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## The next 5 years in the spinal fusion arena Featured

Written by Anuja Vaidya | Thursday, 24 August 2017 19:35

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Seven spine surgeons discuss future spine fusion trends.

*Ask Spine Surgeons is a weekly series of questions posed to spine surgeons around the country about clinical, business and policy issues affecting spine care. We invite all spine surgeon and specialist responses.*

**Next week's question: What are some of the most common financial mistakes that independent surgeons make?**

Please send responses to Anuja Vaidya at [avaidya@beckershealthcare.com](mailto:avaidya@beckershealthcare.com) by Wednesday, Aug. 30, at 5 p.m. CST.

**Question: What are some trends we will see in spinal fusions over the next five years?**

**Vladimir Sinkov, MD. Spine Surgeon at New Hampshire Orthopaedic Center (Nashua):** More fusions will be done in a minimally invasive fashion and on an outpatient basis. Robotic technology will make the procedures more accurate and streamlined. Motion-preservation technology, such as disc and facet replacement devices, will also be used more frequently. As the population ages, their spines will age as well. This will lead to more need for spine surgeries overall.

**Scott Kutz, MD. Neurosurgeon at Texas Back Institute (Plano):** A higher percentage of spinal fusions will be performed using minimally invasive techniques over the next five years. This will reduce operative blood loss and time for recovery from spinal fusion surgery. This will allow for a higher percentage of patients to be treated in ambulatory-surgery centers.

Greater use of intraoperative navigation and robotics technologies will be utilized to accomplish spinal fusions. This will allow for greater accuracy of instrumentation placement and greater safety with less radiation exposure to the patient and the surgeon and/or staff. Preoperative plans will allow for design of patient-specific implants and instrumentation prior to surgery.

I foresee greater usage of alternate materials that will enhance the biochemical interactions at the implant/bone interface to improve fusion rates and accelerate time to fusion. Greater usage of 3-D printed customizable implants will occur which will allow implant size, shape and modulus of elasticity to be much more patient-specific.

**Ram Mudiyan, MD. Spine Surgeon at Hoag Orthopedic Institute (Irvine, Calif.):** Since the first description of spinal fusion using autogenous bone by Albee (tibial struts) and Hibbs (spinous processes) in 1911, there have been tremendous advances made in the art and science of spinal fusion techniques.

Although autogenous bone graft (iliac crest, local bone) remains the "gold standard," limited supply, donor site morbidity, variable bone quality and host factors have led to an explosion in research and development of alternatives

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to autogenous bone. This is especially relevant in long segment spinal fusions (spinal deformity) and revision cases. These have ranged from synthetic graft extenders (ceramic, bioglass, tricalcium phosphate), a variety of donor bone products (cortical, cancellous, structural allografts, demineralized bone matrix, stem cell based technologies) to bone morphogenetic protein.

At the present time, there is a paucity of relevant clinical data demonstrating the efficacy of one synthetic or DBM product over another. While BMP does enhance the rate of fusion, there have been safety concerns with its use in the cervical spine and around exposed neural elements.

Over the next five years, there will be an increasing emphasis on standardization of the plethora of bone graft products currently available based on high level evidence of efficacy in the clinical setting. Basic science research will continue to be focused on improved stem cell technology, host bone optimization (teriparatide) and alternative, and perhaps safer, forms of BMP. Advances in implant design such as nano-surface technology and 3-D printing may help create a favorable environment for graft incorporation.

Finally, "fusionless" spine surgery using growth modulation such vertebral body stapling in skeletally immature idiopathic scoliosis has shown early promising results in select cases.

**Payam Farjoodi, MD. Spine Surgeon at Center for Spine Health at Orange Coast Memorial Medical Center (Fountain Valley, Calif.):** There will be technical advancements in spinal fusion surgery, however I think the biggest shifts will come in how surgeons approach spinal fusion. Just as we have learned to focus on pelvic parameters in order to improve patient outcomes, new research will help us better classify surgical candidates and more appropriately determine the type and extent of spinal fusions for these patients.

**Plas T. James, MD. Spine Surgeon at Atlanta Spine Institute:** I think for spinal surgery there's technology coming along like navigated spine surgery, using interoperative CAT scans, and more. There's even a process where you can use overhead light to navigate instrumentation placement. As long as you can make it safer that's the key to the future of spinal surgery.

**Brian R. Gantwerker, MD. Founder of the Craniospinal Center of Los Angeles:** Overall, there will be more deformity work being done from an inpatient standpoint. In terms of one-and two-level fusions, the overall level will decrease. There are always studies being published questioning the use of this technique in single-level settings without instability or subluxation. The data, be it good or junk, will be there.

One of my favorite cranial neurosurgeons who I had the honor of working with a little, Dr. Robert Spetzler, would always ask "what's the denominator?" In other words, we should always be dubious of studies where the attrition rate is high or the number of patients being followed more than three months suffer from "the dwindles." In order to support the use of fusion in short segment stenosis and other widely accepted indications, we have to question the studies and look at them critically. That being said, we also have to be honest with ourselves and not ignore good data, just because we don't like what it shows.

**Kern Singh, MD. Co-Director of Minimally Invasive Spine Institute at Midwest Orthopaedics at Rush (Chicago):** Spinal fusions have become common treatment methods for different spinal disorders. More recently, degenerative disc disease and stenosis have been treated under the umbrella of spinal fusion. The improvements caused by these procedures can lead to significant improvements in regular activities that can be performed after treatment. The number of spinal fusions performed will certainly increase along with the number of indicated patients in the growing elderly population. However, spinal fusion is not always preferred over disc replacement because of the diminishment in patients' mobility. Considering this advantage, disc replacement could become more prominent in upcoming years if it is proven to have lower risks of adjacent segment disease.

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