A key challenge of any lateral procedure is patient positioning. To place posterior supplemental fixation after the lateral portion of the surgery, the patient must be repositioned from lateral to prone position. Repositioning requires a significant amount of time in the operating room\(^1\), or the operation can be staged across multiple days.\(^2\)

The amount of time needed to reposition a patient, in addition to the cost of re-draping materials, has led to the adoption of single-position spine surgeries where the pedicle screws are placed with the patient in a lateral position which can be ergonomically challenging for the surgeon. One method of easing the ergonomic constraints of inserting pedicle screws in the lateral position is to use a robotic guidance system like the Mazor\™ robotic guidance platform.

<table>
<thead>
<tr>
<th>Number of Screws (Patients)</th>
<th>Robotic Guided</th>
<th>Navigated</th>
<th>P-value (*significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>190 (50)</td>
<td>165 (49)</td>
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A published article by Khan et al, “Comparing Next-Generation Robotic Technology with 3-Dimensional Computed Tomography Navigation Technology for the Insertion of Posterior Pedicle Screws”, found both technologies had high accuracy rates with percutaneous approaches to insert pedicle screws.\(^3\)

In Case One, Dr. Greg Poulter with OrthoIndy in Indianapolis, whose cases are presented in the article, has performed more than 158 spine cases using Mazor\™ robotic guidance and more than 80 single-position surgeries with the system. The cases presented here were performed using the Mazor X Stealth Edition™ robotic guidance platform. Since these cases were performed, the 5.0 software version of the Mazor\™ robotic guidance platform has launched, which has improved clinical efficiency with the introduction of the the Midas Rex\™ Mazor\™ drill that has reduced the potential for skive when placing pedicle screws.

**Case One**

**History and Examination**

A 55-year-old male presented with degenerative disc disease at L5/S1 leading to herniation and radiculopathy; he had significant pain in his left leg for more than one year prior to surgery and was unresponsive to steroid injections. Comorbidities included heart disease and diabetes, leading to an American Society of Anesthesiologists (ASA) score of two. The patient also had mild scoliosis, but because it was asymptomatic in nature, surgical correction was not recommended.

**Surgical Plan**

The primary goal of this procedure was to restore lordosis to the lumbar spine and to decompress the spine anteriorly to achieve 20° of lordosis and provide stability using posterior instrumentation leading to spinal fusion.

**Procedure**

The patient was placed in the right lateral decubitus position throughout the procedure, providing access to both the posterior and anterior portions of the spine. In addition, care was taken to ensure the patient was positioned on the OR table as posterior as possible to provide trajectory access for bilateral screw placement. The Mazor™ robotic guidance platform was used to place four CD Horizon™ Solera™ Voyager™ 5.5/6.0mm Awl Tap Screws (ATS) at L5 and S1 in accordance with the surgical plan. As the patient would remain in the same position for the entire procedure, no flip or re-draping was required, allowing the procedure to continue with minimal disruption. After an access surgeon provided a pathway to the disc space, a discectomy was performed, and a 12° Sovereign™ interbody cage was inserted into the disc space.

**Outcomes**

Total operative time was two hours and 10 minutes. Adequate decompression was achieved during the anterior portion of the case. Dr. Poulter determined all four screws were placed successfully per the operative plan based on a visual comparison of the surgical plan to postoperative images.

**Case Two**

**History and Examination**

The second case involved a 76-year-old male with degenerative disc disease leading to a collapsed disc and radiculopathy at L5/S1; his symptoms presented as a persistent pain in his back that radiated to his legs, leading him to pursue surgical options. The patient had high blood pressure and cholesterol, which in combination with his advanced age, contributed to an ASA score of two. As such, less time under anesthesia was desired.
Surgical Plan

Much like the first case, the primary goal of this procedure was to decompress the nerves surrounding the collapsed disc. The preferred strategy was to decompress the disc space anteriorly, but plans were also made to use the METRx™ system for a posterior decompression if the osteophytes detected preoperatively reduced visibility and an adequate decompression could not be achieved from the front.

Procedure

The patient was positioned similarly to the patient described in the case one, with access confirmed to the oblique corridor and the planned pedicle screw trajectories. The Mazor™ robotic guidance platform was used to place four CD Horizon™ Solera™ Voyager™ ATS screws at L5 and S1 in accordance with the surgical plan.

About Mazor™ Robotic Guidance System

Mazor™ robotic guidance system delivers predictability of planning, precision of robotics-guidance, and the visibility of navigation in open, minimally invasive, or percutaneous procedures. Mazor™ system core technology delivers accurate pedicle screw placement (1.5mm accuracy) and enables a minimally invasive approach to spine surgery, which has well-established benefits including less tissue trauma, blood loss, postoperative pain, and convalescence.3-6

Indications

The Sovereign™ Spinal System is indicated for use with autogenous bone and/or allograft bone graft comprised of cancellous and/or corticocancellous bone graft, and/or de-mineralized allograft bone with bone marrow aspirate in patients with degenerative disc disease (DDD) at one or two contiguous levels from L2 to S1. DDD is defined as discogenic back pain with degeneration of the disc confirmed by history and radiographic studies. Additionally, the Sovereign™ Spinal System is indicated for use in patients diagnosed with degenerative conditions as an adjunct to fusion. These patients should be skeletally mature and have had 6 months of non-operative treatment. The Sovereign™ Spinal System is intended to be used with autogenous bone and/or allograft bone graft comprised of cancellous and/or corticocancellous bone graft, and/or de-mineralized allograft bone with bone marrow aspirate. These implants may be implanted via a variety of open or minimally invasive approaches. These approaches include anterior and oblique. The Sovereign™ Spinal System may be used as a stand-alone device or in conjunction with supplemental fixation. When used as a stand-alone device, the Sovereign™ Spinal System is intended to be used with 3 titanium alloy fixed or variable angle screws. The accompanying cover plate MUST be used anytime the device is used with any number of variable angle screws. If the physician chooses to use less than 3 of the provided screws, a supplemental fixation in the lumbar spine must be used to augment stability. Implants with lordosis angles greater than 18° are intended to be used with supplemental fixation (e.g. facet screws or pedicle fixations).

The CD Horizon™ Spinal System with or without Sextant™ instrumentation is intended for posterior, non-cervical fixation as an adjunct to fusion for the following indications: degenerative disc disease (DDD - defined as back pain of discogenic origin with degeneration of the disc confirmed by history and radiographic studies), spondylolisthesis, trauma (i.e. fracture or dislocation), spinal stenosis, curvatures (i.e. scoliosis, kyphosis, or lordosis), tumor, pseudarthrosis, and/or failed previous fusion. For patients diagnosed with degenerative disc disease (DDD), the CD Horizon™ Spinal System is intended to be used for the following indications: degenerative disc disease (DDD) at one or two contiguous levels from L2 to S1 with degeneration of the disc confirmed by history and radiographic studies. Additionally, the Sovereign™ Spinal System is intended to be used with autogenous bone and/or allograft bone graft comprised of cancellous and/or corticocancellous bone graft, and/or de-mineralized allograft bone with bone marrow aspirate. These implants may be implanted via a variety of open or minimally invasive approaches. These approaches include anterior and oblique. The Sovereign™ Spinal System may be used as a stand-alone device or in conjunction with supplemental fixation. When used as a stand-alone device, the Sovereign™ Spinal System is intended to be used with 3 titanium alloy fixed or variable angle screws. The accompanying cover plate MUST be used anytime the device is used with any number of variable angle screws. If the physician chooses to use less than 3 of the provided screws, a supplemental fixation in the lumbar spine must be used to augment stability. Implants with lordosis angles greater than 18° are intended to be used with supplemental fixation (e.g. facet screws or pedicle fixations).

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For access to the patient's slime download, please visit the Medtronic website. For more information on the Mazor™ Robotic Guidance Platform, please refer to the manufacturer's website. For more information on the surgical plan, please refer to the Surveillance System.