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Medical Device Innovation for Improved Lives Together

Spine Arthroplasty innovation continues apace



Successfully performed in more than 40,000 patients worldwide, spine arthroplasty can reduce pain and disability while preserving motion. In contrast to traditional fusion techniques, artificial disc and nucleus replacements allow the spine to continue to move and may protect against adjacent disc degeneration. For carefully selected patients, it can transform their lives. International leader in spinal surgery, Dr Jack Zigler, Medical Director at the Texas Back Institute, discusses the latest medical innovations in spine arthroplasty and the findings at the ISSAS in March.

Exploring new materials

Innovation in the next generation of Artificial Disc Replacements (ADRs) marches on and in Europe, ADRs have been a central component of spine arthroplasty for more than two decades. According to Dr Zigler, although adoption in the US has been much slower, due mainly to poor insurance coverage, as the US database of patient outcomes continues to grow and with more academic publication of positive results, coverage has been slowly improving, particularly for cervical ADRs.

With the next generation of ADRs, medical device manufacturers are exploring new materials, including titanium, high-density biocompatible polyurethane and ceramic composites of alumina and zirconia. These materials will offer improved post-operative MRI imaging. "Additionally, devices with variable centres of rotation and shock absorption may improve already good clinical results," Dr Zigler says. Designs are also including porous exterior coatings for better integration and carbon interior coatings for durability.

ISASS 2012 meeting shows innovation

The International Society for the Advancement of Spine Surgery (ISASS) meeting in March 2012 provided a showcase for spine arthroplasty evolution and revolution of spine care in the future. Dr Zigler notes the meeting revealed improved materials in second and third generation ADRs that may provide axial load sharing that may better mimic natural disc function. He also is excited by the prospect biologic interventions may offer in diagnostic, as well as therapeutic patient treatment.

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- A. Einstein

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Encouraging 12-month results from a small prospective study injecting cultivated juvenile cartilage cells for lumbar disc nucleus repair garnered particular excitement. Although the 15-patient study focused on feasibility, 60% of patients showed improvements in MRI imaging. No patients showed neurological deterioration and no immunological response to the chondrocyte injection were observed.

"I believe that biologic interventions will revolutionise how we treat our patients," he says, "We will have diagnostic tools to help differentiate between naturally degenerated discs and painful, functionally disabling discs." He notes that better diagnostic tools may assist in removing insurance company barriers to ADR use.

Cervical ADRs off-label situations offer promise

Early outcomes with cervical ADRs had spontaneous fusion rates of up to 30%, but Dr Zigler reports that rates have significantly decreased with improved technique and postoperative administration of non-steroidal anti-inflammatory drugs (NSAIDs). In one trial he notes that heterotopic ossification rates were reduced to low single digits. He also notes, "Fortunately, even those few patients who essentially auto-fuse still have excellent outcomes equivalent to Anterior Cervical Discectomy and Fusion (ACDF)." Additional uses are on the horizon as well. Spine arthroplasty experts investigating ADR use in off-label or unapproved situations are having interesting results. "In levels adjacent to previous fusion, ADR may prove to be better [at protecting] the remaining segments," Dr Zigler says, "Similarly, in multiple level cervical disc disease, multi-level cervical ADR or hybrid constructs may prove to be a better option." One cervical disc currently in a US investigative trial may receive FDA approval next year for multi-level use.

Interview with Dr Zigler conducted by Marie Gethins of Mediscribe

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Tags: innovation, medical device, MedTech, spine arthroplasty, Dr Jack Zigler, artificial disc replacements, ADR, spinal surgery, artificial disc replacement surgery

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