

in application, and temporal trends of usage. *Methods:* A prospectively-collected database of provincial insurance billables and diagnostic codes was reviewed retrospectively, from 2002-2014. Patients undergoing instrumented spinal fusions or percutaneous vertebroplasty/kyphoplasty were identified. Fee and diagnostic codes were applied to distinguish surgical indication and approach. The use of intra-operative navigation was determined for each case. *Results:* We identified 4607 instrumented spinal fusions in our cohort. Most cases were performed by orthopedic surgeons (63.2%) and the remainder by neurosurgeons. Of 2239 cases with identifiable etiology, CAN was utilized in 8.8%, predominantly for trauma and degenerative pathologies rather than deformity. In univariate analyses, CAN was used more often by neurosurgeons (21.0% vs. 12.4%, $p < 0.001$), in academic institutions (15.9% vs. 12.3%, $p < 0.001$), and when performed in/after 2010 (18.9% vs. 8.9%, $p < 0.001$). Differences by specialty and year remained significant in multiple logistic regression. *Conclusions:* Spinal CAN has proven benefit for instrumentation accuracy, but is used preferentially by academic neurosurgeons. Significant gains must be made in cost and usability to improve access across disciplines and institutions.

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A comparison of perioperative complication rates in adult spinal deformity correction with one versus two surgeons

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Background: Morbidity can be high in the management of adult spinal deformity patients. Complications include blood loss (EBL), durotomy, radicular pain, and postoperative hardware failure. Utilization of one versus two spinal surgeons in spinal deformity correction reduces overall perioperative morbidity is unclear. *Methods:* All procedures were performed by surgeons at a single institution between January 2012-2015. Patients were followed for a minimum of one year and maximum of four years. We retrospectively reviewed 60 cases of adult spinal deformity. Our cohort was divided into 1 versus 2 surgeons (12 vs 48 cases). We analyzed these cases for estimated blood loss and peri-operative complications. *Results:* Cases involving long thoracic to pelvis correction (T3-T6) was 20.8% in the 2 surgeons group and 8.3% in the 1 surgeon group. The EBL > 3.0 L for 1 versus 2 surgeon groups were 25% and 41.6% respectively. Major complications in the 1 versus 2 surgeon group were 25% and 47.9% and the revision rates were 25% versus 37.5%. The percentage of minor complications in the 1 versus 2 surgeon group was 33.3% versus 14.6%. *Conclusions:* Utilizing two surgeons did not reduce complication rates. Procedures performed by two surgeons were more extensive deformity corrections. The extent of correction is the likely explanation for differing complication rates.

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The predictors of patient morbidity after adult spinal deformity correction: bone mineral density and the extent of deformity correction

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Background: Instrumentation failure (IF) such proximal junctional kyphosis/failure or distal junctional failure (PJK/PJF/DJF), rod fracture and screw-loosening can cause morbidity in patients with spinal deformity correction. Factors such as bone mineral density (BMD) or region of deformity correction may play a role in postoperative IF. *Methods:* We reviewed the relationship between IF and BMD or extent of spinal deformity. IF includes PJK/PJF/DJF, fractured rod, screw-loosening, radiculopathy, and non-union. BMD groups included Normal, osteopenia/osteoporosis, and Unknown. The extent of correction included Lumbar, Short Thoracolumbar (5-8 levels), Long Thoracolumbar (8 to 12 levels), and Cervical-thoracic. *Results:* 60 patients (41:19 F:M) were included, with average age of 65. Total IF = 29 patients (48.3%). Normal BMD in N=14, with half of them (50.0%) developing IF; Low BMD in N=15, with one-third of them (33.3%) developing IF. Lumbar correction was performed in N=19, with IF in 36.8%; Short Thoracolumbar correction was performed in N=28, with IF in 46.4%; Long Thoracolumbar correction was performed in N=11, with IF in 81.8%; and Cervical correction in N=2, with no postoperative IF. *Conclusions:* Patients that received long-segment thoracolumbar had the highest rates of postoperative morbidity. We did not demonstrate an association between abnormal BMD and postoperative IF. A larger study would be needed for further investigations.

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Anterior surgical fixation for cervical spine flexion-distraction injuries

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Background: Optimal surgical management for flexion-distraction cervical spine injuries remains controversial with anterior, posterior, and circumferential fixation being accepted. Here, we examined risk factors for clinical and radiographic failure in patients with one segment cervical flexion-distraction injuries having undergone anterior surgical fixation. *Methods:* A retrospective review of 57 consecutive patients undergoing anterior fixation for cervical flexion-distraction injuries between 2008-2012 was performed. The primary outcome was the number of patients requiring additional surgical stabilization and/or radiographic failure. Data collected included age, gender, mechanism and level of injury, facet pattern injury, and vertebral endplate fracture. *Results:* Six patients failed clinically and/or radiographically (11%). Four patients (7%) required additional posterior fixation. Two patients identified met radiographic failure criteria, however had fused radiographically, were stable clinically, and no further treatment was pursued. Progressive kyphosis and translation correlated with need for revision ($p < 0.05$ and $p = 0.02$,