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SPINE REVIEW
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Spinal Deformity Surgery — On the Cutting Edge

By Laura Dyrda

The ultrasonic BoneScalpel from Misonix is designed to increase bone cutting effectiveness and safety in spinal procedures, which has a huge impact on patient safety and outcomes for spinal deformity procedures. The technology cuts bone while leaving elastic soft tissue mostly unaffected during incidental contact.

"The BoneScalpel modernizes deformity correction since it provides for a safer and faster procedure than traditional instruments, like osteotomes and kerrisons," says Suken Shah, MD, a spine surgeon with Alfred I. DuPont Hospital for Children in Wilmington, DE. He uses the BoneScalpel for several procedures, including:

- Facectomies
- Ponte osteotomes
- Vertebral column resections
- Thoracoplasties.

The technology can also be used in more complex procedures. "Any time you have to remove, cut or reshape bone, the BoneScalpel will help. If you're doing a deformity, it's great," says Isador Lieberman, MD, director of the scoliosis and spine tumor center at the Texas Back Institute in Plano, TX.

The instrument amplifies an electrical signal and converts it into a high back-and-forth motion with a blunt blade going at the frequency of 22,500 times per second. The oscillation makes the device unique and ensures surgeons don't damage the surrounding soft tissue.

"It's like going from cutting with a chainsaw to having a fine, precise tool so what I plan ahead of time I can implement in the operating room more efficiently," says Dr. Lieberman. "It replaces a lot of the other tools I would use about 80 percent of the time. The other instruments we have are high-speed, rotating burrs and if you get too close to the nerve or dura, you rip the tissue. I don't have that issue with the BoneScalpel."

Dr. Lieberman says spinal deformity procedures using the BoneScalpel are quicker and have less blood loss because of the ultrasonic technology.

"The blood actually coagulates on the surface of the bone and you end up losing a lot less blood during the operation," he says. "You are losing less blood because your procedure is faster and the bone ends aren't bleeding."

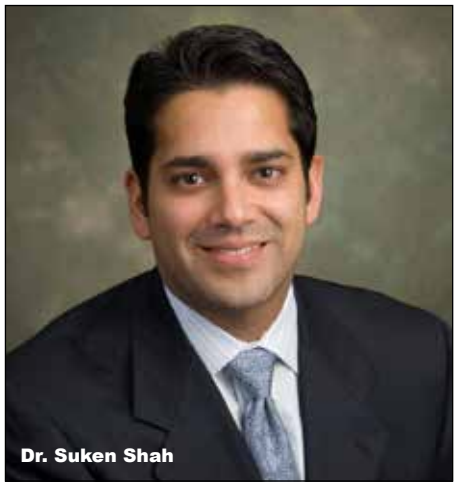
A study published in *The Spine Journal* found the ultrasonic BoneScalpel for adult idiopathic scoliosis patients led to significantly less bleeding when compared with standard instruments.

"The BoneScalpel offers controlled cutting and excising of bone without the potential for damage to soft tissue, nerves, dura or pleura," says Dr. Shah. "Essentially any bone can be cut with the BoneScalpel but when there are important soft tissue structures in the vicinity that need to be preserved, it becomes much more valuable. Also, since it does not heat the bone while cutting like a burr or oscillating saw, it may induce less thermal damage to osteocytes."

And it's easy to incorporate into an experienced surgeon's armamentarium.

"There isn't really a learning curve; it's more like an anxiety curve," says Dr. Lieberman. "Anyone working around the spinal cord on a day-to-day basis knows how to treat tissues carefully. The BoneScalpel has an irrigation component to make sure the blade stays cool and doesn't scorch the bone you're working on."

This technology isn't new to healthcare. Low power ultrasonics have been used in dentistry for decades for fine work. The BoneScalpel has been developed with high power ultrasonics for spine surgery procedures. "I don't know why we haven't caught on in orthopedics," says Dr. Lieberman. "We do bigger work with larger bones and bone cavities, but now with minimally invasive procedures we're also doing fine, detailed work. I think this technology will take off in the orthopedics and neurosurgery community."


Dr. Suken Shah

Spine surgery techniques and ultrasonic technology will continue to improve in the future, improving outcomes and reducing complications.

"Our hope is that we will have safe, efficient tools to expose the spine of its soft tissue rather than the traditional Cobb elevator and electrocautery," says Dr. Shah. "Ultrasonic technology offers tremendous promise in this area. This would further decrease blood loss during spinal deformity surgeries and offer procedural efficiencies not available up to this point. Devices to control epidural bleeding without injuring the dura or neural structures would also be welcomed, as well as devices to seal the dura in the event of duratomy." ■

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Minimally Invasive Spine Surgery — Current Trends & Topics

By Laura Dyrda

Minimally invasive surgery is sweeping the spine field. It allows surgeons to perform less morbid procedures with less pain and faster recovery for the patients. Infection rates are also lower with less invasive procedures. Surgeons are using a variety of methods to access the spine in the least disruptive way possible.

"It does matter whether you decompress with a drill or ultrasonic BoneScalpel because the BoneScalpel offers controlled movements when you're working close to important organs," says Daniel Rosenthal, MD, director of spine surgery at Bad Homburg Regional Hospital in Frankfort, Germany. "Using the ultrasonic technology is safer for your patients and it's less stressful for the surgeon because they aren't pulling and twisting with their hands like they would with other instruments."

The BoneScalpel from Misonix uses ultrasonic technology to make spine surgery safer and reduce complications, which is a huge advancement in the field. "The BoneScalpel gives surgeons the ability to control their work in small places," says Dr. Rosenthal. "It first cuts without twisting or rotating. You need much less force to control the blade to make sure it doesn't slip."

The BoneScalpel has a higher economic value than conventional drills, including its efficiency in the operation room as it decreases OR time, has fewer complications, lower infection rates and less blood loss.

"Shorter operating room times create a huge savings," says Juan Uribe, MD, director of the complex and minimally invasive spine section in the department of neurosurgery at the University of South Florida, Tampa, FL. "You are decreasing the amount of time spent on the procedure by doing the bone resection with the BoneScalpel. There are a lot of advantages."

Dr. Uribe continued, "The BoneScalpel has changed the way I perform minimally invasive spine procedures. It enables a more effective decompression of the lateral recess and foramen than I was able to do with traditional instruments. My procedures are also more efficient with the BoneScalpel as I now only require one instrument to perform the decompression, where as in the past, I was using multiple instruments."

The technology is easy to adopt, said Dr. Uribe, and it can be used for tumor, deformity, trauma and degenerative cases. The BoneScalpel may also widen the spectrum of minimally invasive techniques in spine surgery.

"Each surgeon has to figure out how to get the most out of their procedures, and this ultrasonic instrument can help surgeons achieve that," says Dr. Rosenthal. "There are some surgeons who like to push the envelope and stay on the cutting edge of spine surgery, which is moving toward less invasive procedures."


Dr. Juan Uribe

This ultrasonic technology is relatively easy for surgeons to incorporate into their practice, although basic training is required. The field of ultrasonics and Misonix technology will likely continue to grow in the future.

"Misonix blasted the field wide open," says Dr. Rosenthal. "Everywhere we need to have a precise and good bone resection, we can use the BoneScalepel because it has different blades and shavers. It's good for drilling and removing bone layer by layer." ■

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Located in Farmingdale, New York, Misonix, Inc. specializes in the development and commercialization of ultrasonic surgical devices for neurosurgical, spinal, advanced wound care and general surgery procedures. Our portfolio of products are all based upon the unique properties of ultrasound and its ability to differentiate hard and soft tissue for different clinical requirements. A fast growing global business, Misonix, Inc. operates in over 45 countries and is a recognized leader in advanced surgical tools offering unprecedented safety, speed and precision.

The Misonix BoneScalpel™ is a novel and unique surgical device in that it offers a faster and safer osteotomy as compared to standard bone cutting tools. It efficiently slices bone while leaving elastic soft tissues largely unaffected during incidental contact. This can be particularly important during spinal surgery where bone segments are frequently removed in close vicinity to the spinal cord, nerve roots and major arteries. Ultrasonic cutting of bone is made possible by amplifying an electrical signal and converting it into a high back-and-forth motion of a blunt blade at the extremely high frequency of 22,500 times per second.

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