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## Key Concepts for Clinical & Quality of Care Research in Spine Surgery: Q&A With Dr. Artem Vaynman of Neurological Surgery Featured

Written by Laura Miller | March 22, 2013

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Artem Y. Vaynman, MD, a board-certified neurosurgeon with Neurological Surgery in Great Neck, N.Y., discusses research trends for spine surgery and where it will be most important to focus efforts in the future.

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**Q:** What short-term research can we expect to develop over the next five to 10 years that will make an impact on the spine field?

**Dr. Artem Vaynman:** For short term research, surgeons will be looking at minimally invasive procedures with less disruption to the tissue but still accomplish the goals of taking pressure off the neural elements of the

spinal cord while maintaining stability so compression doesn't occur.

Some instrumentation for these procedures already exists and developers are working on the next step: three-dimensional navigation for spine surgery. There are a few systems on the market — some are anterior, lateral or minimally invasive transforaminal approaches — and most of them are X-ray or fluoroscopically guided, but the new technology including robotics allows surgeons to navigate the spine with a greater precision, minimize malposition of the hardware and eliminates revision surgery for misplaced hardware. We could see more advanced instruments that are digitized in 3D, and right now you can't do a fusion with 3D navigation. The work in that direction continues.

There is also the area of motion preservation, or disc replacement procedures. There is a lot of research being done there and some of the studies have shown good results. Unfortunately, these studies are difficult to reproduce. When the initial surgeons are doing these procedures, they have very good results but when the general population of surgeons performs them there is variance.

**Q:** What will it take to further develop motion preservation technology for a broader range of surgeons?

**AV:** We don't completely understand the motion of the spine and we don't have specific standards of how much motion is normal or pathological, which can lead to disorders later on. We have seen development in hip and knee replacement technology, but in the spine the motion is more complex and without good models and clear definition of the standard motion, it's hard to develop materials that will simulate natural motion.

The design of the implant highly depends on establishing a primary biomechanical model. Most are developed in studies with a cadaver spine where the implant goes through motion and researchers

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see where the ligaments will fail. That's not a live model. You need a human model with EMG recording and fluoroscopic monitoring. It's difficult to achieve, but the bottom line is without that type of modeling it's difficult to say you have a plastic that will simulate living tissue.

With tissue, the motion grows as stress is applied until you reach the tissue's limit and there is breakage. Metal implants will have a completely different interaction and a lot of them won't resist motion and at that point it will lock. As a result, it's hard to expect the metal implant to behave like living tissue.

**Q: What long-term initiatives are spine surgeons working on?**

**AV:** There are several areas of long term research, one being stem cell research because one of the things that concerns spine surgeons most is neurological injury. A lot of technology is dedicated to rebuilding the spine utilizing instrumentation and bone grafting. However, the ultimate answer will be developing self-repair modalities. The body will repair itself.

**Q: When will these developments play a bigger role in spine medicine?**

**AV:** It all depends on funding because research is extremely expensive and there are ethical issues that aren't 100 percent resolved in the public, such as cloning, so we don't know whether federal money will be spent on these projects. We are just in the fertilization stage and it will take time before we come to any projects that will change patients' lives. I think that stem cell treatments are a very long term goal overall in medicine to develop technology allowing the body to heal itself.

**Q: Beyond clinical research, where are surgeons focused on gathering data and publishing articles?**

**AV:** We are just beginning to research and develop quality of care standards. This is an area where the medical societies have not really established a good idea of what the standards are in this country. We also want to look at readmissions and how to avoid them. I think the best way to avoid readmissions would be to standardize the treatment of patients as much as possible.

We have so many poorly designed studies and reports about treating specific conditions, but there are no guidelines on who can and cannot do surgery. Each hospital uses their own credentialing for spine procedures and there might be someone who isn't qualified to perform a spinal surgery, or other specialists who aren't aware of other treatment options available for their patients.

There is a trend of surgeons learning to do one procedure well and to perform it for every patient. This can be problematic if the patient would respond better to another treatment. The best way to prevent readmissions and have the best outcomes is to tailor cut surgery based on the patient's individual needs. It's challenging because our studies don't provide an absolute prediction on how each patient will behave. We need to see what really works well instead of thinking about financial incentives for surgeons from each procedure.

**Q: Where should more research focus in the future?**

**AV:** There is definitely more research now being done on degenerative disc disease. In the future, everything in medicine with relate to prevention. We should concentrate on how to prevent the disease, diagnosing and catching it at earlier stages and treating them with early intervention, to put patients back on track for better health. There should be a combined approach of the surgeons with psychologists, pain management specialists, primary care physicians, neurologists and other specialists so the disease is diagnosed at an early stage and patients are educated about the best behavioral traits in avoiding spinal problems. We don't want them coming into our office as a car wreck.

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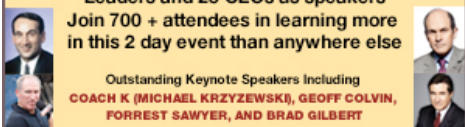
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