

Perceptions of Spine Surgery

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Commentary

The past several decades have brought the emergence of many advances in surgery of the spine. In the past three decades, great progress in the operative and non-operative treatments of spinal disorders has been made. The more exciting and promising advances in spine surgery involve minimally invasive surgery, disc nucleus replacement and biologics. Minimally invasive surgery (MIS) aims to reduce the approach-related morbidity of conventional open procedures. Although MIS is not a novel idea, several new approaches and instrumentation systems are worthy of review. Intervertebral disc nucleus replacement has been developed to address degenerative disc disease through the replacement of the nucleus pulposus while preserving the annulus fibrosis.

A variety of novel implants for disc nucleus replacements have been developed and are currently being investigated. Biologics are being developed and investigated and include bone morphogenic proteins used for the enhancement of arthrodesis and in the treatment of degenerative disc disease. Bone morphogenic proteins used in reconstructive and regenerative procedures of the spine are a new and rapidly evolving area in spinal surgery. Bone morphogenic proteins aim to enhance arthrodesis and alleviate the morbidity associated with iliac crest autograft harvest. Bone morphogenic proteins have also been investigated in the treatment of disc degeneration in an effort to slow or reverse the degenerative process. These newly emerging technologies in spine surgery are the focus of this article. Minimally Invasive Surgery of the Spine the fundamental principle underlying minimally invasive surgical approaches to the spine is to achieve adequate exposure of desired anatomic structures to accomplish the surgical objectives while minimizing

excessive soft-tissue dissection and prolonged retraction. MIS techniques reportedly lead to decreased perioperative morbidity, decreased narcotic use, decreased length of hospital stay, and decreased costs.

Minimally invasive procedures have been promoted by financial pressures on the health care system and the resultant push to reduce hospital costs. Furthermore, MIS techniques have been reported to have comparable rates of complications relative to conventional open procedures. The drawbacks of MIS techniques are that they require specialized equipment and training before implementation, which often presents a steep learning curve to the surgeon. The long-term outcomes of MIS procedures need to be objectively compared with conventional open procedures to validate their safety and outcomes. Traditional posterior approaches to the lumbar spine require a midline longitudinal incision extending proximal and distal to the spinal segments of interest. Decompressive lumbar laminectomy and instrumented fusion require a significant amount of soft-tissue dissection and prolonged retraction to perform the posterolateral fusion and to obtain the appropriate lateral to medial pedicle screw angulation.

The conventional approach allows for adequate visualization during the procedure but the associated prolonged soft-tissue retraction has been shown to cause soft-tissue ischemia, paraspinal muscle dysfunction, and potential chronic pain. By definition, minimally invasive surgery of the spine involves smaller incisions and less soft-tissue dissection relative to conventional open procedures. The rationale for minimally invasive surgery of the spine is to minimize paraspinal muscle retraction and dissection with the goal of decreasing blood loss and postoperative pain, accelerate postoperative recovery, and thereby improve clinical outcomes. Ideally, once the minimally invasive approach has been completed, adequate access is provided to accomplish the same goals as the conventional open procedure.

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