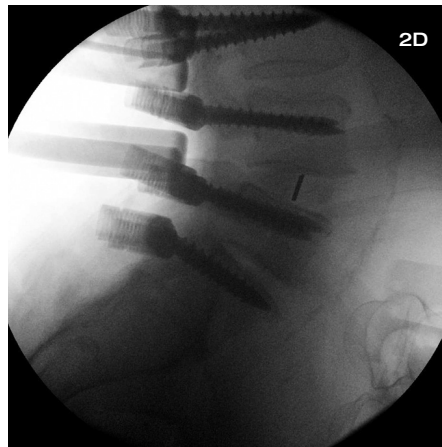
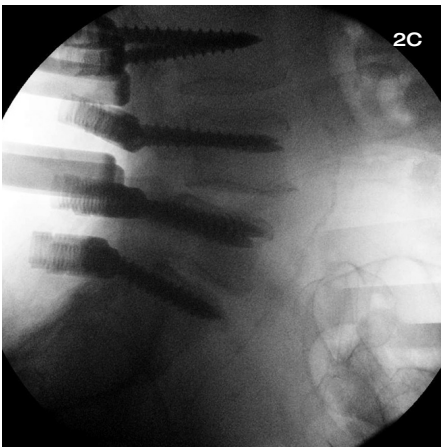


Figure 2A. Weight-bearing lateral X-ray demonstrating an iatrogenic pars defect and spondylolisthesis.

2B. Lateral X-ray, prone, on ProAxis table, in neutral position. Note the posterior endplate contact at L4/5, and the tall disc space.

2C. Lateral fluoroscopic view after screw placement, with the ProAxis table in 15deg of flexion. The L4/5 spondylolisthesis has reduced, and the end-plates are no longer in contact.

2D. An appropriately sized interbody cage was placed without excessive root retraction or bone resection.

Benefits of ProAxis Table: Patient Manipulation

A 75-year old male underwent L4 and L5 laminectomies several years prior to presentation and stated that he initially had relief. Over the past three years, however, he had developed worsening back (Figure 2) and bilateral leg pain and he had trouble standing upright. He underwent a transforaminal lumbar interbody and posterolateral fusion of L4-S1. At the time of surgery, the posterior-inferior endplate of L4 was in contact with the superior endplate of L5 and in combination with a tall disc height anteriorly, it would normally be very difficult to place a cage of adequate height without excessive bony resection. The ProAxis table, however, allowed for patient manipulation and easy access for disc space preparation and cage replacement without significant nerve damage and bone removal. The patient had prompt and dramatic relief of leg pain and recovered normal strength and gait.

Benefits of ProAxis Table: Rod Contouring

Ten years after an L4-S1 fusion, a 58-year old woman developed stenosis and was having difficulty standing upright. She explained that she felt as if she was “tilting over.” Standing X-rays (Figure 3 on next page) revealed an 8.5cm sagittal imbalance and although preoperative X-rays on the ProAxis table in neutral position revealed improved lordosis, a 6.7cm sagittal imbalance remained. Interbody fusions were performed and the table was extended 20 degrees. The rods were contoured to the position on the screws and the result was that the reduction screws that were placed in anticipation of needing additional correction were unnecessary. In fact, the rods were bent into kyphosis to help prevent the risk of a junctional problem and rod contouring was not needed to affect the correction. This minimized the force on the construct and the screw-bone interface and her correction remains excellent even 16 months later (Figure 3d).

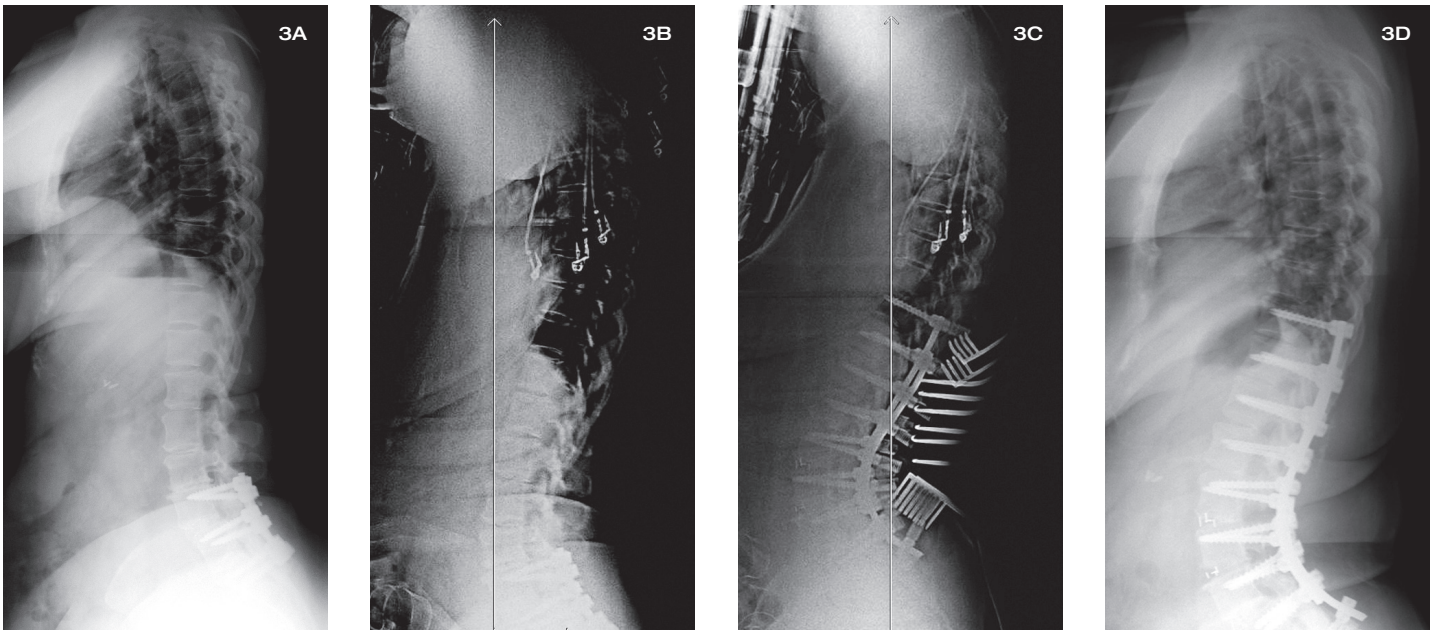


Figure 3A. Preoperative weight bearing lateral X-ray demonstrating a solid arthrodesis from L4-S1, with an 8.5 cm sagittal imbalance.

3B. Post-positioning, preoperative lateral X-ray on the ProAxis table. In spite of improved lordosis, a 6.7 cm sagittal imbalance remains.

3C. Intraoperative lateral X-ray after ProAxis extension, demonstrating ideal sagittal balance.

3D. At 16 month follow up, correction remains excellent.

Conclusions

Benefits of the ProAxis Surgical Table in spinal surgery include better spinal extension and intraoperative patient manipulation, allowing surgeons to position patients in less static, more dynamic ways. Based on the above findings, the ProAxis Surgical Table will improve surgical outcomes and improve long-term patient satisfaction while allowing for less demanding and potentially damaging iatrogenic effects.

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