BECKER'S
SPINE REVIEW

How active hinge tables can lead to better spine surgery outcomes

Spine surgery is a daunting responsibility. With a patient's nervous system at risk in an operating room, it's essential to fill the operating room with superior equipment that complements the surgeon and patient. However, the equipment is not limited to forceps and scalpels or osteotomy techniques. Spine surgeons may also benefit from utilizing advanced operating tables like the ProAxis® Spinal Surgery Table.

Mizuho OSI officially launched its ProAxis Spinal Surgery Table in July 2013. The table features software-controlled, hinge technology designed to support the biomechanical aspects of spinal and imaging procedures. With hinge technology, the ProAxis table supports instantaneous vertebral axis of rotation with coordinated patient translation.

Surgeons can adjust the table to their desired degree of flexion and extension, providing direct visualization of intraoperative changes in vertebral alignment. Mizuho OSI developed the table to facilitate spinal canal decompressions and controlled closure for lumbar osteotomies as well as various minimally invasive surgeries.

Before launching its most advanced surgical table, spine surgeons were accustomed to Mizuho OSI's Spinal Surgery Top and Radiolucent Imaging Top, which were part of the company's original Modular Table System (MTS). The table system was designed for anterior and posterior fusions, surgical correction procedures and decompressions, among other procedures.

"The MTS became widely used in the 1990s and was very early on regarded as the standard for the operating room," said Brett Babat, MD, a spine surgeon with Nashville (Tenn.) Neurosurgery Associates. "The first generation of the active hinge tables was cumbersome and a little unpredictable, but as technology has evolved to the ProAxis Table, I see hinge tables in more facilities. Additionally, facilities have adopted more than one of these tables because it is becoming the new standard of care." Mizuho designed its ProAxis Table to provide an advanced positioning platform that supports a variety of procedures, including pedicle subtraction osteotomies, spinal fusions, and motion preservation surgery.

Why patient positioning is important

When performing lumbar spinal fusions, spine surgeons are focused on optimizing and maximizing safe neural decompression in positions with correct lordosis. With a traditional prone table, surgeons have a limited range within which to adjust the degree of lumbar lordosis. On other standard tables, surgeons are challenged with the force required to achieve lordosis.

However, surgeons have a new option: tables that promote dynamic patient positioning. "One of the advantages of having active assistance from the table is I can start the patient in a less lordotic position, which makes the beginning of a decompression safer because there is more space for the neural elements," Dr. Babat said. "Then as the decompression progresses, I can increase the lordosis to where I want the patient to be, and the position the patient will most likely be in when he or she is upright. As we increase the lordosis, I can also track and see if there is stenosis occurring because of the repositioning."

Patients in less lordotic positions show fewer impacted nerves; however, there are still areas where neurological nerves are present. Using tables that allow for active patient movement intraoperatively enable surgeons to identify nerves when a patient is in more lordotic positions. The ProAxis Table allows spine surgeons to remove bone, perform the decompression, place instrumentation and then use the table along with gravity to change the position of the patient's spine, requiring less force on the bone screw interface.

"Having a table like the ProAxis allows surgeons to adjust lumbar lordosis intraoperatively based on what a surgeon sees," said Dr. Babat. "It also allows surgeons to maximize lumbar lordosis in fusion cases where it's even more important because surgeons are establishing a more permanent position in the lumbar spine. If surgeons don't get accurate lordosis, they are setting the patient up for long-term pain and multiple additional operations."

How active patient position yields long-term success

As active hinge tables help surgeons achieve the appropriate lordosis, the table also assists with osteotomy closure. Tables that allow for movement can be used for cases ranging from discectomies to lumbar reconstruction procedures. By using a table that moves throughout the procedure, surgeons can achieve appropriate spinal alignment with less effort.

The ProAxis Table accommodates for all lordotic positions, allowing the surgeon to use the table as an additional tool in achieving the desired outcome. Being able to adjust lordosis allows the surgeon to place the patient in the ideal position for each stage of the procedure.

"When we are doing osteotomies either posterior or three columns, we can start the patient in their natural position using the ProAxis Table," said Dr. Babat. "Once we have performed the procedure, we can use the table itself to aid in the closure of the osteotomy, which decreases the risk of screw cut out. Specifically, in patients with poor bone quality, when you start pulling on the pedicle screws to try to change the position, you put a lot of force on a very small area, and it's not hard to rip the screw through a pedicle and rip the point of fixation. This can also cause acute instability on the operating room table."

By achieving correct lordosis upon the completion of the initial surgery, the need for future revision and reoperation procedures may be reduced. The ProAxis Table is designed to give surgeons advanced conditions and tools in the operating room, which helps decrease the likelihood of having to revisit patients later for additional surgeries.

Designed with the surgeon in mind

The ProAxis table is customizable for the surgeon in addition to the patient. Surgeons can lower or raise the table depending on their height, eliminating the need to stand on stools for certain patients.

"This is important in some of our larger patients where, as a surgeon, we might want to drop the foot of the table quite low for a reverse Trendelenburg," said Dr. Babat. "In larger patients, we also often have to raise the head of the table to the point where the back is higher than we would like. Surgeons then ultimately have to stand on stools. The ProAxis Table allows surgeons to drop the leg position low enough so the surgeon can stand without a stool and comfortably address the lumbar spine."

Surgeons can also develop pain from poor operating table heights and surgical chairs. With proper range of motion, surgeons prevent musculoskeletal injuries and reduce risks during operation. A study in *Allergy & Rhinology* found surgical tables with a range of 63.5 cm to 125.7 cm and surgical stools with a range of 50.8 cm and 72.4 cm provide the greatest versatility for diverse physician height. The ProAxis and other active hinge tables allow surgeons to adjust table height throughout procedures without compromising the desired position.

Surgeons can also retain more control of the patient's vitals. "The ProAxis Table makes patient positioning quick, easy and predictable. With the table, I can make easy adjustments to the operating areas and ensure safe and quick positioning of the upper extremities: arms and neck. The table also provides easy access to the endotracheal tube and easy assessment of pressure on the eyes."

An active hinge table provides surgeons with ideal conditions to achieve sagittal alignment and reduce potentially damaging iatrogenic effects. The ProAxis Table combines its advanced performance features with the familiarity of the traditional open frame. "It's a table that is similar enough to a standard table that many surgeons will intuitively know how to use and position without having to relearn," said Dr. Babat. "Yet, the table also allows for more sophisticated and advanced options that an active hinge table provides."

Conclusion

By using a table that puts dynamic and precise positioning control in the surgeon's hands, patients can benefit from improved long-term results and satisfaction. Immersed in continuous innovation, Mizuho OSI designed the ProAxis table with both the surgeon and patient in mind. The company's desire to eliminate the need for revision operations helped create a table that promotes preservation, stabilization and visualization. ■
