Medtronic
Engineering the extraordinary

How Medtronic's AiBLE™ ecosystem delivers personalized spine surgery to surgeons and patients

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What is the AiBLE™ ecosystem?

AiBLE™ is our answer to the challenge of variability in spine surgery, integrating pre-op, intra-op and post-op care, across technology, workflow, and data in the pursuit of better, more personalised & predictable outcomes.

In what ways does AiBLE™ personalize treatment?

AiBLE™ allows us to see the person beyond the procedure. The patient specific plan is the cornerstone to approaching each and every case based on that unique individual.

Powered by data aggregation of thousands of spinal procedures, the process creates an iterative virtuous cycle that improves with each procedure.

What direction is AiBLE™ headed in the future?

We have an obligation to drive healthcare forward. By 2025, 40 billion devices will be connected to the internet, generating data, so a seamless experience is critical in delivering on the demand for more personalized and customized patient experiences.

Our goal is for AiBLE™ to continue to grow, leaning into the incredible advances in AI to improve efficiency and, crucially, repeatability. I believe that the next frontier is convergence – the convergence of human intelligence, machine learning and unlocking the potential of data. Our hope for the future of AiBLE™ is to create a seamless experience from diagnosis, planning, procedure and through to recovery. This is how we will deliver on our promise to connect, predict and advance spine surgery for today and tomorrow.

Dr. Justin Seale specializes in less-invasive spinal surgery utilizing computer navigation and robotic guidance. Dr. Seale developed a comprehensive practice in correcting spinal deformity such as scoliosis and kyphosis. He utilizes patient-specific implants that are created from surgical plans that leverage AI-driven predictive modeling. He also has a passion for revising failed spine surgeries.

Dr. Seale has shared how he uses the AiBLE™ ecosystem today and a case study is included to illustrate how treatment was personalized to his patient.

How are you using AiBLE™ today in your practice?

All adult spinal deformity correction procedures in my practice utilize UNiD™ ASI combined with Mazor™ robotic guidance for preoperative planning and to achieve that planned correction. I began utilizing UNiD™ ASI four years ago and then a year later, I began using Mazor™ robotic guidance. The data I have collected shows that my deformity corrections are accurate using both of these technologies together.

How has AiBLE™ changed your practice?

During my spinal deformity training, I was taught that rod bending and deformity correction was an "art form." Mazor™ robotic guidance and UNiD™ ASI have changed my deformity practice from an art to a science that is precise and reproducible. This gives me the confidence that my patients are receiving customized treatment based on data and carried out with precision.

What specific insights have you learned since using UNiD™ ASI?

Based on my UNiD™ ASI data*, I determined that I was proficient in performing ALIF and OLIF procedures, but that I was not achieving enough lordosis in L5-S1 TLIF procedures. This led me to switch from static cages to expandable cages and I have since achieved lordosis correction objectives, thus improving outcomes for my patients.

*Advanced post-operative analysis is only available after a certain threshold of completed cases with longitudinal data is uploaded to UNiD™ Hub.

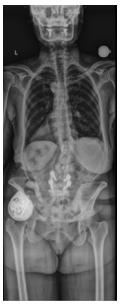
Learn more at:
medtronic.com/aible

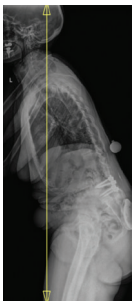
AiBLE™ to do more

Case study

The case presented here demonstrates how Dr. Seale uses solutions from the AiBLE™ ecosystem in practice.†*

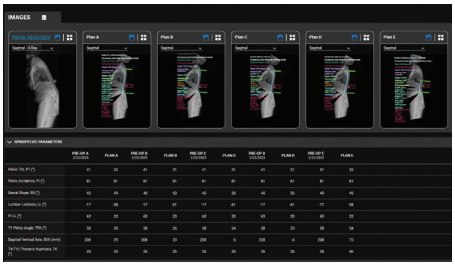
History and examination





A 64-year-old female presented with severe bilateral L5 radiculopathy and back pain. The patient had a prior L2-5 fusion.

Case simulation and planning



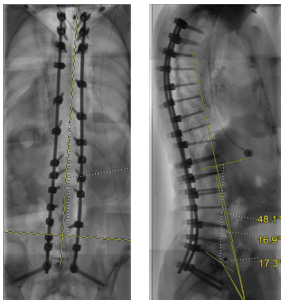
The UNiD™ LAB engineer uses a proprietary software platform to simulate multiple surgical strategies based on a combination of the surgeon's input and preferences, as well as scientific literature. Each simulation is processed through proprietary predictive models allowing the surgeon to visualize the postoperative compensatory mechanism most likely to occur.

Of the six simulated surgical plans, the plan with the best predicted sagittal alignment was chosen by Dr. Seale. The plan was recreated on a CT scan on the Mazor™ planning software and CD Horizon Voyager™ screw trajectories were planned with proper tulip head alignment.

Surgical plan

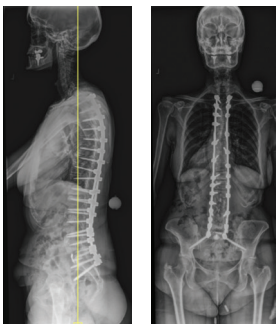
The goal of this procedure was to decompress the L5-S1 segment and stabilize the spine from T3 to S2 while restoring proper lumbar lordosis and sagittal vertical axis parameters.

Procedure



The patient underwent an L5-S1 ALIF followed by T3-S2 PSIF. CD Horizon Voyager™ screws were placed with the Mazor™ robotic guidance system. Sagittal alignment was corrected using the UNiD™ patient-specific rods as a template. Correction was evaluated intraoperatively using the 2D Long Film feature on the O-arm™ imaging system.

Outcomes



Patient had resolution of preoperative pain and alignment goals were achieved.

†Individual patient outcomes may vary based on severity of condition, extent of surgery, and patient's response to treatment. Physicians should use their own clinical judgment when deciding how to treat the conditions discussed.

*Patient images in this article are courtesy of Dr. Seale.

These indications are intended for the US audience only. Please refer to your regional indications at manuals.medtronic.com

Indications

UNiD™ Spine Analyzer

The UNiD™ Spine Analyzer is intended for assisting healthcare professionals in viewing and measuring images as well as planning orthopedic surgeries. The device allows surgeons and service providers to perform generic as well as spine related measurements on images, and to plan surgical procedures. The device also includes tools for measuring anatomical components for placement of surgical implants. Clinical judgment and experience are required to properly use the software.

The MEDICREA™ INTERNATIONAL S.A. UNiD™ Patient Specific Rods, when used with the different vertebral anchorage components of the associated spinal systems, are intended to provide immobilization and stabilization of spinal segments in skeletally mature patients as an adjunct to fusion in the treatment of the following acute and chronic instabilities or deformities of thoracic, lumbar, and sacral spine. Please refer on www.medtronic.com/unid webpage for indications and risk on UNiD™ rods. Risks associated with these spinal implants include loosening, disassembly, bending, breakage, and/or postoperative loss of correction and/or reduction of the spine.

The Mazor X is indicated for precise positioning of surgical instruments or spinal implants during general spinal and brain surgery. It may be used in open or minimally invasive or percutaneous procedures. Mazor X 3D imaging capabilities provide a processing and conversion of 2D fluoroscopic projections from standard CArms into volumetric 3D image. It is intended to be used whenever the clinician and/or patient benefits from generated 3D imaging of high contrast objects. The Mazor X navigation tracks the position of instruments, during spinal surgery, in relation to the surgical anatomy and identifies this position on diagnostic or intraoperative images of a patient.

The O-arm™ O2 Imaging System is a mobile x-ray system designed for 2D fluoroscopic and 3D imaging for adult and pediatric patients weighing 60 lbs or greater and having an abdominal thickness greater than 16cm and is intended to be used where a physician benefits from 2D and 3D information of anatomic structures and objects with high x-ray attenuation such as bony anatomy and metallic objects. The O-arm™ O2 Imaging System is compatible with certain image guided surgery systems.

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.

Except for hooks, when used as an anterolateral thoracic/lumbar system, the CD Horizon™ spinal system titanium, cobalt chrome, and stainless-steel implants may also be used for the same indications as an adjunct to fusion.

When used for posterior non-cervical pedicle screw fixation in pediatric patients, the CD Horizon™ spinal system titanium, cobalt chrome, and stainless-steel implants are indicated as an adjunct to fusion to treat progressive spinal deformities (i.e. scoliosis, kyphosis, or lordosis) including idiopathic scoliosis, neuromuscular scoliosis, and congenital scoliosis. Additionally, the CD Horizon™ spinal system is intended to treat pediatric patients diagnosed with the following conditions: spondylolisthesis/ spondylolysis, fracture caused by tumor and/ or trauma, pseudarthrosis, and/or failed previous fusion. These devices are to be used with autograft and/or allograft. Pediatric pedicle screw fixation is limited to a posterior approach.

For instruments and implant-specific indications, contraindications, warnings, precautions, and other important medical information, please see the package inserts for the respective product(s).

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