METHODS: Part I: 152 patients were operated using the freehand technique ‘n’ AIRO technology approach (TNT group); 137 were operated using freehand anatomic and fluoroscopy (Fluoro Group). Radiographic measurements, and clinical outcomes including radiation dose, blood loss, operative time and 30-day complications were compared. Part II: 152 TNT patients were compared to 356 AIS patients from the NSQIP database that were operated on using computer-assisted navigation between 2012 and 2018 (Navigation Group). Operative time, blood loss and 30-day complications were compared. All data was presented as mean and frequencies where appropriate. Fisher’s Exact and Kruskal-Wallis tests were used for statistical analysis.

RESULTS: Part I: Average radiation dose for TNT patients was 8.3 mGy compared to 3.5 mGy for the fluoro group (p < 0.001). Average radiation time was 12.6 seconds for the TNT group versus 29.8 seconds for Fluoro (p < 0.001). Operative time was significantly shorter for the TNT patients with an average of 236.6 minutes versus 308.8 minutes (p < 0.001). TNT patients had significantly less blood loss than fluoro patients (444 cc vs 625 cc, p < 0.001). 17 (11.1%) of TNT patients required transfusion compared to 24 (17.5%) Fluoro patients (p < 0.001). Two (2.3%) patients in the TNT group returned within 30-days for superior mesenteric artery syndrome. 5 (3.6%) Fluoro patients returned within 30 days, four for surgical site infections requiring irrigation and debridement, and one patient returned for deep vein thrombosis. Part II: TNT Group had a mean operative time of 236.6 minutes compared to 352 for the Navigation group (p < 0.001). 73.6% of Navigation patients were transfused versus 9.2% of TNT patients (p < 0.001). Navigation patients had significantly more 30-day complication than TNT patients (p < 0.001). Most Navigation returns were deep wound infection, sepsis and reoperation. In contrast, TNT patients only had two cases of superior mesenteric artery syndrome.

CONCLUSIONS: As novel technology allows for better anatomic bone visualization, surgeons should implement these innovations into their technique accordingly, while maintaining surgical control. This technique and technology approach allows for adopting technology into surgical approach rather than restructuring the surgical approach. This happy medium helps with screw accuracy without prolonging surgical time, blood loss and associated complications and has superior surgical outcomes compared to both traditional fluoroscopy and computer assisted approaches.

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

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P48. The use of motion metrics parameters to predict postoperative patient reported outcomes in patients with lumbar stenosis and spondylolisthesis

Braden McKnight, MD1, Zoé Fresquez, BA2, Paul O. Mgham3, Trevor Grieco, PhD4, John A. Hipp, PhD2, Jeffrey C. Wang, MD2, Zorica Buser, PhD1, 1 Keck Hospital of USC, Los Angeles, CA, US; 2 USC, Los Angeles, CA, US; 3 Keck School of Medicine of USC, Los Angeles, CA, US; 4 Medical Metrics, Inc., Houston, TX, US; 5 Olympia, WA, US; 6 USC Spine Center, Los Angeles, CA, US; 7 Keck School of Medicine, University of Southern California, Los Angeles, CA, US

BACKGROUND CONTEXT: Lumbar stenosis is a common spinal pathology and studies have shown that surgical treatment is often more effective than nonoperative management. Surgical options for the treatment of lumbar stenosis include decompression alone or decompression with fusion. Patients are often chosen for decompression with fusion when there is perceived instability; however, it is often unclear which radiographic parameters indicate instability requiring fusion.

PURPOSE: To evaluate the potential of motion metrics in predicting postop Patient Reported Outcomes (PROs) in patients with lumbar stenosis undergoing decompression with fusion or decompression alone. We hypothesize that patients with abnormal preoperative motion parameters will achieve better outcomes with decompression with fusion, and that patients with normal preop motion metrics will achieve better outcomes with decompression alone.

STUDY DESIGN/SETTING: Retrospective single center cohort study.

PATIENT SAMPLE: Patients treated for single level lumbar stenosis with spondylolisthesis by either decompression only or decompression plus fusion.

OUTCOME MEASURES: PROs (ODI, VAS and NRS), Angular Motion, Intervertebral Translation, Sagittal Plane Shear Index (SPSI), Spondylolisthesis Index, Anterior and Posterior Disc Integrity Index, Global ROM.

METHODS: This preliminary analysis includes 16/40 patients. Preop and 1-year postop flexion/extension X-ray images were analyzed with previously validated motion analysis software. Since the mechanical integrity of soft-tissues cannot be assessed unless the soft-tissues are sufficiently stressed, patients with <3 deg of preop intervertebral rotation between flexion and extension were excluded. Demographic data were obtained from medical records, including age, gender, length of stay, comorbidities and PROs.

RESULTS: Of the 16 patients, 12 (75%) were female and 4 (25%) were male. Ages ranged from 33 to 77 years old with an average of 64 at the time of surgery. Two patients had surgery at L3-L4 (12%) and 14 had surgery at L4-L5 (88%). All 16 patients received decompression with fusion. The 95% confidence interval of a dataset that includes 384 radiographic-correctly normal asymptomatic volunteers was used to define normal limits of motion. SPSI > 2 indicates that the translation per degree of rotation was beyond the upper limit of normal. Preop SPSI was measured at 16 treatment levels and 50 non-treatment levels. Preop SPSI at the treatment level was 1.4±2.5 [-4.1 to 6.4] with 7 patients having SPSI>2 and 9 subjects having SPSI<2. Preop SPSI at non-treatment levels was 0.6±1.9 [-2.5 to 9.9] and the postop SPSI at non-treatment levels was 0.4±1.5 [-2 to 4.8].

CONCLUSIONS: SPSI is an objective measure of sagittal plane instability that may inform physicians of the need for fusion. In this preliminary analysis, the mean preop SPSI at the treatment level approached the upper limit of normal, while the mean at non-treatment levels was near the center of normal. There were 43.8% of patients who had abnormal preop SPSI values at the treatment level. Upon review of the PROs we will determine if preop SPSI is predictive of clinical outcome success, and if other novel metrics can be used along with SPSI to inform the optimal treatment pathway.

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P49. Cervical spine CT scans can miss fractures when football equipment is in place

Anit Piple, BS1, Carol Bernier, DO2, Mark Rogers, DO1, Kelley Whitmer, MD1, David Keyes, MD2, Anmol Bansal, MD3, Jonathan J. Carmouche, MD1, 1 Fremont, CA, US; 2 Carilion Clinic, Roanoke, VA, US; 3 Edward Via College of Osteopathic Medicine, Blacksburg, VA, US; 4 Roanoke, VA, US

BACKGROUND CONTEXT: Iatrogenic worsening of a spinal injury can result in significant harm to football athletes and complicate its management when equipment is removed in the acute setting by inexperienced personnel. Spine imaging before removal of protective equipment mitigates this risk. There is a controversy regarding the ideal timing of equipment removal and whether current diagnostic imaging modalities are effective to detect these injuries without equipment removal. Prior data suggests that CT is a diagnostic modality for this purpose, however, radiologists’ accuracy in detecting specific fractures must be investigated. However, there is no established modality to perform imaging in these patients with protective equipment in place.

Refer to onsite annual meeting presentations and postmeeting proceedings for possible referenced figures and tables. Authors are responsible for accurately reporting disclosure and FDA device/drug status at time of abstract submission.