BACKGROUND CONTEXT: Three-column osteotomies are frequently used in the correction of severe spinal deformities. However, these can be associated with high complication rates and significant risk for neurological injury. Preoperative traction is one modality that has been used by surgeons to obtain a partial correction prior to definitive fusion. Low numbers and variability of traction protocols, however, have limited previous surgeons to obtain a partial correction prior to definitive fusion. Low numbers and variability of traction protocols, however, have limited previous reports of outcomes of sustained preoperative traction.

PURPOSE: We describe a novel halo-gravity traction (HGT) protocol for patients with severe spinal deformities in West Africa, and assess the clinical and radiographic outcomes.

STUDY DESIGN/SETTING: Retrospective case series.

PATIENT SAMPLE: 29 consecutive pediatric patients with severe spinal deformity.

OUTCOME MEASURES: Radiographic measurements and SRS-22 scores obtained pre-traction, post-traction, and 6 weeks postoperatively.

METHODS: All patients who underwent HGT prior to deformity surgery in Ghana from 4/2012 to 8/2013 were reviewed. HGT was started at 20% and increased by 10% per week until 50% of body weight was reached by 4 weeks. Traction was maintained in a wheelchair, walker and in bed except for meals and personal hygiene. Xrays were obtained pre-traction, every 4 weeks in traction, and at 6 weeks post-op. Demographic variables, operative data, radiographic parameters, and HRQL scores were collected. A deformity reduction index (DRI) was calculated at each time point by summing the scoliosis and abnormal kyphosis for each patient and reported as a percentage of the preoperative deformity.

RESULTS: 29 patients underwent HGT for an average 107 days (range 58-179) prior to definitive posterior spinal fusion (24 patients) or placement of growing rods (5 patients). The major curve improved from 131° to 90° (31%) after HGT, and to 57° (56%) postoperatively. HGT was equally effective in correcting both scoliosis and kyphosis in patients with biplanar deformities, even after adjusting for curve flexibility. Pure kyphotic curves were rigid (flexibility 22% after traction), with a correction index (% postop curve correction/% flexibility) of 3.88, which is similar to historical controls (Lenke et al, Spine, 2009). Deformity correction with HGT plateaued at 63 days. SRS-22 scores improved significantly pre-traction (3.5) versus postop (4.5), but there was no change post-traction (3.9) versus pretraction (3.5). There were 11 pin tract infections, with no complications and Results

CONCLUSIONS: Halo-gravity traction is a safe method to partially correct severe spinal deformities prior to a definitive procedure. It may obviate the need for higher risk 3-column osteotomies to achieve optimum correction. A prospective study is underway to determine which specific curve types are most amenable to preoperative traction.

FDA DEVICE/DUG STATUS: This abstract does not discuss or include any applicable devices or drugs.

http://dx.doi.org/10.1016/j.spinee.2014.08.273
decompression, with or without vertebrectomy and vertebral body reconstruction, was reviewed retrospectively to determine whether these techniques can be beneficial in the treatment of symptomatic spinal metastases.

**STUDY DESIGN/SETTING:** An IRB-approved retrospective review was performed on patients with a tissue-proven diagnosis of cancer and MRI evidence of metastatic epidural spinal cord compression (MESCC), treated in a multidisciplinary spine tumor practice at an academic center, and who underwent minimally invasive spinal decompression, either prior to or subsequent to other adjuvant treatments. Patients with multiple (more than two) levels of ventral spinal cord compression, severe instability that would require instrumentation even without any decompressive procedures, refused surgical intervention, or failed to obtain medical clearance for surgical intervention were excluded.

**PATIENT SAMPLE:** Forty-three patients were identified, but 13 were excluded due to multiple levels, no confirmation of tumor at the site, or no decompression performed (biopsy only). Thirty patients were included and followed until death or current date.

**OUTCOME MEASURES:** Length of stay and time to ambulation in those capable of ambulation. Numerous anatomical factors (including ratio of average spinal canal AP diameter above and below the index level of compression to the diameter of the residual canal at the level of worst compression, vertebral body height measurements at various points on the midline, and Cobb angle) as well as numerous previously validated functional scores (Hauser ambulation score, Karnofsky score, survival). Outcomes of patients who underwent this type of spinal operation were measured before the operation, immediately after the operation and at 1 month after the operation.

**METHODS:** All patients underwent, after preoperative evaluation and imaging, a paramedian incision and a tubular dilator facilitated minimally invasive approach to hemilaminectomy with or without transpedicular or costotransversectomy for vertebrectomy, and direct cement vertebroplasty or vertebral body replacement with poly-methyl methacrylate (PMMA) cement and closure with commercially available cyanoacrylate skin adhesive rather than sutures or staples. Length of stay and time to ambulation, in those capable of ambulation, was measured from the hospital records. Postoperative imaging was obtained in all patients.

**RESULTS:** Thirty patients underwent 32 initial procedures with an average surgical time of 2:30 hours and average blood loss of 560 cc. Average AP canal diameter improved from 82.9% of baseline, to 93.1%. Those able to walk preop were unchanged from baseline, but those unable to ambulate preop improved significantly from a mean Hauser score (1-9, 1 is intact, 9 is no significant motor function) of 8.6 to 7.0 after the operation and to 6.4 at one month. Four of the eight in the poor ambulating group improved an average of 3.5; the other 4 had no significant change, and ambulation typically occurred by day 2 after surgery. Mean survival was 496 days—1.62 years for patients with good ambulation, 0.57 years for those incapable of ambulation, was measured from the hospital records. Postoperative imaging was obtained in all patients.

**CONCLUSIONS:** Minimally invasive surgical treatments for MESCC can result in short procedures, rapid mobilization, short hospital stay, low rates of wound and other postoperative complications, potential improvement in ambulation status even for those with the worst exams. Long-term survival and longevity of neurological function can be maintained in this population with repeat procedures when necessary.

**FDA DEVICE/DRUG STATUS:** This abstract does not discuss or include any applicable devices or drugs.

---

**P22. Sacro-Pelvic Fixation Using the S2 Alar-Iliac (S2AI) Screws in Adult Deformity Patients: Experiences with O-Arm/Stealth Navigation versus Robotic Guidance**

Isador H. Lieberman, MD, FRCSC, MBA; Xiaobang Hu, PhD; Paul J. Holman, MD; Blake N. Saba, MD; Siclosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US; Houston Methodist Neurological Institute, Houston, TX, US

**BACKGROUND CONTEXT:** Many pelvic fixation techniques have been introduced in adult deformity surgeries due to the high stress of long constructs and high rates of L5-S1 pseudoarthrosis. The S2-alar iliac (S2AI) technique is a recently described method that involves a fixation from the S2 sacrum into the ilium. Due to the complex and variable anatomy of the sacral-pelvic region and intervening sacroiliac joint, optimal screw fixation is difficult even with biplane fluoroscopic guidance.

**PURPOSE:** The purpose of this study was to review and report our experience with two different techniques for sacro-pelvic fixation: O-arm/Stealth navigation and robotic guidance.

**METHODS:** We retrospectively reviewed 25 consecutive patients who underwent S2AI fixation with O-arm/Stealth navigation and 15 consecutive patients who underwent S2AI fixation with robotic guidance. Clinical and radiographic records were reviewed for all these patients. Radiographic measurements include SVA, TK, LL, PI, PT and SS. Outcome measurements include complications, ODI scores and/or back pain and leg pain VAS scores.

**RESULTS:** For S2AI fixation with O-arm/Stealth navigation, patients mean age was 63 years (range 43-76) and 18 patients were female. Twenty-two surgeries (88%) were revision surgeries. The mean levels instrumented were 10±4. There were 4 dural tears (16%) intraoperatively and no other intraoperative complications or difficulties with the O-arm/Stealth navigation were encountered. Patient mean length of stay was 13±6 days. All cause morbidity and mortality occurred in 7 patients at an average of 8 months follow-up including one mortality due to malignant toxic megacolon. Mean radiographic changes were (preop/postop): SVA 62.3 mm (100.6/38.3), TK 15° (34.3/49.3), LL 28.7° (28.7/57.5), PI 0° (53/59.3), SS 7.4° (30/37.4), PT 10.2° (26.7/16.5). One average, the patients’ ODI score improved 8.6 points at the latest follow up (range 3-18 months).

**CONCLUSIONS:** S2AI fixation was more common in revision surgeries and no technique difficulties were encountered with O-arm/Stealth navigated or robotic guided S2AI fixation in this series. At short term follow-up, the patients in these two groups had similar all cause complication rates and clinical outcomes.