

fusion, respectively. All measurements and judgements were performed by an independent radiologist.

RESULTS: Six-month results for segmental mobility were available for 71 patients (39 ABC/32 CSLP). Baseline (immediately postoperative or at discharge) mean segmental motility for the ABC group was 1.67 mm, 1.37 mm after 3 mos and 0.5 mm after 6 mos. For the CSLP group these values were 0.95 mm, 1.9 mm, and 1.88 mm. The difference at 6 mos between both groups is significant ($p=.009$). There have been 4 patients with hardware complications within the CSLP group ($n=41$) and no implant complications within the ABC group ($n=45$), $p=.048$, Fisher exact test.

CONCLUSIONS: There is now evidence, that dynamic plate designs provide a more rapid fusion in cervical spine surgery than rigid plate designs. Moreover, the rate of implant complications tends to be lower in this group. To date, these interim results are just true for the 6-month follow-up period.

FDA DEVICE/DRUG STATUS: ABC dynamic anterior cervical plating system: Approved for this indication; CSLP Plating System: Approved for this indication.

CONFLICT OF INTEREST: No conflicts.

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P22. Anterior Screw Fixation in Type II Odontoid Fractures: Is it a Reliable Method in the Elderly?

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BACKGROUND CONTEXT: Optimal surgical treatment in elderly patients with type II odontoid fracture, which is the most common injury of the axis, is still controversial.

PURPOSE: The purpose of this study was to compare the outcomes of treatment between age groups in type II odontoid fracture using anterior screw fixation.

STUDY DESIGN/SETTING: A retrospective study to validate the usefulness of anterior odontoid screw fixation, especially in the elderly with type II odontoid fracture.

PATIENT SAMPLE: Twenty-nine patients who had Type II odontoid fracture were treated consecutively by anterior odontoid screw fixation between 2001 and 2004. The patient group comprised 23 men and 6 women. There were 13 patients aged 60 years or older (Group 1) and 16 patients younger than 60 years of age (Group 2).

OUTCOME MEASURES: The medical records, simple X-rays, and CT scans of all patients were reviewed and fusion rate, union time, incidence of perioperative complications, neurological outcome, and mortality were compared between two groups.

METHODS: Patients were grouped as follows: group 1: 60 years or older (mean age, 64.5 yr); and group 2: younger than 60 years (mean age, 38.4 yr). Radiological and clinical follow-up were performed on each group and compared. Statistical analysis was performed with Fisher exact test. A p value of <0.05 was considered statistically significant.

RESULTS: All patients were treated with anterior odontoid screw fixation by use of one compression screw. Mean follow-up was 18.3 months. Fusion rates were 77% in group 1 and 81% in group 2. If follow-up studies revealed pseudoarthrosis, additional dorsal fixation with transarticular C1-C2 screws or C1-C2 posterior screw-rod fixation with bone graft was performed. Mean union time was 17.1 weeks in group 1 and 14.4 weeks in group 2. Neurological status at admission and after treatment was similar in both groups. Statistical analysis did not show significant differences for other factors between two groups except union time.

CONCLUSIONS: Outcome after anterior odontoid screw fixation in type II odontoid fracture, especially in the elderly, is comparable to that of the younger patients. Therefore, anterior odontoid screw fixation can be a useful method to treat the type II odontoid fracture in the elderly.

FDA DEVICE/DRUG STATUS: Cannulated Compression Screw (AO): Approved for this indication; Herbert Cannulated Screw: Approved for this indication.

CONFLICT OF INTEREST: No conflicts.

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P23. IDE Clinical Results of the ProDisc-L: Comparison of Training Cases to Randomized Trial

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BACKGROUND CONTEXT: As part of the initiation of the IDE trial of ProDisc-L, three nonrandomized training procedures were performed by each investigation site or primary investigator before beginning the randomized portion of the study. The purpose was to familiarize the surgeon with the surgical technique as well as the instrumentation after receiving didactic instruction and observing a senior surgeon doing several cases.

PURPOSE: To compare results of patients treated with a ProDisc-L as part of the 'training cases' to patients treated with a ProDisc-L in the randomized arm of the clinical trial.

STUDY DESIGN/SETTING: A multi-center prospective, randomized clinical trial was completed to assess the safety and efficacy of the ProDisc-L prosthesis (Synthes Spine, L.P.) compared with fusion at one level from L3-S1.

PATIENT SAMPLE: There were 3 nonrandomized patients treated with ProDisc-L as 'training cases' at each of 17 centers for 51 enrolled and 50 treated (ProDisc-L-NR). These are compared with 161 patients treated with ProDisc-L at 1 level in the randomized arm from the same 17 centers (ProDisc-L-R) of the IDE trial.

OUTCOME MEASURES: SF-36, VAS, Oswestry Disability Index (ODI), neurologic status, radiographic ROM.

METHODS: Efficacy was evaluated by the SF-36, VAS, Oswestry patient assessments, and range of motion (ROM) measurements. ROM was measured using standard radiographic methods. All patients were assessed preoperatively and postoperatively at 6 weeks, 3, 6, 12, 18, and 24 months.

RESULTS: Demographics were not different among patient populations. Average age (years) was 37.9 ± 8.0 for ProDisc-L-NR and 38.7 ± 8.0 for ProDisc-L-R. Gender was 40% male for ProDisc-L-NR versus 51% male for ProDisc-L-R. A higher number of ProDisc-L-NR patients (48%) versus ProDisc-L-R patients (35.4%) had a previous surgical procedure. There was no significant difference between the two arms in operative time (ProDisc-L-NR: 125 ± 46.1 vs. ProDisc-L-R: 121 ± 59.2), blood loss (ProDisc-L-NR: 189 ± 155.3 vs. ProDisc-L-R: 204 ± 231.3), and days of hospital stay (ProDisc-L-NR: 3.4 ± 1.39 vs. ProDisc-L-R: 3.5 ± 1.29). The retroperitoneal approach was used in 96% of ProDisc-L-NR patients and 99% of ProDisc-L-R patients. ODI and VAS pain scores were significantly less at all follow-up timepoints for all patients compared with presurgery ($p<.0001$). At 2 years, there was no difference in ODI improvement (ProDisc-L-R: 46% vs. ProDisc-L-NR: 57%), and VAS satisfaction (ProDisc-L-NR

79.5±28.1 mm vs. ProDisc-L-R 76.7±29.2 mm). There was slightly greater improvement in VAS pain for ProDisc-NR (89.6%) than for ProDisc-L-R (79.2%). There was no difference between F/E ROM measurements between ProDisc-L-NR (8.8±4.59°) and ProDisc-L-R (7.7±4.67°). There were no reoperations in the 'training cases' versus (6/161) in the randomized patients.

CONCLUSIONS: This study reports Class I data for the ProDisc-L. There was no difference in operative time, blood loss, and hospital stay between 'training cases' and randomized patients treated with ProDisc-L. Outcomes of 'training cases' were similar or improved compared with patients treated with ProDisc-L in the randomized study. These results support the ease and reproducibility of the ProDisc-L technique and instrumentation and a rapid learning curve for the surgical procedure.

FDA DEVICE/DRUG STATUS: ProDisc-L: Approved for this indication.
CONFLICT OF INTEREST: Author (JZ) Consultant: Synthes Spine; Author (JZ) Grant/Research Support: Synthes Spine.

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P24. Reliability and Accuracy and of Fine-Cut CT Scans With Reconstructions to Evaluate Status of Posterolateral Fusions With Surgical Exploration as the Reference Standard

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BACKGROUND CONTEXT: Surgical exploration continues to be the gold standard to evaluate the status of a posterolateral fusion and for the diagnosis of nonunion. An accurate noninvasive test would be desirable. Previous studies on the accuracy of CT scans using 6-mm axial slices reported a 57% to 80% correlation with surgical exploration. Current high-resolution CT scanners produce contiguous 1-mm-thick axial sections to optimize spatial resolution and to enhance the quality of computer-generated reformatted images.

PURPOSE: To determine the accuracy of fine-cut computed tomography scans with coronal and sagittal reconstructions to determine the status of an instrumented posterolateral fusion by using surgical exploration as the reference standard.

STUDY DESIGN/SETTING: Cross sectional, blinded.

PATIENT SAMPLE: Patients who underwent a posterolateral fusion, who subsequently had a fine-cut CT scan to evaluate the fusion and required a revision surgery for any indication (nonunion, painful instrumentation, adjacent level degeneration) were included in the study.

OUTCOME MEASURES: Evaluation of facet and posterolateral fusion on fine-cut CT scans and surgical exploration as the reference standard.

METHODS: Three spine surgeons evaluated the facet and posterolateral fusions of 93 CT scans over 163 levels. Right and left facets and posterolateral gutters were classified as fused or not fused. The surgeons were not aware of the findings on surgical exploration. The kappa coefficients for inter-observer variability were calculated. The likelihood ratios (LR) when both, one, or none of the facets and when both, one, or none of the posterolateral gutters were not fused were calculated. The likelihood ratio for a positive result tells how much the odds of the disease increase when a test is positive. Sensitivity and specificity could not be calculated as the results are not dichotomous.

RESULTS: The kappa coefficient for inter-observer variability for evaluating facet fusions (0.42) and posterolateral fusions (0.32) showed moderate agreement between the raters. When both facets were read as not fused, it is 4.09 times more likely that the patient has a nonunion on surgical exploration, when one facet is not fused it is 1.33, and when both facets are fused, it is 0.36. When both posterolateral gutters were read as not fused, it is 2.94 times more likely that the patient has a nonunion on surgical exploration, when one posterolateral gutter is not fused it is 2.14, and when both posterolateral gutters are fused it is 0.16 (Table 1).

Table 1

Facet Fusion	Likelihood Ratio	Predictive Probability
Nonunion Both facets	4.09	80%
Nonunion One facet	1.33	57%
Solid Both facets	0.36	26%

Posterolateral Fusion	Likelihood Ratio	Predictive Probability
Nonunion Both facets	2.94	75%
Nonunion One facet	2.14	68%
Solid Both facets	0.16	14%

CONCLUSIONS: The reliability of fine-cut CT scans with reconstructions based on the kappa statistic is moderate. The probability of a patient having a nonunion on surgical exploration is higher when both facets are not fused (80%) than when both posterolateral gutters are not fused (75%). The probability of a patient having a solid fusion is higher when both posterolateral gutters are fused (86%) than when both facets are fused (74%). When either only one facet or one posterolateral gutter is fused, the CT scan is not predictive of nonunion or solid fusion. The probability of a patient having a nonunion on surgical exploration when both facets and both posterolateral gutters are not fused is 88%.

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

CONFLICT OF INTEREST: Authors (MD, SG) Consultant: Medtronic Sofamor Danek; Authors (MD, SG) Grant/Research Support: Medtronic Sofamor Danek; Author (SG) Royalties: Medtronic Sofamor Danek.

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P25. Removal of Lumbar Interbody Devices and Implants: Complications of Anterior Exposure of the Spine

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BACKGROUND CONTEXT: Lumbar interbody fusion has become an increasingly popular method for arthrodesis. Consequently, the number of anterior revision procedures has increased. The anterior approach provides access to greater bony surface area but carries the added risk of serious injury to the great vessels, abdominal adhesions, and a higher incidence of morbidity. These risks are even higher with revision procedures. The complications associated with this type of revision have not been reported.

PURPOSE: To report on patients having undergone revision lumbar surgery anteriorly to remove interbody devices placed anteriorly or posteriorly and to determine the incidence of associated complications.

STUDY DESIGN/SETTING: Retrospective cohort study was conducted at two inpatient facilities.

PATIENT SAMPLE: Fourteen consecutive patients having undergone anterior removal of interbody devices.

OUTCOME MEASURES: No outcome tools were used. This was strictly a review of intraoperative complications.

METHODS: The clinical and radiographic results of 13 consecutive patients who had removal of interbody devices through an anterior approach and one patient with removal of anterior fixation (7 male, 7 female; mean age 43 years, range 28 to 62 years) were reviewed. The procedure during which the original implant was placed was a posterolateral lumbar interbody fusion (PLIF) in 4, transforaminal (TLIF) in 5, and anterior (ALIF)