## CONCURRENT SESSION 2A: EMERGING & NAVIGATION FREE PAPERS

### **Paper #2:** Simultaneous Lateral Interbody Fusion with Robot Assisted Pedicle Screw Fixation in Single Position: Seven Consecutive Cases from a Large Volume Center

*Komal Naeem, MD; Malika Bhargava, MD; Randall Porter, MD; and* | ***Corey Walker, MD***

**Introduction:** Robotic arm used in spine surgeries aids in accurate trajectory planning of pedicle screws. Minimally invasive approaches for lateral interbody fusion require lateral decubitus positioning of the patient. A change in position from lateral decubitus to prone is required for the same-day pedicle screw fixation, which adds to the surgical time and decreases the efficiency of this procedure.

**Aims/Objectives:** We present a case-series of single position (lateral decubitus) surgery for lateral interbody fusion and pedicle screw fixation.

**Methods:** We performed a retrospective analysis of all patients who underwent single position surgery for lateral (trans-psoas and pre-psoas) interbody fusion and pedicle screw fixation, treated by senior author. We also collected intraoperative details, prospectively. Gertzbein-Robbins classification was used for pedicle screw accuracy assessment. Grades A and B were considered clinically acceptable.

**Results:** We enrolled seven patients in total, six had single level fusion and one had two-level fusion. Average age was found to be years 68years (SD 9.06years) and mean body mass index of 31.6kg/m2 (SD 5.1kg/m2) was reported. Five (71.4%) patients had spinal instability whereas 4 (57.1%) had scoliosis and one patient had prior lumbar surgery. We do not report any immediate postoperative complications. Hip flexor weakness was reported in 3 patients and was found to be transient in 2, resolved in ~30 days. We do not report hip dysesthesia, hip numbness, new-onset radiculopathy or hardware failure in average follow-up of 6months. Average radiation dose was found to be 238.9mGy (SD130.6mGy) In total, 28 screws were placed, and 2 (9.1%) required repositioning because of medial and lateral breech. Screw accuracy assessment was done for 21 screws and placement of 16 (76.2%) pedicle screws were clinically acceptable (grades A and B). We recorded time for the different steps of surgery for four patients. The average time per screw was reported as 9.8minutes (SD 7.4 minutes). The average time for the entire procedure from skin incision to skin closure was 257minutes (SD27.7minutes). Acquiring intraoperative CT, importing images and screw planning consumed 35% (168 minutes) of total surgical duration. We report good neurological outcomes for all patients.

**Conclusions:** We present the cases for simultaneous minimally invasive approach for lateral interbody fusion and percutaneous pedicle screw fixation in single position. This surgical technique does not only decrease the radiation exposure and blood loss but also reduces the surgical time. We report that this technique can produce favorable outcomes among elderly patients with multiple co-morbids.

**Disclosures:**

**K. Naeem:** None. **M. Bhargava:** None. **R. Porter:** A; Barrow Neurological Foundation. B; Globus Medicle, Medtronic, Stryker. D; The medical memory.

### **Paper #3: Improved Bone-Removal Using a New Device** in Open and Minimal Invasive Approaches: A 2-Center Experience with 143 Patients

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**Introduction:** Spinal procedures often require the removal of bony tissues to prevent nerve compression and reduce pain. Sufficient bone removal is complicated by the need to minimize supporting bony structure destruction. Efficient osteophyte removal can prevent future pain and discomfort and may therefore be necessary in some cases. Traditional bone removal tools and methods limit the surgeon's ability to reach difficult to access regions and therefore increase healthy bone removal and procedure time.

**Aims/Objectives:** Here we describe and evaluate the experience accumulated using a recently developed, FDA-approved, shielded curved drill, designed to provide efficient bone removal from difficult to access bony structures such as the foramen, while improving procedure safety and speed.

**Methods:** The device was used in 2 centers to perform foraminotomy, osteophyte removal, and disc-space preparation since October 2016. All the procedures for which a record of device use was available were included in the analysis. Overall, 143 procedures were reviewed, including lumbar and cervical spinal fusions and decompressions. Of these 143 procedures, 77 were performed minimally-invasively. Procedure length of time was recorded, as well as the duration of device use. Surgeon assessment was obtained using questionnaires at the end of each procedure.

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**Results:** All the procedures were deemed successful, without device-related tears. Sufficient bone removal was obtained using the device in 96% of the procedures. In some cases of multi-level complicated fusions, the time reduction using the device was estimated at several hours. Lumbar foraminotomy using the device required, on average, 2 minutes/foramen. Osteophyte removal required, on average, 3.2 minutes. The device was successfully used in both open and minimal invasive settings.

**Conclusions:** The results of the study found that the device is safe and effective for performing osteophyte removal and foraminotomy in both open and minimal invasive settings. Procedure time reduction was noted as the most significant advantage by the surgeons.

**Disclosures:**

**J. Peloza:** None. **L. Khoo:** B; Carevature Medical Ltd. **M. Millgram:** B; Carevature Medical Ltd. **S. Kutz:** B; Carevature Medical Ltd. **R. Guyer:** B; Carevature Medical Ltd. **E. Ashkenazi:** B; Carevature Medical Ltd.. D; Carevature Medical Ltd.

### **Paper #4** Stem Cell Injections for Axial Back Pain: A Systematic Review of Associated Risks and Complications with Case Illustration of Diffuse Hyperplastic Gliosis Resulting in Cauda Equina Syndrome

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**Introduction:** Axial lower back pain is a disease of epidemic proportions that exerts a heavy global toll on the active workforce, and results in more than half a trillion dollars in annual costs. Stem cell injections are being increasingly advertised as a restorative solution for various degenerative diseases and are becoming more affordable and attainable by the public.

**Aims/Objectives:** There have been multiple reports in the media of these injections being easily available abroad outside of clinical trials, but scientific evidence supporting them remains scarce. We present the case of a serious complication after a stem cell injection for back pain and provide a systematic review of the literature of their efficacy and associated risks and complications.

**Methods:** We performed a systematic review of the literature using the PubMed, Google Scholar, and Scopus online electronic databases for articles reporting stem cell injections for axial back pain in accordance with the PRISMA guidelines. Primary focus was on outcomes and complications. We also report a case of glial hyperplasia of the roots of the cauda equina directly related to stem cell injections performed abroad.

**Results:** We identified 14 studies with 147 patients that met our search criteria. Follow-up periods ranged from 6 months to 6 years, and 50% of the studies had a follow-up of 1 year or less. Most studies reported favorable outcomes although 33% were using subjective measures. There was a tendency for pain relief to wane after 6 months to 2 years, with patients seeking a surgical solution. Only one study was a randomized controlled trial.

**Conclusions:** There is still insufficient data to support stem cell injections for back pain. Additional randomized controlled trials with long term follow-up are necessary before statements regarding their efficacy and safety can be made.

**Disclosures:**

**S. Aoun:** None. **V. Peinado Reyes:** None. **T. El Ahmadieh:** None. **C. Bagley:** None.

### **Paper #5:** Minimally Invasive TLIF with Expandable Articulating Interbody Spacers Significantly Improves Radiographic Outcomes Compared to Static Interbody Spacers

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**Introduction:** The goal of minimally invasive transforaminal lumbar interbody fusion (MIS TLIF) is to restore and maintain disc height and lordosis until arthrodesis occurs while minimizing muscle disruption and improving recovery time. The radiographic outcomes of an articulating expandable spacer in MIS TLIFs have yet to be thoroughly investigated in comparison to more traditionally used static spacers.

**Aims/Objectives:** The purpose of this study is to compare the radiographic outcomes of an articulating expandable spacer to a static spacer used in MIS-TLIF.

**Methods:** This was a multi-site, multi-surgeon, retrospective clinical study from a prospectively collected database with Institutional Review Board exemption. It included 48 patients with a diagnosis of degenerative disc disease at one level from L3 to S1 with or without Grade 1 spondylolisthesis who underwent MIS TLIF using either an articulating expandable or static interbody spacer for the treatment of low back pain and/or radiculopathy. Twenty-seven patients were in the articulating