THE EFFECT OF PARTIAL FACETECTOMY VS. NO FACETECTOMY ON VERTEBRAL PURCHASE OF COLORADO-2 PEDICLE HOOK

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INTRODUCTION: Partial facetectomy can improve the seating of the hook on the pedicle by different ways. The recommended pedicle hook placement in Colorado-2 system is without facetectomy. There is no biomechanical study in the literature comparing the strength of hook/laminar interface between the partial facetectomy an~ no facetectomy in the Colorado-2 pedicle hook (C2PH) design against 45 degrees posterolateral pull-out force.

MATERIAL&METHODS: T4, T5, T8 and T9 levels of 5 fresh frozen human cadavers were instrumented with C2PH. Half of the implant sites were undergone to facetectomy.

The potted specimens, embedded in U shaped metal profile filled by PMMA, were mounted with a 45 degrees of angle to the lower platform of MTS Mini Bionix Model Machine and a pull-out force 45 degrees posterolateral to the specimen was applied by the upper arm of the MTS machine. The lower platform was blocked and the upper arm permitted only for hinge movement between the rod and instrument during the posterolateral pull-outs.

RESULTS: All of the no facetectomy cases (100%) showed gap between pedicle and the hook and medialization in the x-rays. Half (%50) of the facetectomy cases showed ideal seating while the others (%50) showed some medialization or gap. The failure forces and failure patterns of no facetectomy (609N) and facetectomy (636N) groups were quite similar. But a trend of difference appeared when the ideally seated facetectomy group (778N) compared with the other cases (493N) of this group ($p<0.1$).

CONCLUSION: Facetectomy can reduce the strength of the lamina in cases which the, hook does not seat ideally. This effect probably due to destruction of the integrity of the lamina and facetectomy can become a risky procedure if the hook misses the pedicle. But facetectomy can facilitate the ideal seat of the pedicle hook onto the pedicle in Colorado-2 pedicular hooks and contribute more strength even without using any additional tools.

ORAL PRESENTATION

COMPARISON OF VERTEBRAL PURCHASE STRENGTH FOR SEGMENTAL TRANSLATION OF PEDICLE SEREWS, SUBLAMINAR WIRES, PEDICLE HOOKS AND MODIFIED PEDICLE HOOKS

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INTRODUCTION: Anchoring of pedicle hooks to the lamina provides improved stability and increased pull-out strength. Studies compared anchored pedicle hooks to standard pedicle hooks as well as pedicle screws against posteriorly directed pull-out force. However, scoliosis correction creates a posterolateral resultant force. The goal of this study was to perform mechanical testing simulating the posterolateral force created with the translational correction of scoliosis.

METHODS: After the measurement of BM D, 26 fresh frozen human cadavers were instrumented with Colorado Pedicle Hook (CPH), CPH-Staple (CPHS), USS-Pedicle Hook (USSPH), Colorado Pedicle Screw (CPS), and Luque Sub-Laminar Wire (LSLW) in the unconstrained but only the hooks were used in the constrained study. Pull-outs were performed in 45° posterolateraly with MTS Mini Bionix Model Machine. The lower platform was free in all movements in horizontal plane in unconstrained but blocked in constrained part of the study. The upper arm restricted only rotation in the unconstrained but permitted only for hinge movement in the constrained part of the study.

RESULTS: LDCs of CPH and CPHS showed similar characteristics as observed in CPS and USSPH. Differences in failure forces among CPHS (430+/-118), USSPH (603+/-328), and CPS (592+/-293) were insignificant, however, LSLW (788+/-290) and CPH (175+/-93) were significantly different from others in unconstrained part of the study. In the constrained part, no difference was observed between CPHS (442+/-164) and USSPH (560+/-213). Only CPH (288+/-189) increased its strength.

CONCLUSION: The LDCs of CPH and CPHS show that the latter keeps its hook properties but increases its strength with addition of the staple. Behavior of USSPH resembles CPS. While CPHS and USSPH were showing significantly higher strength than CPH, especially during the unconstrained pull-outs, they also kept their strength in constrained system. CPH and CPHS never violated the neural structures.

ORAL PRESENTATION

RISK OF ADJACENT VERTEBRAL BODY FRACTURES AFTER BALLOON KYPHOPLASTY: A BIOMECHANICAL STUDY

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INTRODUCTION: This biomechanical study investigated the incidence, location, morphology, and load required to create subsequent VB fractures adjacent to balloon kyphoplasty.

METHODS: Ten fresh human thoracolumbar specimens (9F/1 M), mean age 78±8.9yrs, each consisting ol 5 adjacent vertebrae were used. BMD was measured. VB cortices were instrumented with strain gauges. After cancellous bone disruption in the middle VB, the specimens were compressed under follower load until a fracture was observed with >25% anterior height loss. Fracture reduction was performed by balloon kyphoplasty under a physiologic preload of 250N. After bone cement hardening the specimen was recompressed until an adjacent fracture was observed either on video fluoroscopy or detected as discontinuity in the strain gauge data. The vertebral kyphosis after the initial fracture and after balloon kyphoplasty, the location and morphology of the adjacent fracture, and fracture load were recorded.

RESULTS: The initial VCF increased the vertebral kyphosis (6.2°vs.18°, $p<0.01$). Balloon kyphoplasty significantly corrected the VB deformity; however, the residual kyphosis remained larger than the intact value (6.2°vs.11°, $p<0.01$). The adjacent VB fracture occurred above the initial VCF in six specimens, and below in four. The mean fracture load was 698±328N. The BMD ol the adjacent fractured VB was smailer than un-fractured VB (99.0 vs. 119 mg/cc, $p<0.05$). Macroscopic examination showed four specimens with endplate depression and cortical wall fractures, three with only endplate depression, and three with only cortical wall fractures.

DISCUSSION: Fracture load for VB adjacent to kyphoplasty appears to be much smaller compared with that reported for the first VCF in osteoporotic spines. Low BMD was a strong risk factor lor location of subsequent fractures. The residual kyphosis and bone cement augmentation may also contribute to increased stress at adjacent levels, increasing the risk of subsequent fractures.

ORAL PRESENTATION

BIOMECHANICAL COMPARISON OF ANATOMIC TRAJECTORY VERSUS INJECTABLE CALCIUM SULFATE GRAFT AUGMENTED PEDICLE SCREW FOR SALVAGE IN CADAVERIC THORACIC BONE

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INTRODUCTION: There are many ways to salvage pedicle screws such as using larger and/or longer size pedicle screws, augmentation or inserting screws in a different trajectory. Although polymethylmethacrylate immediately increases the construct stiffness, it may cause bone necrosis, toxin relaxation and/or neural injury. On the other hand, calcium sulfate bone grafts have a high potential for biologic incorporation and no thermal damage effeat. The anatomic trajectory technique can use both primary and revision procedures. The object of this study is to compare the biomechanical periormance of the two pedicle screw revision techniques in order to assist in clinical decision making.

MATERIAL AND METHODS: Polyaxial pedicle screws were lirst inserted with a straight forward approach on both sides ol 17 fresh human cadaveric thoracic vertebrae. The maximal insertion torque (MIT) for each screw was measured and then axial pull-out strength (POS) were recorded. Afterwards, these pedicle screws were randomly assigned to be replaced either by calcium sulfate graft augmentation or anatomic trajectory lor salvage. The graft augmented screws were placed utilizing the previous holes. Finally, MIT and POS ol the revision screws were recorded.

RESULTS: The mean MIT decreased with the anatomic trajectory salvage technique when compared to the straight lorward approach, 0.23 Nm vs 0.38 Nm, respectively (p=0.003). The anatomic trajectory revision resulted in decreased POS when compared lo the POS ol the straight forward, 297 N vs 469 N, respectively (p=0.003). The graft augmentation increased the POS when compared to the POS of the straight forward, 680 N vs 477 N, respectively (p=0.017). The mean POS ratio of revised screw to original was 0.71 for anatomic trajectory screws and 1.8 for graft augmented screws (p=0.002).

CONCLUSION: This study demonstrated that graft augmented pedicle screw achieved belter POS than the anatomic trajectory technique in cadaveric thoracic spine.

ORAL PRESENTATION

METOPROLOL TREATMENT DECREASES TISSUE MYELOPEROXIDASE ACTIVITY AFTER SPINAL CORD INJURY IN RATS

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INTRODUCTION: Neutrophil infiltration has been reported to play an important role in spinal cord injury (SCI). In addition to their cardioprotective effects, beta-blockers have been found to have neuroprotective effects on central nervous system. In the currenl study, the authors investigated the effect of metoprolol on myeloperoxidase (MPOIE activity, a marker of neutrophil activation, in spinal cord alter experimental traumatic injury in rat.

MATERIALS AND METHODS: Rats were divided into six groups. Controls (1) received only laminectomy. The sham operated group (2) received laminectomy and spinal cord samples were taken at 4 hr of laminectomy. The trauma only group (3) underwent 50. g/cm contusion injury with no medication. Groups 4, 5, and 6 received 30 mg/kg methylprednisolone, 1 mg/kg metoprolol, and 1 ml saline, respectively. All the medications were given intraperitoneally as a single dose, immediately alter trauma. Spinal cord samples were taken at 4 hr of trauma and studied for MPO activity.

RESULTS: The results showed that tissue MPO activity increased alter injury. Both metoprolol and methylprednisolone treatments were decreased MPO activity indicating that reduction in neutrophil infiltration in damaged tissue. The effect of metoprolol on MPO activity was found to be similar to the methylprednisolone.

CONCLUSION: Metoprolol showed neuroprotection property after confusion injury to the rat spinal cord by decreasing MPO activity. Further studies are required to identify the protective effect of metoprolol after spinal cord injury.

ORAL PRESENTATION

LOAD SHARING BETWEEN CORTICAL AND TRABECULAR BONE WITHIN A HUMAN THORACIC VERTEBRAL BODY: AN IN VITRO BIOMECHANICAL STUDY

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INTRODUCTION: The vertebra has a composite structure, composed of trabecular centrum surrounded by cortical shell. The cortical and trabecular components share the load when the vertebra undergoes axial loading. The issue of load sharing between the centrum and shell of the vertebral body and its relevance to age related fractures is poorly understood and published results are contradictory.

MATERIAL and METHODS: Seven cadaver spines including T5-T12 levels were used for this study. Each vertebrae was separated and surrounding musculature was removed. Each corpus was separated from its posterior elements and cleaned using alcohal and ether for strain gauge application at the mid level of the vertebral body. Four uniaxial strain gauges were altached to the cortex in parallel to the longitudinal axis of each vertebra. Each vertebra was placed in MTS Allience RT/10 materials testing machine and exposed to compressiye load. The testing is repeated with different loads (200-400-600 N) and speeds (1-5-10-25 mm/see). Alter intact testing, trabecular bone was removed in a step-wise fashion [25%, 50%, 75%, and 100% of the trabecular bone (TB)] through a window at the bottom end-plate. All tests were repeated alter each step. Using the strain data from "100% TB removal" the percentage of the load at the cortical bone was calculated for each condition.

RESULTS: The strain recorded from the cortex increased steadily as the TB was removed gradually. Although load sharing rate showed some changes for different levels, loads, and speeds; approximately 40-45% of the total load was experienced by cortex in a intact vertebra. The effects of level, osteoporosis and testing conditions on the load sharing were analysed using statistical methods.

CONCLUSIONS: Results suggested that the cortical bone took al most 40-45% of the lotal axial load acting upon a vertebra. Moreover, this percentage did not show significant change even though the trabecular bone vanished 50%.

ORAL PRESENTATION

SPINAL IMPLANTS AND RADIATION THERAPY: THE EFFECT OF VARIOUS CONFIGURATIONS TITANIUM IMPLANT SYSTEMS IN THE SINGLE VERTEBRAL METASTASIS MODEL

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INTRODUCTION: Combination of surgery and radiotherapy is a common clinical practice in management of spine tumors. Although it is known that metallic implants disturb radiotherapy beams, it has been a mystery how these disturbances reflect in case of spinal irradiation in the presence of a spinal implant. The aim of this study is to investigate the effect of various spinal implant combinations on the radiotherapy dose in a vertebra metastasis model.

MATERIALS AND METHODS: Standard saw bones and the following implant combinations were used, posterior instrumentation with or without anterior column titanium cage reconstruction, anterior instrumentation and anterior column reconstruction with titanium cage or bone cement. 60C˚ and LINAC irradiation was performed twice and thermoluminescent dosimeters were used to measure the dose changes at the spinal canal.

RESULTS: The posterior instrumentation models resulted in 5 to 7 % decrease in the radiation dose delivered to the spinal canal at all energy levels, whereas the anterior instrumentation systems resulted in <1 % decrease with LINAC, and <2% increase with 60C˚ irradiation. When the center of the spinal canal was evaluated individually, the anterior instrumentation with cement reconstruction model resulted in 5,5% increase in the delivered radiation dose with 60C˚ irradiation, whereas, other instrumentation models with both energy levels resulted in a dose disturbance of <1 %.

CONCLUSIONS: Our results demonstrate that spinal implants have variable dose perturbation effects depending on the spinal implant construct and energy level of the radiotherapy beam. The majority of these changes are statistically different from implant-free irradiation, but the clinical significance of these changes is questionable. However, in order to stay on the safe side, anterior instrumentation with anterior titanium cage reconstruction system, which has the least dose perturbation effect, should be the implant of choice.

ORAL PRESENTATION

THE EFFECT OF PEDICLE SCREW PLACEMENT ACROSS THE NEUROCENTRAL CARTILAGE ON THE MORPHOLOGY OF THE SPINAL CANAL AND PEDICLE IN IMMATURE PIGS

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INTRODUCTION: Transpedicular fixation has been less commonly applied to pediatric population especially because of the risk of damage of the NCC. The aim of this study is to investigate the effects of pedicle screw insertion on spinal canal and pedicle morphology in immature pigs, and if transpedicular fixation has an effect, to document whether this occurs due to inhabitance of the screw inside the growth plate (neurocentral cartilage-NCC) or due to compression applied across the NCC.

MATERIALS AND METHODS: Twelve newborn pigs (4-6 weeks of age) were operated. left sided pedicles from L 1 to L5 were studied, while right sides served as controls. Pigs were randomly assigned into 3 groups: I; Pedicles were probed only. II; Screws were inserted. III: Alter screw insertion, a washer and a nut were engaged at the pedicle entry point so that gradual compression across the NCC was achieved. Alter 4 months, spiral CT was used to measure the pedicle lengths, and size of the halves of the spinal canal.

RESULTS: In group I, the operated hemicanal area was not statistically different from the nonoperated side (p=0.159). Pedicle screw insertion either with (p=0.007) or without (p=0.005) compression resulted in smaller hemicanal area and shorter pedicles at the operated side, respectively (p=0.008 and p=0.021). Approximately %4-9 shortening of the pedicle lengths, and %20-26 narrowing of the hemicanal areas on the instrumented side occured with transpedicular instrumentation (Group II, III).

CONCLUSION: Even without compression, pedicle screws passing through the NCC in immature pigs disturb spinal canal growth significantly. Clinical relevance for young children should be further studied.

ORAL PRESENTATION

BIOMECHANICAL MODELLING OF INTRADURAL PRESSURE ALTERATIONS IN SPINE TRAUMA

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INTRODUCTION: The severity of biomechanical instability in spine traumas may affect the neurologic status, however, the relationship between neurologic and biomechanical instability is stili controversial. The aim of this study was to detect intradural pressurı alterations under fixed loadings in a spine model with biomechanical instability, and thus to evaluate the concept of neurologic instability from a different perspective.

MATERIALS AND METHODS: Nine sheep lumbar spine segment (L1 to L5) were tested Spine segments were freed from the muscles and a transducer catheter was placed into the subarachnoid space. Intradural space was filled with radio opaque dye and ends of the dura were closed with knots. The catheter was connected to the pressure measurement monitor. A special biomechanical testing device was designed for this study. The samples were loaded with 400 Newton (physiologic loading) under flexion extension, right and left side bendings. Interspinous and intervertebral disc space heights and intradural pressure alterations were recorded. All measurements were repeated after left facet joint, right facet joint, and disc excisions, respectively. During, testing, two examples were out of the study because of the dural tears. The results of the seven segments were compared with the Wilcoxon and Friedman tests for statistical analysis.

RESULTS: Under flexion and side bendings, there were no differences of intradural pressure alterations between intact spine, one or two facet joint excision, and the spine with three elements removed. However, under extension loading, an increase in intradural pressure was recorded (p=0.018). This pressure alteration was more prominent in intact spine.

CONCLUSION: Injuries of the spine elements may cause alterations of intradural pressure during physiologic movements. The clinical studies are needed to outline the relation of these pressure alterations with neurologic injuries.

ORAL PRESENTATION

ANATOMIC VARIATIONS OF THORACIC DUCT AND ITS IMPORTANCE IN SPINE SURGERY

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INTRODUCTION: The evaluation of the anatomic features of the thoracic duct may be important for spine surgery because iatrogenic or traumatic injuries are reported. Anatomic studies are only few and morphology of the thoracic duct is stili unclear. The aim of this study was to evaluate the anatomic variations of the thoracic duct.

MATERIALS AND METHODS: Nine thoracic ducts were dissected from formaldehyde preserved male cadavers. The drainage patterns, ductus diameter in upper-mid and lower thoracic segments, tributaries and morphology of cisterna chili were determined. The position of thoracic duct in respect to the vertebra and the relationships with the azygos vein were ascertained. Means and standard deviations were used as descriptive measures to define variations.

RESULTS: Thoracic duct was detected in all cases. Main tributaries were located at the upper (T 4-6) and lower (T10-12) thoracic segments. In all cases, thoracic duct was located in the midline at the thoracolumbar junction, however, at the upper part, it was tend to place slightly left side of the anterior longitudinal ligament. Two major anatomic variations were detected in thoracic duct. Thoracic ducts were superficial according to the azygos vein, but in one case, a major tributary was placed under the azygos vein. Eight of nine cadavers had cisterna chili. It was placed at T12-L 1 junction and generally !ocated at the midline.

CONCLUSION: Two different anatomic variations were detected. The location and the anatomic variations of the thoracic duct may complicate the anterior surgery and these variations should be considered.

ORAL PRESENTATION

ADJACENT LEVEL SPONDYLOSIS AFTER ANTERIOR CERVICAL FUSION: AN EXPERIMENTAL MODEL

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OBJECTIVE: Adjacent level spondylosis is a major inconvenience of the fusion after anterior cervical discectomy. Animal models for adjacent level spondylosis is lacking in the literature. This study is planned to develope an animal model of adjacent level spondylosis.

METHOD: 64 white rabbits underwent anterior cervical surgery. Ten rabbits are sacrificed for morphometric measurements to produce a plate system. 20 rabbits underwent anterior discectomy at C3-C4 level and a plate with two screws at C3 and C4 bodies was placed (Group A). 20 rabbits had discectomy at C3-C4 and C4-C5, and a plate was placed at C3, C4 and C5 bodies (Group B). 14 rabbits had sham operatians without discectomy or fixation (Group C). All groups are divided into two subgroups: one is sacriliced 6 months and the other subgroup is sacriliced 12 months alter surgery.

Whole cervical spine is excised and fixed in 10% formaline solution. Upper and lower segments ol the fixation levels were examined according to Miyamoto Classification in a blind fashion and a five Grade scaling system was used.

RESULTS: All animals having plate fixations showed significant fusion at discectomy levels and different grades of adjacent level spondylosis. One or two level plate fixatian did not cause significant difference of upper or lower disc levels in 6 month evaluations. The number of Grade 3 & 4 degeneration was 16,7% in Group A1, 11,1 % in Group A2, 18,8% in Group B1 and 42,9% in Group B2 ($p<0.05$). Pathological grading of animals with two level discectomy and plate fixation at 12 months showed significantly more spondylosis in adjacent levels than 6 months evaluation and one level fixation.

CONCLUSION: This study describes a reproducible animal model for adjacent level spondylosis alter ACDF and plate fixation. Animals with two level fixation and 12 month follow-up had significantiy more severe degeneration at adjacent levels, than 6 month evaluations and than animals with one more level plate fixation.

ORAL PRESENTATION

THE COMPARISON OF IN VITRO RESULTS OF SURGICAL RECONSTRUCTION WITH THE RESULTS OF COMPUTER ANALYSIS IN SHEEP VERTEBRA CORPECTOMY MODELS

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INTRODUCTION: The reconstruction of corpectomy defect is essential to restore biomechanical stability of the vertebral column. This study aims to compare the reconstruction methods made by bone cement and chest tube together with bone cement in terms of stability against axial compressive loading; to make the same experiments by using finite element analysis.

MATERIALS AND METHODS: There were 10 sheep lumbar 4-6 vertebral unit in each three group. Group 1 served as control and L5 corpectomy defect was reconstructed with bone cement only in group 2 and with chest tube (silastic tube) and bone cement in group 3. Axial compressiye loads were applied to specimens and failure points were recorded. The same measurements were made by using finite element analysis ol L4-6 spinal unit by static analysis.

RESULTS: In vitro failure points were meanly 8490 N for group 1, 3762 N for group 2 and 5788 N for group 3. There were statistical differences between each group (p<O.05). In finite element analysis, the average tension was 200 MPa in group 1, 93.3 MPa in group 2 and 25.2 MPa in group 3.

CONCLUSION: Finite element analysis showed the exact effects ol axial compressive loadings in two different corpectomy + reconstruction methods. We conclude that linite element analysis can be used instead of the human cadaver studies and provide many different test options by using the same model.

ORAL PRESENTATION

THE EFECT OF LOCALIZATION OF TITANIUM MESH CAGES ON STABILITY AFTER CORPECTOMY: A FINITE ELEMENT ANALYSIS

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INTRODUCTION: The reconstruction of corpectomy defect is essential to restore biomechanical stability of the vertebral column. This study aims to compare the finite element models in which corpectomy defects were reconstructed by titanium mesh cages placed anterior, middle and posterior one-third of the vertebral corpus.

MATERIALS AND METHODS: By help of computed tomography images of sheep vertebra, a three level computer model of L4-L6 spine was created and L5 corpectomy was performed. Titanium mesh cages were placed in anterior 1/3in one model, middle and posterior 1/3 in the others.

RESULTS: The average tension values were meanly 320 MPa for anteriorly placed model, 124MPa for middle and 45 MPa for posteriorly placed models respectively.

CONCLUSION: Finite element analysis showed the exact effects ofaxial compressiye loadings in three different corpectomy-reconstruction models. The posterior placement of titanium mesh cage increases the axial stability and decreases the force transfer to the distal segments.

ORAL PRESENTATION

HYDROXYAPATITE COATING ENHANCES FIXATION OF TITANIUM PEDICLE SCREWS: A MECHANICAL AND IN VIVO STUDY IN A CALF

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INTRODUCTION: Previous studies showed that hydroxyapatite (HA) coatings improve fixation of stainless steel pedicle screws, with increased pull-out resistance and reduced risk of loosening. To our knowledge in this area only few HA coatings took place on titanium pedicle screws. However, the coating method used were plasma spray. Due to disadvantagous of this method we used sol-gel method.

MATERIALS AND METHODS: An experimental study was performed to investigate the elfects of HA coating on titanium pedicle screws . For this the torque resistance in a calf for uncoated and coated screws were evaluated.

The study was approved by the Atatürk University regional ethical committee for animal experiments. An eight month old male calf (120kg) used in this study. Surgical procedure was performed under aseptic conditions and assisted general anesthesia. A calf were operated in order to implant the pedicle screws at T1 0-13 and L 1-3 segments. Totally fourteen pedicle screws, which were seven HA coated, and seven uncoated were inserted in pedicle overall seven vertebral segment. Each segment had two pedicle screws in which one in the right, with uncoated, and the other in left side, coated by HA. The animal was pharmacologically euthanized 4 months later. The insertion and extraction torques were recorded using the same torque gauge manometer having a range of 25-500 Ncm (Torsiomax 775/50).

RESULTS: The mean insertion torque was found as 80.7±46Ncm for the HA-coated screws and 117.8±46Ncm for standard uncoated screws. The mean extraction torque of HA coated was found to be as 246.4±36Ncm which was significantly greater than uncoated screws 85±12.3 Ncm. The differences in extraction torque was significant ($p<0.001$). Histopathologic examination showed affluent new bone formation around HA-coated screws compared with uncoated screws.

RESULTS: HA coating of titanium pedicle screws by sol gel method resulted improved fixation with increased torque resistance and reduced risk of risk of screw loosening.

ORAL PRESENTATION

BLINDNESS INCREASES THE INCIDENCE OF LEFT SIDED SCOLIOSIS: A PINEALECTOMIZED CHICKEN MODEL

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STUDY DESIGN: Randomized prospective study using experimental scoliosis model in pinealectomized chicken.

OBJECTIVES: To investigate the effect of the side of visual impairment on the incidence and laterally of the curves on a pinealectomized chicken model.

METHODS: Sixty newly hatched white leghorn chicks were divided equally into three study groups of no visual impairment (n=20) (group 1), left sided blindness by enucleation (n=20) (group 2), and right sided blindness (n=20) (group 3), Pinealectomies and enucleations were performed on the 2nd day after hatching AP X- rays were obtained on the 5th and 10th weeks, and the incidence, side and magnitude of the resulting scoliotic curves were recorded.

RESULTS: Pinealectomy model yielded a general scoliosis incidence of 60%. The occurrence of scoliosis was not different between the groups (65%, 55%, 60% respectively, p=0.812). The incidences at 5th and 10th weeks were both 40%, due to the death of six chicken between the 5th and 10th weeks, as well as the appearance or disappearance of curves in this time period, again not different between the groups. The laterality of the curves however, was significantly different (p=0.045). The visually impaired groups tended to have left thoracic curves as frequently as the right thoracic curves (7 R, 4 L in Gr. 2: and 7 R, 6 L in Gr. 3), whereas in group 1, the thoracic curves were predominantly right sided (12 R, 1 L). The average magnitude of the curves was 30.4 7±19.32 deg., not significantly different between the groups (27.6±16.7 deg, 23.7±21.5 deg, 39.8±17.7 deg respectively, p=0.109).

CONCLUSIONS: Unilateral visual impairment does not have a significant effect on the overall incidance and magnitude of scoliosis in pinealectomized chicken. It does affect the laterality of the curves though, visually impaired subjects having a significantly higher likelihood of left thoracic curves, regardless of the side of blindness.

ORAL PRESENTATION

BIOMECHANICAL BEHAVIOR OF ANTERIOR AND POSTERIOR FIXATION OF THE SUBAXIAL CERVICAL SPINE FOLLOWING FLEXION DISTRACTION INJURIES

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PURPOSE: To compare the stability of anterior cervical locking plates with interbody fusion alone and in combination with either lateral mass constructs, or posterior interspinous wiring.

METHODS: Eighteen fresh frozen cervical spines were tested sequentially with the application of an axial load with flexion-extension and lateral bending moment arms. Measurement of the relative motion of the C4-5 segment in both the axial and sagittal planes was facilitated by the use of metal markers. Each specimen was tested intact, following sectioning of anterior and posterior soft tissues, after anterior plate fixation and interbody fusion and with augmentation with lateral mass fixation or posterior interspinous wiring.

RESULTS: Intact specimens had an average range of motion of 5.78 +/- 2.49 degrees, whereas the destabilized spines averaged 16.17 +/- 2.17 degrees. No statistically significant differences were found between specimens with only anterior plate fixation 1.84 +/- 0.85 degrees, with addition of posterior plating 1.66 +/- 2.16 degrees, or with addition of posterior interspinous fixation 0.73 +/- 0.51 degrees. However, there was a statistically significant difference between the intact specimens and both groups which included posterior fixation along with anterior plate fixation. In addition, all groups with either anterior plating alone or with the addition of posterior fixation showed a statistically significant difference when compared to the destabilized specimens.

CONCLUSION: Anterior plating and interbody fusion at the C4-5 motion segment following flexion-distraction injuries significantly increases the motion segment stability, and is comparable to supplemental posterior plating or interspinous wiring augmentation.

ORAL PRESENTATION

EFFECT OF VERTEBROPLASTY ON THE COMPRESSIVE STRENGTH OF VERTEBRAL BODIES

SPIROS GEORGE PNEUMATICOS (Baylor College of Medicine, Greece), LYNDON NGUYEN, JOHN HIPP, MICHAEL H. HEGGENESS

PURPOSE: To compare the effect of vertebroplasty on the compressive strength of unfractured vertebral bodies.

METHODS: Four cadaveric thoracic spines were used for this experiment, for a total of forty vertebral bodies. Prior to testing, each thoracic spine was submitted to bone density testing and radiographic evaluation to rule out any obvious fractures. Under image intensification, six cc of a mixture of polymethylmethacrylate (PMMA) with barium (8% of barium per 40% of PMMA) was injected into every other vertebral body of each spine specimen. Following vertebroplasty, all soft tissues were dissected from the spine and the vertebral bodies were separated and potted into circular frames to allow for mechanical testing. Testing to failure was performed using a combinalion of axial compressian and anterior flexion moments. Two pneumatic cylinders applied anterior and posterior loads at a distance ratio of 4:3 relative to the anterior vertebral body wall while two additional cylinders applied lateral loads, each at a constant rat e of 200 N/s.

RESULTS: Average failure loads for non-vertebroplasty specimens was 6724.02 t/3291.70 N, whereas the specimens injected with PMMA failed at an average compressiye force of 5770.50 +/- 2133.72 N. No statistically significant difference in failure loads could be found between intact specimens and those which had undergone vertebroplasty.

CONCLUSION: We were surprised to note that under these loading conditions, no significant increase in compressiye strength of the vertebral bodies could be documented. This suggests that same caution be applied to the concept ol "prophylactic" vertebroplasty in patients at risk for fracture.

ORAL PRESENTATION

IN VITRO COMPARISON OF BIORESORBABLE AND METALLIC CERVICAL FUSION PLATES IN STABILIZING A SINGLE-LEVEL ACDF

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INTRODUCTION: Anterior cervical discectomy and fusion (ACDF) with plating is a widely accepted treatment for degenerative cervical disc pathology. Metal plates have been successfully used to increase the fusion rate. However stress shielding, image degradation, dsyphagia, and implant failure are problems associated with metal plate instrumentation. Bioresorbable polymeric plates may be preferable in that they provide bioresorbable qualities and mav provide less stress shielding. The purpose of this study was to compare the flexibility of a bioresorbable graft containment plate with that of a static titanium plate following simulated ACDF.

METHOD: Twelve human cervical spinal segments (C2-3, C4-5, C6-7) were tested intact to ±2.5Nm in flexion-extension and axial torsion with a 20N axial preload, and resulting motions were recorded. Discectomy and grafting were performed, and tests were repeated after plating with either bioresorbable poly (L,D-lactide) plates (n=6, Inion) or static titanium plates (n=6, DePuy). The range of motian (ROM) was calculated for all states, and percent reduction in ROM was calculated for intact vs. uninstrumented ACDF vs. two types of plated ACDFs. Groups were compared using a t-test.

RESULTS: Uninstrumented ACDF did not provide a repeatable change from the intact ROM (mean reduction ± SD = 3±35%). Compared to uninstrumented ACDF, metal plates significantly reduced the ROM by 65±11% ($p<0.001$), and bioresorbable plates significantly reduced ROM by 55±13% ($p<0.001$). The percent reduction in ROM provided by the two plates did not differ significantly ($p=0.16$).

CONCLUSIONS: Bioresorbable and titanium plates both stabilized a single-level simulated ACDF in this study. While the two plate systems did not differ significantly in vitro, invivo behavior is currently being investigated. However, this study does suggest that significant stabilization is achieved by bioresorbable graft containment plates in the immediate post-operative state.

ORAL PRESENTATION

EFFECT OF MELATONIN AND MELATONIN RECEPTORS ON CASPASE-3 AND MYELOPEROXIDASE ACTIVITY AFTER SPINAL CORD INJURY

ERKAN KAPTANOĞLU (Ankara Numune Education Hospital, Turkey), SELÇUK PALAOĞLU, ÖZERK OKUTAN, İHSAN SOLAROĞLU, KAMER KILINÇ

INTRODUCTION: The aim of the present study was to demonstrate the effect of melatonin on caspase-3 (apoptosis) and myeloperoxidase activity (neutrophyl infiltration) after experimental spinal cord injury. Luzindole, a melatonin receptar blocker, has been used in order to show the effect of melatonin receptors on this neuroprotection.

MATERIALS AND METHODS: Randomly selected adult Wistar rats were used for the study (n=8 for each). The groups were Control (no trauma), Trauma (50 g-cm, weight drop), Treatment with Methylprednisolone (MPSS, 30mg/kg), Melatonin (10mg/kg), Luzindole and Melatonin (5mg/kg and 10 mg/kg, respectively), and Vehicle (5% ethanol). Tissue samples from spinal cord were obtained 24 hours after clinical evaluation.

RESULTS: Trauma itself has increased the caspase-3 and myeloperoxidase activity at the injury site. Although melatonin prevented an increase in myeloperoxidase activily after spinal cord injury, it did not prevent the increase in caspase-3 activity in the rat spinal cord after injury. The effect of melatonin on MPO activity seems to be partly due to melatonin receptors. When melatonin was used after luzindole, increase in caspase-3 activity was prevented comparing to trauma.

CONCLUSION: These results indicate that one of the neuroprotective mechanisms of melatonin after spinal cord injury is prevention of neutrophyl infiltration but not the caspase-3 dependent apoptotic cell death.

ORAL PRESENTATION

DEVELOPMENT OF OSTEOPOROTIC VERTEBRA MODEL FOR IN-VITRO EXPERIMENTAL APPLICATIONS IN BIOMECHANICS

ATİLLA AKBAY (Hacettepe University, Turkey), SERDAR AYDIN, ÖZGÜR ILGAZ, GÖKHAN BOZKURT, SELÇUK PALAOĞLU

INTRODUCTION: Tests of newly developed spinal instrumentation material to an osteoporotic vertebra model is generally neglected because of high costs of osteoporotic vertebrae. Production of osteoporotic vertebra in animals is expensive and time consuming. Objective of this study is to produce osteoporotic vertebrae in-vitro for experimental applications in biomechanics.

MATERIAL AND METHOD: This study was performed on 24 fresh lumbar vertebrae from 4 calf. Vertebrae were divided into 2 groups (experimental and control). BMO was measured to see pre process BMD by DEXA. A hole was opened in the pedicles of each vertebra.These holes were extended with a blunt tip probe. In experimental group each vertebra was put into a glass, filled with an acid decalcifier. The decalcifier solution in 50cc volumes was introduced through the holes with an infusion pump. After keeping and irrigating, the vertebrae in the decalcifier solution for 24 h vertebrae were washed with saline. These procedures were made with saline at control group. The vertebrae were subjected to DEXA to measure post process BMD. After then both pedicles of each vertebra were tapped and pedicle screws were introduced. Following, each vertebra was secured into material testing machine. Pullout test was done at the rate of 5mm/min.

RESULTS: We used paired t-test for BMD data. The mean BMD measurement for preprocess was found as 1,43±0.08 g/cm^2 and for post process was found as 1,12±0.08 g/cm^2. The paired test showed the difference to be statistically significant ($p<0,05$). The mean peak pullout lo ad was found 704,54±190,33 N in post process group and 1709,09±352,72 N in control group. The test showed the difference to be statistically significant ($p<0,05$).

CONCLUSION: The statistical analysis showed that BMD measurement values and pedicle screw pullout forces could be reduced by this method. This method could be utilized for produce osteoporotic vertebrae for experimental applications in biomechanics.

ORAL PRESENTATION

VIDEO ASSISTED THORACOSCOPIC SURGERY (VATS) IN SPINAL DEFORMITIES: IS IT REALLY MINIMALL NVASIVE?

MOHAMED EL-MESHTAWY (Assiut University, Egypt)

This prospective study aims to assess the minimal invasive character of thoracoscopic techniques. Traditionally most of the reconstructive procedures for the management ol spinal deformities are performed through open approaches. Now these procedures can be performed using VATS. However there is a great controversy about the minimal invasive character of VATS. From August 1996 till March 2001, 178 patients with spinal deformities; Kyphosis (n=100) and Scoliosis (n=78) underwent anterior thoracoscopic spinal surgery combined with posterior instrumentation. The following points were studied: the success and safety of the thoracoscopic techniques (blood loss, operative time, operative difficulties, ICU stay, chest tube drainage and postoperative complications), the coronal and sagittal contour analysis. Conversion to open thoracotomy was not necessary in any case. The mean operative time of the thoracoscopic approach was 105 minutes (SD. 55 minutes) and the mean blood loss was 1540 ml (SD. 466 ml). Bleeding more than 2000 ml (48 patients) and ventilatory support > 72 hours (27 patients) were the most common postoperative complications. No deaths were occurred as a result of the surgical technique. The chest tube out-put was 435.5 ml in average (SD.112 ml). The follow up period was 41 months in average (range 24- 58 months). Based on our results of applying the thoracoscopic techniques for deformity patients, we think that the thoracoscopic anterior spinal surgery is a valuable minimal invasive technique. It combines the goals of improving visualization and minimizing the surgery-related patient morbidity with the goals of achieving efficacious, safe, and equivalent results when compared with its open surgical counterpart.

ORAL PRESENTATION

RESULTS OF ONE STAGE THORACOSCOPIC SPINAL RELEASE AND POSTERIOR OSTEOTOMIES FOR CORRECTION OF KYPHOTIC DEFORMITY IN ANKYLOSING SPONDYLITIS

MOHAMED EL-MESHTAWY (Assiut University, Egypt), HEINRICH BOEHM

STUDY DESIGN: A retrospective study of 24 ankylosing spondylitis patients with rigid kyphotic deformities of the thoracic and thoracolumbar spine who underwent combined anterior thoracoscopic osteotomies-fusion and posterior multiple corrective osteotomies done at one stage in the prone position.

METHODS: From 1996 through 1999, twenty-four patients with progressive kyphotic deformity of the thoracic (n=14) and thoracolumbar (n=10) spine underwent a new technique that allows the combined use of thoracoscopic anterior osteotomy and fusion, and posterior multiple V-shaped osteotomies with transpedicular fixation. The average age of the patients was 46 years (32-59). There were 18 males and 6 females. Eighty levels posteriorly and sixty-nine levels anteriorly were osteotomised in the 24 patients. The average preoperative thoracic kyphosis angle was 69 degrees (51-89) while the average lumbar fordosis was 20 degrees(+5-45). The Cobb angle of the planned area for ventro-dorsal osteotomies was 19.5 degrees in average (5-35). The mean follow up period was 41 months (24-62months).

RESULTS: All patients were satisfied with cosmesis alter surgery. The mean amount of correction was 34.5 degrees (15°-60°). The mean degree of loss of correction was 6.5 degrees (0°-12°) at the final follow up. The operative time of endoscopic procedure was 80 minutes (50-110). In no case was conversion to emergency open thoracotomy necessary. Regarding the clinical and radiographic parameters, excellent and good results were obtained in 22 patients (91.6%) at the final follow up. There was no mortality or vascular complications. No neurological complications recorded except in one patient who had neurological deterioralion postoperatively progressed from incomplete to complete paraplegia in the course of follow up.

CONCLUSIONS: Thoracoscopic anterior osteotomy and fusion approved to be safe and efficient approach.

ORAL PRESENTATION

SAFETY OF POSTERIOR SEGMENTAL INSTRUMENTATION AND FUSION FOR DYSTROPHIC SPINAL DEFORMITY IN PATIENTS WITH NEUROFIBROMATOSIS TYPE I

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INTRODUCTION: To evaluate the safety of third generation posterior segmental instrumentation of dystrophic spinal deformities in patients with Neurofibromatosis type I.

MATERIALS AND METHODS: The records of 17 patients with diagnosis of neurofibromatosis type I and spinal deformity were reviewed. The patients with dystrophic spinal deformity treated with third generation posterior instrumentation were included. Ten patients (4 female,6 male) with an average age of 10 years (4-17) and follow-up of 37,5 months(4-120) formed the subjects of this study. Four patients had previous subcutaneous rod and one patient had Luque instrumentation. Five patients had dural ectasia. All patients were neurologically intact before surgery. All patients had posterior instrumentation and nine had additional anterior release and fusion. Halo traction was used in 2 patients. Sublaminar wiring was used in five and spinous process wiring was used in four patients. Intracanal anchorage by sublaminar wires or laminar hooks at the level of intraspinal pathology is avoided. Allograft was used for fusion in all patients.

RESULTS: The major curve was corrected from preoperative average of 79°(60°-115°) to postoperative 36,22°(16°-78°)(54,1%). Thoracic kyphosis was corrected from 65,32° (38°-90°) to 35,42° (16°-50°) (45,7%) postoperatively. Hyperkyphosis was normalized in eight patients. Sagittal and coronal balance restored to normal or improved. No neurological complication or infection was observed. In one patient instrumentation was revised due to inappropriate caudal end vertebra selection.

CONCLUSION: Third generation posterior instrumentation of dystrophic spinal deformities in neurofibromatosis type I can be done safely and corrections comparable with idiopathic curves can be achieved. Even the dystrophic vertebra can be instrumented with versatility of third generation posterior systems.

ORAL PRESENTATION

SAFETY AND EFFICACY OF POSTERIOR INSTRUMENTATION FOR PATIENTS WITH SEVERE CONGENITAL SCOLIOSIS

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PURPOSE: To evaluate the safety and efficacy of posterior segmental instrumentation and correction of congenital scoliosis.

MATERIALS AND METHODS: Inclusion criteria of this retrospective study were patients with congenital scoliosis who were treated with long segment instrumentation (more than 6 functional units). 42 (32 female, 10 male) patients formed the basis of the study. Average age of the patients was 12 (4-24) years and average follow-up was 30 (1-120) months. 31 patients had spinal dysraphism. 15 patients had previous and 3 patients had simultaneous surgeries due to spinal dysraphism. 18 patients had mild neurological abnormalities preoperatively but all were ambulatory. In 13 patients anterior release was done in addition to posterior instrumentation and fusion. Wake-up test was used for spinal monitoring.

RESULTS: The major curve was corrected from of 68,7°(46°-114°) to 39.4° (20°-65°) with a 42.6% correction. The compensatory curves were corrected from 44,2° (24°-85°) to 22° (10°-48°) 50,2% correction rate. The average loss of correction for 31 patients with at least 2 years f/up was 2.4° for major and 3.52° for the compensatory curve. A patient had a paraparesia associated with misplaced upper thoracic pedicle screws with total recovery alter revision, 1 ambulatory patient with neuruological compromise had deterioration in her neurological status only to recover partially. 2 patients had superficial and 1 patient had a deep infection for which an implant removal was necessary. Implant failure with pseudoarthrosis occurred in 1 patient who was revised successfully.

CONCLUSION: Spinal instrumentation was relatively safe and efficient for patients with congenital scoliosis when translation, compression and vertebral column shortening were the maneuvers to realign the spinal column, avoiding distraction.

ORAL PRESENTATION

TURKISH SRS-22 QUESTIONNAIRE AND MINIMUM 10 YEARS FOLLOW-UP SURGICAL RESULTS OF AIS PATIENTS CLASSIFIED ACCORDING TO LENKE CLASSIFICATION

İ. TEOMAN BENLİ (SSK Ankara Hospital, Turkey), SERDAR AKALIN, MAHMUT KIŞ, ERBİL AYDIN, BÜLENT ATEŞ, VEDAT URUÇ

In this study, 109 patients of adolescent idiopathic scoliosis operated with TSRH instrumentation system were retrospectively evaluated after minimum 10 years of follow-up and were classified according to Lenke Classification and Turkish version of SRS-22 questionnaire was applied. Average follow-up period was 136.9±12.7 months and mean age was 14.4±1.9. According to Lenke Classification, 24 patients had Type I, 14 patients had Type II, 22 patients Type III, 27 patients had Type LV, 10 patients had Type V and 12 patients had Type VI curves. When all the patients were included, preoperative mean Cobb angles of upper thoracic, thoracic and thoracolumbar / lumbar curves in the frontal plane were 26.0°±13.9°, 56.9°±22.6° and 35.4°±17.6° respectively. Upper thoracic, thoracic and thoracolumbar / lumbar curves were corrected by 67.5±22.2 %, 65.9±18.2% and 61.5±20.9 % respectively postoperatively with a statistically significant change (p: 0,00) (Final rates of correction: 56.0±23.9 %, 56.7±17.7 % and 53.5±22.4 %). Normal physiologic thoracic and lumbar sagittal contours were provided in 93.6 % of the patients. Although none of the patients had a balanced curve preoperatively, in 96.3 % of the patients totally or clinically well balanced curves were provided postoperatively. At the last visit these balanced curves were maintened with a statistically insignificant decrease. Overall, main values pain, general self-image, function, mental status and satisfaction from treatment questionnaire were 3.8±0.7, 3.6±0.7, 4.0±0.8, 3.6±0.7 and 4.7±0.3 respectively at the last control visit. Regarding these values, any statisticaly significant difference was not noted related to the curve types. In the light of these findings, 10 years follow-up of the patients treated with TSRH instrumentation demonstrated an efficient correction in the frontal and sagittal plane deformities and trunk balance and life quality of the patients were generally improved subjectively.

ORAL PRESENTATION

SURGICAL MANAGEMENT OF FIFTY SIX DIFFICULT AND NEGLECTED SCOLIOSIS CASES FROM DEVELOPING COUNTRIES

ZIAD ALZOUBI (Jordan Spine Centre, Jordan)

INTRODUCTION: 56 cases of 90°-135° curves that referred to the author from several Arabic neighboring countries, where scoliosis screening and/or surgery are either not existent or very poor.

MATERIALS: 56 cases of severe scoliosis, Cobb angle more than 900 admitted for surgical correction.

METHODS: Complete pre-surgery assessments of all cases were performed, which included radiological exams, 3D CT, MRI, neurological and cardio pulmonary assessments. The risks of surgery were then discussed with patients (and their guardians), and were weighed against the risks of cardio pulmonary complication if surgery were not to be performed. All 56 patients were then treated surgically. The aim of these surgeries was to achieve partial correction and fusion to avoid progressive cardio pulmonary and neurological complications. Thirty-two were treated by anterior approach with corpectomy, discectomy and release, followed by posterior instrumentation using ISOLA system. Twenty-four cases of revision, paralytic and neglected idiopathic were treated by posterior approach and eggshell procedure, and with instrumentation whenever it was needed.

RESULTS: 35-70% correction occurred with an average of 53%. In 46 cases, there were no intra-operative or early post-operative complications. Three male cases had unilateral paresis on the concave side. However, all 3 cases improved al most completely within 3-7 months after surgery. One death occurred due to incomplete paralysis and fatigue of respiratory muscles. Late Complications: Five cases of upper hooks distraction, and one needed late re-implantation and cutting the upper part of the rod on the convex side.

CONCLUSION: We present our experience in the problems we encountered and the troubleshooting approaches we followed to solve these problems. We highlight the need for establishing spinal centers in the underdeveloped countries to increase the awareness of the pathology of scoliosis both for medical practitioners and the public.

ORAL PRESENTATION

ANTERIOR INSTRUMENTED FUSION FOR CONGENITAL KYPHOSCOLIOSIS

MAHİR GÜLŞEN, CENK ÖZKAN, CÜNEYT KAVAK (Çukurova University, Turkey)

INTRODUCTION: Mild deformities at earlyage is currently managed by posterior arthrodesis with or without instrumentation. A combined procedure, anterior release and posterior instrumentation is usually needed to achive correction when the deformity is large or the patient is an older child or adolescent. Although the surgical procedure involves an anterior approach posterior instrumentation is preferred. To our knowledge there is no reported series on one stage anterior fusion and instrumentation in the treatment congenital kyphoscoliosis.

METHOD: Seven patients treated by anterior instrumented fusion with the diagnosis of congenital kyphoscoliosis were reviewed after an average follow-up of 44 (24-62) months. Two patients were male and five were female and the average age was 11 (8-13) years. The deformity was type i in five patients and type II in two patients. Mean extent of the deformity was over six vertebrae (range,5-8), and instrumented fusion extended over six vertebrae (range,4-9). Neurosurgical release was done in two patients due to diastematomyelia prior to corrective surgery.

RESULTS: Average kyphotic deformity improved from 69 (47°-90°) degrees to 40 (22°-60°) degrees postoperatively and 43 (25°-62°) degrees at final follow-up (38% correction). Scoliotic deformity averaged 51 (16°-88°) degrees preoperatively, 29 (8°-65°) degrees postoperatively and 31 (8°-68°) degrees at final follow-up (39 % correction). Lass of correction exceeding 100 was not observed. Junctional kyphosis occured in one patient and was treated by subsequent posterior instrumented fusion. No neurological or other major complication occured.

CONCLUSION: Corrections achieved in both caronal and sagittal plates compared well with the results obtained with posterior and combined anteroposterior procedures. Significant correction may be achieved in congenital kyphoscoliosis through one stage anterior instrumented fusion.

ORAL PRESENTATION

COMPARING THE RESULTS OF THE INSTRUMENTATION OF PEDICLE SCREWS VERSUS HYBRID SYSTEM IN ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS) SURGERY

ÖMER KARATOPRAK (Göztepe Hospital, Turkey), KORAY ÜNAY, NADİR ŞENER

OBJECTIVE: In this study the results of the patients with AIS who were operated with hybrid system (HS) (the combinatian of hook, sublaminar wires and pedicle screws) and only pedicle screws (PS) were evaluated retrospectively and compared statistically.

MATERIAL AND METHOD: 32 women and 14 men, overall 46 cases with AIS who were underwent a posterior surgery were considered. The mean follow up was 15.3 months (range:12-35). HS was used in 26 of the cases and PS was used in 20 of the cases. In both group, cases with similar average of ages (HS group: 15.6; HS group: 14.5; p= 0.142), with similar preoperative major Cobb angles (HS group: 60.5˚; PS group: 61.8˚; p= 0.253) and with similar number of the vertebrae which were included in the fusion (HS group:12.1; PS group:12.3;p=0.717) were added. Anterior release was applied to 8 of the cases from the HS group and 6 cases from the PS group. Thoracoplasty was applied to 6 patients from HS group and 3 patients from PS group. Cases were evaluated with different kinds of parameters at preoperative, early preoperative and 12th month.

RESULTS: Results were considered with respect to Mann Whitney U test. According to this, similar results were gained in statistical meaning ($p>0.05$) at the evaluation of the correction (67.7 % in HS group and 70.3 % in PS group), the loss of correction (4.1' in HS group and 3.6° in PS group), translation of the apical vertabra (38.0 % in HS group and 36.0 % in PS group) and in the time of surgery (360 min in HS group and 357 min in PS group). A statistical significant difference ($p<0.01$) in the derotation of the apical vertebra (14.3° in HS group and 20.1° in PS group) and in the amount of hemorrhage (1813 ml in HS group and 1564 ml in PS group) were established.

CONCLUSION: Results of correction have been reported as 50% with hook instrumentation, 60% with sublaminar wire and 70% with PS. There is a requirement of studies in which the curve flexibility is evaluated.

ORAL PRESENTATION

THE VALIDITY OF LENKE'S CRITERIA FOR DEFINING STRUCTURAL PROXIMAL THORACIC CURVES IN PATIENTS WITH ADOLESCENT IDIOPATHIC SCOLIOSIS

AKIN ÇİL (Hacettepe University, Turkey), MURAT PEKMEZCİ, MUHARREM YAZICI, AHMET ALANAY, EMRE ACAROĞLU, VEDAT DEVİREN, ADİL SURAT

INTRODUCTION: Lenke et ai. classified curves of adolescent idiopathic scoliosis patients and assigned the term "structural" or "nonstructural" to each curve. However, there is still not much consensus on the definition of structural proximal thoracic (PT) curve, and structurality criteria for PT curve have not been validated, yet. Aim is to delincate the efficiency of using Lenke's criteria during the decision of whether to include the PT curve into instrumented fusion or not in AIS patients treated with a posterior translational instrumentation.

MATERIALS AND METHODS: Thirty-seven consecutive AIS patients (6 male, 31 female) with an average age of 15 years (11-24) and average follow-up of 55 months (24-90) were studied. Two groups were constructed according to the involvement of PT curve into instrumented fusion. Group I; uppermost extent of the instrumentation either T2 or T3 indicating inclusion of PT curve into instrumentation, Group II; uppermost extent of the instrumentation at T4 or lower indicating partialar no inclusion of the PT curve into instrumented fusion. Radiographic evaluation included measurement of PT, main thoracic (MT), thoracolumbar-lumbar curves and sagittal Cobb angles of T2-T5, T5- T12, and T10-L2.

RESULTS: The 2 groups were statistically equivalent in terms of age at operation, followup, preoperative PT and MT, and their corresponding side bending curve magnitudes, as well as the parameters related to shoulder balance, preoperatively.

The 2 groups were also statistically equivalent in terms of immediate postoperative and latest follow-up PT and MT. CONCLUSION: It was observed that Lenke's description for structurality of PT curves can ettectively determine which curves need fusion and which curves do not. Since there was no difference among inclusion of a nonstructural PT curve into fusion or solely fusing the MT curve in terms of outcomes, extension of fusion to T2 or T3 is un necessary.

ORAL PRESENTATION

RADIOGRAPHIC EVALUATION OF POSTERIOR INSTRUMENTATION AND FUSION WITH ALLOGRAFT BONE FOR PATIENTS WITH CONGENITAL SCOLIOSIS

MEHMET AYVAZ, H. GÖKHAN DEMİRKIRAN (Hacettepe University, Turkey), AHMET ALANAY, MUHARREM YAZICI, R. EMRE ACAROĞLU, ADİL SURAT

INTRODUCTION: Posterior fusion and instrumentation is being used for neglected cases of congenital scoliosis cases. Successful fusion by using autogralt and instrumentation has been reported in the limited number of papers on the treatment of neglected congenital cases. However, there is not yet any report analysing the fusion rate for the patients with congenital scoliosis treated by posterior instrumentation and fusion using allograft only. Use of allograft may not be an ideal option to achieve fusion in congenital scoliosis due to the bony abnormalities and missing posterior elements. The aim of this study was to investigate the efficacy of posterior fusion with allograft in patients with congenital scoliosis.

MATERIALS AND METHODS: 21 patients (16 female, 5 male) with congenital scoliosis who underwent posterior spinal fusion with instrumentation using allograft bone were evaluated retrospectively. The average at surgery was 11,5 (Range) years and average follow up was 28 (24-48) months 9 patients had simultaneous or prior laminectomies to address the intraspinal abnormalities. Standing A-P and lateral spine radiographs before and after surgery, and at the most recent followup were evaluated by one independent observer at 2 times. Radiographic parameters described by Bridwell et al were used to evaluate the fusion.

RESULTS: Two patients were found to have no fusion, 6 patients 'probably fusion and 14 'definitely fusion'. The average preoperative curve of 68,7° was corrected to 38,7° postoperatively. The average loss of correction at the final follow-up was 3,3°. Overall success rate of fusion was 90.4%.

CONCLUSION: With the use of segmental spinal instrumentation, satisfactory spinal fusion could be achieved with allograft in congenital scoliosis. Since the morbidity of allograft is lawer, it may be a reasonable alternative to autografts in the treatment of neglected congenital scoliosis.

ORAL PRESENTATION

SINGLE STAGE POSTERIOR CORRECTION FOR SHEUERMANN'S KYPHOSIS

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INTRODUCTION: Scheuermann disease is a common cause of structural kyphosis of the thoracic and thoracolombar spine. The indication for surgery is a kyphosis of more than 60 degrees that is increasing and can not be controlled by the brace and pesistant pain despite conservative managemant. The operative treatment consists of a two-staged combined anterior-posterior and a single-staged posterior surgery. The aim of this study was to compare the results of posterior surgery with the results of the combined anterior-posterior surgery reported previously in the literature.

MATERIALS AND METHODS: Surgical treatment was performed for 19 patients with Scheuerman's kyphosis (5 females, 14 males, average age 17,6 (13-33). Posterior segmental instrumentation, correction with shortening of posterior colon and posterior fusion were choosen as operative methods. The outcomes of patients were reported for 26,3 (6-82) months in average.

RESULTS: The median preoperative kyphosis was 78,5° (65°-96°), immediate postoperative kyphosis averaged 42,6° (22°-54°). The average correction was % 45 (21-72). At final follow up the median kyphosis had increased to 46,2° (24°-60°) with 3,6° loss of correction. During follow up an increase of kyphosis in 3 patients. One of patient had developed reversibi paraplegia

CONCLUSION: The results of this study suggest that with correct indication and well performed surgical technique the posterior approach is sufficient to get successful correction from both a functional and cosmetic standpoint. In the preoperative planning, levels to be fused should be well planned. We advise using of pedicular screws for all segments if it is possible. In adults with anterior bony bridging or in the presence of structural deformity, combined anterior and posterior surgery is indicated. Despite the fact that the procedure is technically demanding, in general satisfactory results can be obtained with posterior instrumentation and fusion.

ORAL PRESENTATION

POSTERIOR VERTEBRECTOMY IN KYPHOSIS, KYPHOSCOLIOSIS AND SCOLIOSIS CAUSED BY HEMIVERTEBRA

MEHMET AYDOĞAN (Florence Nightingale Hospital, Turkey), ÇAĞATAY ÖZTÜRK, MEHMET TEZER, MERCAN SARIER, ABDULLAH GÖĞÜŞ, AZMİ HAMZAOĞLU

INTRODUCTION: Vertebrectomy and instrumentation via posterior approach only is being increasingly used in sagittal, frontal plane and combined deformities. Purpose of this retrospective study is to evaluate the clinical and radiological results of (hemi) vertebrectomy and instrumentation only via posterior approach in spinal deformities.

MATERIALS AND METHODS: Between the years of 1998 and 2004, 19 patients (3 scoliosis, 5 kyphosis, 11 kyphoscoliosis) hemivertebrectomy and interbody fusion using posterior instrumentation with titanium mesh cage (TMC) via only posterior approach. The age of the patients ranged from 2 to 22 and hemivertebrectomy was performed at thoracal level in 6, thoracolumbar in 8 and lumbar in 5 patients. TMC was used for anterior column support and interbody fusion in patients who had residual anterior gap preventing bone to bone contact. Correction and stabilization were achieved by posterior polyaxial pedicle screws.

RESULTS: Average follow-up is 4.6 (1-7) years. We did not confront any loss of correction, pseudoarthrosis, and TMC collapse or implant failure.

CONCLUSION: It is possible to perform surgeries for intramedullary pathologies (Le. tethered cord resection etc.) in the same stage by this type of surgery. And as the procedure shortens the vertebral column, it increases the effectiveness of additional neurosurgical procedures. However, there are some disadvantages of the technique. There is some difficulty to perform enough decompression in the opposite site by this method. And the major disadvantage compared to standard posterior and combined anterior-posterior procedures is the possibility of significant bleeding. As a conclusion; hemivertebrectomy and instrumentation via posterior approach only is a good one-stage surgical treatment option which avoids the surgical trauma and morbidity related to anterior surgery. However it is a technically demanding surgical procedure requiring extreme care and experience in spine surgery.

ORAL PRESENTATION

VERTEBRECTOMY AND INSTRUMENTATION VIA POSTERIOR APPROACH FOR SEVERE SAGITAL AND FRONTAL PLANE DEFORMITY

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INTRODUCTION: Vertebrectomy and instrumentation via posterior approach is being increasingly used in the surgical treatment for severe sagital plane deformity. This approach is especially useful in patients who may not tolerate an anterior surgical procedure due to poor medical conditions but have severe spinal cord compromise caused by osteoporotic fractures in the aging spine, combined sagital and frantal plane congenital deformities with or without intramedullary abnormalities, healed post-infectious deformities. Purpose of this retrospective study is to evaluate the clinical and radiological results of vertebrectomy and instrumentation only via posterior approach in various spinal pathologies.

MATERIALS AND METHODS: Twenty-nine patients had vertebrectomy and interbody fusion using titanium mesh cage via posterior approach and posterior instrumentation between the years of 1998 and 2004. Etiological distribution was as follows: 10 patients (over 60 years of age) with severe osteoporotic fracture and neurological deficit, 3 patients with severe posttraumatic deformity, 6 patients previously operated for scoliosis and presented with severe decompensation and combined (sagittal and frantal plane) deformity, 6 patients had post-infectious severe sagital plane deformity and spinal cord compression, 1 deformity due to Ehlers-Danlos syndrome, 1 due to mucopolysaccharidosis, 1 due to Martan syndrome and 1 due to neurofibromatosis. The age of the patients ranged fram 12 to 82 years.

RESULTS: Average follow-up is 4.5 (1-6) years. We did not confront any loss of correction, pseudoarthrosis, and titanium mesh collapse or implant failure.

CONCLUSION: Vertebrectomy and instrumentation via posterior approach is a good surgical treatment option in elderly patients whose medical condition does not permit an anterior procedure for spinal cord compromise and in patients who have pseudoarthrasis and severe sagital and frontal plane deformity.

ORAL PRESENTATION

SURGICAL TREATMENT OF NEGLECTED CONGENITAL SEOLIOSIS VIA POSTERIOR APPROACH

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INTRODUCTION: Patients with late diagnosed or neglected congenital scoliosis have rigid scoliotic, kyphoscoliotic and lordoscoliotic deformities which result in trunk imbalance. In addition, associated intramedullary abnormalities necessitate a challenging preoperative planning. Purpose of this study is to evaluate the results of surgeries performed via posterior approach only.

MATERIALS AND METHOD: Twenty-nine patients aged 7- 29 (mean; 18.3) years were operated. Sixteen of 29 patients had associated intramedullary abnormalities besides congenital scoliosis. These include diastomatomyelia and tethered cord in 10 patients, only tethered cord in 5 patients and retethering in one patient. The operation method was chosen according to the magnitude and type of deformity. Treatment of intramedullary pathologies was done in all patients in the same session of anesthesia. Correction and stabilization were achieved by posterior pedicle screws. Titanium mesh cages were used in patients with residual anterior gap and anterior column support.

RESULTS: Average follow-up period was 4.7 (2-10) years. In three patients, the superticial wound infection; in two patients, transient lower extremity paresis was seen. Wound infection responded well to local wound care and neurological complications completely recovered during the follow-up after revision surgery. The fusion was achieved in all patients and neither implant failure nor pseudoarthrosis was observed.

CONCLUSION: During the diagnosis and treatment planning of late diagnosed or neglected congenital scoliosis cases, excellent and high-technology neuroradiological investigations are mandatory. The treatment of intramedullary pathologies in the same surgery is another advantage of this kind of surgery. However, long operation time, risk of infection and cerebrospinal fluid leakage after the operation constitute the disadvantages.

ORAL PRESENTATION

LATE REVISION SURGERY IN ADOLESCENT IDIOPATHIC SCOLIOSIS

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INTRODUCTION: Our purpose in this study was to determine and analyze the reasons or problems like trunk imbalance, pseudoarthrosis, implant failure, junctional kyphosis and degenerative changes at the proximal or distal parts of the instrumentation leading to revision surgery in early or late periods in AIS patients and discuss the possible methods or approaches for solution.

MATERIALS AND METHODS: Thirty-three AIS patients who had revision surgery between the years of 1994 and 2003 and had minimum of two-year follow-up were evaluated. The average age was 17.8 (9-50) years. Reasons leading to revision surgery were pseudoarthrosis in 8, coronal plane decompensation in 2, sagittal plane decompensation (due to short fusion) in 3, complex frontal and sagittal plane deformity (due to pseudoarthrosis) in 7, rib-hump deformity in 2, implant failure (anterior instrumentation proximal screw pull-out and posterior instrumentation distal screw pull-out) in 2, deep infection (not responsive to debridement and irrigation) in 3, caudal junctional degenerative problem in 2, late implant related reaction in 2, neural impingement by implant devices in 2 patients.

RESULTS: Posterior fusion with compression instrumentation was performed for simple pseudoarthrosis patients. Posterior osteotomy or vertebrectomy or combined surgery was performed for patients who had complex frontal and sagittal plane deformity due to pseudoarthrosis.

CONCLUSION: Revision surgery for spinal deformity is extremely challenging and decision making requires considerable experience and expertise in complex reconstructive spinal surgery. It is essential to determine the major problem of the patient and the use of good quality neuroradiological investigation for planning. The use of posterior osteotomy, posterior transpedicular osteotomy or vertebrectomy is becoming more popular nowadays. We believe that this kind of complicated deformity surgery should be done by experienced spine surgeons.

ORAL PRESENTATION

EARLY SURGICAL TREATMENT FOR SPINE DEFORMITY IN PATIENTS UNDER 10 YEARS OLD

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INTRODUCTION: To assess the efficacy of early combined surgery for young patients affected by early onset spinal deformities.

MATERIAL AND METHODS: A consecutive series of 35 patients aged 10 years or younger, affected by spinal deformities and surgically treated between 1990 and 2000 was reviewed. There were 13 males and 22 females with a mean age at surgery of 6.1 years old (range 1 - 10 yrs). Twenty-eight cases underwent planned anterior and posterior surgery whereas the remaining 7 patients were treated by a posterior fusion alone using paediatric segmental devices.

RESULTS: At an average follow-up of 5 years (range 3-10), of the 18 cases with regular curve shape (10 Infantile Idiopathic Scoliosis [IIS], 6 Congenital Deformities, 1 Spondylometaphyseal displasia, 1 Marfan Syndrome) treated by planned anterior convex epiphysiodesis and posterior instrumentation 17 had no progression of deformity and 1 fair progression of deformity. Repeated surgery was required in two cases: 1 new instrumentation for implant breakage and 1 reinsertion of thoracic hooks. In the six cases treated by planned anterior hemivertebra resection and posterior instrumentation, we observed solid fusion in all, only in one case 1 repeated surgery was required for new instrumentation .

Both cases treated by planned anterior fusion and posterior instrumentation (1 neurofibromatosis cervical kyphosis and 1 Sacrum agenesia) resulted in stable fusion.

Seven cases treated only by posterior instrumentation (4 IIS, 1 Spondylometaphyseal Dysplasia, 1 Freeman Sheldon Syndrome, 1 Arthrogryposis) resulted in 4 with progression of deformity. Worth mentioning is the fact that 7 out of 10 revision procedures performed for this series occurred in the posterior only group.

CONCLUSIONS: Planned anterior convex epiphysiodesis or hemivertebra resection supplemented by posterior segmental instrumentation can control curve progression in early onset spinal deformities better than previous techniques.

ORAL PRESENTATION

RADIOLOGICAL CHANGES IN ADJACENT SEGMENT TO FUSION IN ADOLESCENT IDIOPATHIC SCOLIOSIS PATIENTS AND CORRELATION WITH SF-36 IN LONG TERM FOLLOW-UP

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The aim of this study is to analyze radiological changes in adjacent intervertebral discs and their correlation with SF-36 findings in adolescent idiopathic scoliosis patients with posterior spinal instrumentation and fusion.

31 adolescent idiopathic scoliosis patients treated with posterior spinal instrumentation and fusion with mean follow up of 10 years (6-16 years) were included in this study. Intervertebral disc height in adjacent and one below and upper adjacent segment to fusion were measured in preoperative and follow-up lateral radiographs. Radiographic measurements of lumbar intervertebral disc height in 36 age-matched healthy volunteers constituted the control group. Radiographic measurements for each segment at follow-up were compared with preoperative measurements and control group. Magnetic resonance imaging was also performed and disc degeneration was assessed at follow-up in the study group. Clinical outcome was analyzed with SF-36 questionnaire and correlation with intervertebral disc changes was assessed.

A decrease in intervertebral disc height at follow-up from preoperative values was detected in all-lumbar segments (L1-2 p= 0.08, L2-3 p= 0.01, L3-4 p= 0.23, L4-5 p= 0.249).

Mean disc height measurements of control group were higher than control group but were not statistically significant except for L2-3 level (L1-2 p= 0.93, L2-3 p= 0.10, L3-4 p= 0.333, L4-5 p= 0.404). Degenerative changes in MRI were increased in upper adjacent segment compared with lower adjacent segment (p= 0.01). SF-36 scores did not show correlation with any parameters.

Decrease in disc height can be seen in idiopathic scoliosis patients with instrumentation and fusion at 10 years follow-up but may not be a significant finding since disc heights of study group at follow-up were higher than the control group. Upper adjacent segment showed more degenerative changes than lower adjacent segment. There appears to be no correlation between SF-36 results and radiographic parameters.

ORAL PRESENTATION

CORONAL AND SAGITTAL MALALIGNMENT OF THE SPINE DUE TO TOTAL CONGENITAL DISLOCATION OF THE HIP (CDH) TEXT

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INTRODUCTION: Variations in sagittal and coronal alignment of the spine is seen in patients with inappropriately treated or neglected CDH.

MATERIALS &METHODS: 48 cases with uni- and 58 with bilateral CDH were included (mean age: 36,5; 32 men, 74 women). Hips were classified according to Eftekhar as acetabular dysplasia (AD)(n=16), intermediate acetebulum (IA) (n=28), total dislocation with pseudoacetabulum (PA)(n=29) and without PA(NC)(n=32). AP and lateral standing radiographs were taken. Leg length discrepancies (LLD), the angles by Co bb 's method of each neighbour segments and total lumbar lordosis in two planes, sacral slope and sacral inclination (SI) were measured.

RESULTS: AP L2-L3 (p=0,040), lateral L1-L5 (p=0,010) and L1-S1 segmental angle (p= 0,016) changes according to Eftekhar classification. L2-L3 segmental angle in PA was higher than that in IA; L1-L5 total lumbar lordosis angle in NC was higher than that in PA and L1-S1 total lumbosacral angle was higher in NC than that in PA and in IA. Sacral inclination (p=0,000), AP L1-L2 (p=0,027), L2-L3 (p=0.001), L3-L4 (p=0,033), L4-L5 (p=0,040), L1-L5 angle (p=0,001) was changed related to be bilateral or unilateral dislocation. SI in bilateral cases was higher then in unilateral cases. On the other significant parameters, the unilateral cases mean values were greater.

CONCLUSION: In CDH, the pathologic changes of the acetabulum and entire pelvis influences the spine. In unilateral cases, the coronal plane deformities of the spine becomes more evident because of the greater amount of the LLD. The increase of the lordosis of the distal lumbar segments was dependent in two factors: the level of the dislocation and the distance of the center of the femoral head from the midsacralline. In patients with total dislocation without a HP, the spinal malalignment is more severe because of their more shorter legs despite the increase of the ROM of the hip. In CDH, pseudoacetabulum is a positive factor on the spinal complaints and a negative factor on the functional status.

ORAL PRESENTATION

TREATMENT OF LENKE TYPE 1 CURVES IN ADOLESANT IDIOPATHIE SEOLIOSIS: COMPARISON OF THREE DIFFERENT TYPES OF INSTRUMENTATION

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PURPOSE: To analyze the results of anterior single rod instrumentation (AF), posterier hybrid (PHF) (hook-pedicle screw combinatian) and posterior pedicle screw (PPF) instrumention in Lenke type 1 curves.

METHODS: A retrospective analysis of 39 patients of AlS of Lenke type 1 curve with a mean follow-up of 54 months (24-91 months). Mean age was 14 (10-18). There were 23 females and 16 males. Parameters included preoperative, post operative and at the latest follow-up sagittal and caronal curve magnitudes, apical vertebral translation (AVT) and rotatian (AVR), caronal C7 - CSVL displacement. Number of instrumented levels, hospital stay, estimated blood lass, operation time, instrumentation costs were also analyzed. Student's t test was used for statistical analysis.

RESULTS: The average age, gender and curve magnitude were similar between three groups. Significant differences were found in correction of curves, AVT, AVR and mean number of instrumented levels. PPF has obtained better correction of AVI. AF has more curve and AVR correction, better C7-CSVL correction, lesser fused segments, shorter operation time, lesser blood lass and lower instrumentation cost.

CONCLUSIONS: Lenke Type 1 curves can be treated succesfully with three methods. Advantages of anterior single rod instrumented carrectian are as follows: Better correction in caronal, sagittal and transversal planes, shorter operation time, lesser blood lass, lower instrumentation cost and safer instrumentation.

Table I: Cornal correction

	Number of cases	Preop Cobb	Postop Cobb	Follow-up	Mean Curve Correcion
AF	15	54.4˚ (40-74)	14.4˚ (6-30)	19.1˚ (10-40)	73% (*)
PHF	16	60.8˚ (45-80)	21.3˚ (4-36)	25.8˚ (10-40)	65%
PPF	8	68.7˚ (45-80)	23.8˚ (12-30)	25.5˚ (15-36)	63%

* p<0.05 compared with other two groups

Table II: AVT, AVR, C7-CSVL correction and mean number of instrumented levels

	Mean AVT correction	Mean AVR correction	Mean number of levels	Mean C7-CSVL correction (mm)
AF	58%	50%	7.4(*)	8.4
PHF	48%	30% (*)	9.5	5.6(*)
PPF	63%(*)	45%	9.3	7.7

* p<0.05 compared with other two groups

Table III: Mean thoracal kyphosis angles

	Preoperative	Postoperative
AF	27	32.7
PHF	38.5	38.6
PPF	54	35

ORAL PRESENTATION

BEHAVIOUR OF LUMBAR REGION AFTER THORACIC FUSION IN LENKE TYPE 1 CURVES: EFFECTS OF THREE DIFFERENT TYPES OF INSTRUMENTATION

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INTRODUCTION: The purpose of this study is to analyze the lumbar region after thoracic anterior single rod instrumentation (AF), posterior hybrid (PHF) (hook-pedicle screw combination) and posterior pedicle screw (PPF) instrumention in Lenke type 1 curves.

METHODS: A retrospective analysis of 39 patients of AIS of Lenke type 1 curve with a mean follow-up of 54 months (24-91 months). Mean age was 14 (10-18). There were 23 females and 16 males. Parameters included lumbar modifiers, preoperative, postoperative and at the latest follow-up caronal curve magnitudes, apical vertebral translation (AVT) and rotatian (AVR) of the main curve and preoperative, post operative and at the latest follow-up scoliosis and lordosis angles ol the lumbar region. Student's t test was used for statistical analysis.

RESULTS: Correction amounts, lumbar modifiers, preoperarative, post operative and follow-up lumbal caronal and sagittal angle measurements are shown in the Tables I - IV. Although AF provided better coronal correction in the main curve and better lumbar lordosis, PF provided better AVT correction and spontaneous lumbar scoliosis correction.

CONCLUSION: AVT correction of main curve is more effective for spontaneous lumbar scoliosis correction in Lenke type 1 curves

Table I: Correction amounts

	Number of cases	Preop Cobb	Correction	AVT conection	AVR correction
AF	15	54.4° (40-74)	73% (*)	58%	50%
PHF	16	608° (45-80)	65%	48%	30% (*)
PPF	8	68. 7° (45-80)	65%	63% (*)	45%

* p<0.05 compared with other two groups

Table II: Lumbar Cluve modıfier types

	A	B	C
AF	8	5	2
PHF	7	6	3
PPF	6	2	-

Table III: Spontaneous lumbar scoliosis correction

	Preop Cobb	Postop Cobb	Mean curve correction	Follow-up Cobb	Final correction
AF	21.1° (12-40)	10.6° (0-18)	52%	103° (0-18)	55%
PHF	23. 5° (5- 30)	11. 9° (0-20)	51%	10° (0-20)	57%
PPF	21.6° (5-30)	8° (O-12)	62%	5° (0-6)	76% (*)

Table IV: Lumbal lordosis angles

	Preop Cobb	Postop Cobb	Follow-up Cobb
AF	35˚ (10-57)	38.5˚ (30-50)	41.9˚ (30-50) (*)
PHF	36.2˚ (0-50)	36.2˚ (16-43)	35.9˚ (16-45)
PPF	42.5˚ (0-60)	34˚ (16-40)	34˚ (16-40)

* p<0.05 compared with other two groups

ORAL PRESENTATION

THE EFFECT OF RESIDUAL LOWER END VERTEBRA TIIT ON THE OUTCOME OF SURGICAL CORRECTION IN PATIENTS WITH ALS

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INTRODUCTION: Restoration of caronal and transverse orientation of the end vertebrae to neutral and sagittal orientation to physiologic contours is the main goal in spinal deformity surgery. However, some degree of residual deformity is usually inevitable. There is still debate on whether to save a distal level and accept a residual deformity or to include that segment into fusion mass with a better deformity control. Besides, the possible effect of the magnitude of this residual deformity on the surgical outcome has not been well-established. This study was designed to investigate the effect of the magnitude of the residual tilt of lower end vertebra (LIV) on the radiological parameters.

MATERIAL AND METHODS: 67 AIS patients treated with posterior instrumentation system and followed-up for a minimum of 2 years were reviewed. 28 patients (5 male, 23 female) with an average age of 14 years (11-18) and follow-up of 52 months (24-90) having Lenke C modifier formed the subjects of this study. Patients were assigned into 2 groups (I: LIV tilt at the immediate postop. radiogram ≤5 degrees, II: >5 degrees). There was no difference in terms of the extent of the lower instrumentation level among 2 groups. Following parameters were compared on the immediate postop. and latest follow-up radiograms: magnitude of scoliosis curves, T2-T12 kyphosis, T12-S1 lordosis, lordosis below LIV.

RESULTS: Although all measured parameters were found to be statistically not significant among groups in the preoperative and immediate postop. period, main thoracic (MT) and thoracolumbar/lumbar (TL) curve magnitudes were found to be significantly increased at the latest follow-up in group II ($p<0.01$).

CONCLUSION: Despite having a reasonable curve correction in the immediate postoperative period, residual LIV tilt >5 degrees may result in worsening of the MT and TL curve magnitude in time. Residual LIV tilt at the immediate postop period may be considered as a risk factor for progression.

ORAL PRESENTATION

ANTERIOR CERVICAL DISCECTOMY FOR ONE- AND TWO-LEVEL CERVICAL DISC DISEASE: THE EFFECT OF ANTERIOR PLATING

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INTRODUCTION: Over a 5-year period, 60 patients with cervical spondylotic myelopathy were treated surgically with one or two-level anterlor cervical discectomy and fusion.

MATERIAL AND METHODS: 36 patients had cervical plates, whereas 24 had fusions without plates. The follow-up period ranged from 16 to 40 months. Clinical and radiographic follow-up data were obtained.

RESULTS: The pseudarthrosis rates were 4% for patients with plating and 12% for patients without plating. There was no statistically significant correlation between pseudarthrosis and gender, age, level of surgery. The plating procedure resulted in preserving overall lordosis. Accelerated degenerative changes at the levels adjacent to fusion were seen in 12% of patients with plating, compared to 9% in patients without plating. According to Odom's criteria the overall result was excellent to good in 95% of patients with plating compared to 75% in patients without plating.

CONCLUSIONS: The addition of plate fixation for one and two-level anterior cervical discectomy and fusian is a safe procedure and does not result in higher complication rates The use of plate fixation successfully maintains cervical spine alignment. Patients treated with cervical plating had overall better results when compared with those of patients treated without cervical plates.

ORAL PRESENTATION

EARLY RESULTS OF ANTERIOR INTERBODY CAGE FUSION AND ANTERIOR CERVICAL DISCECTOMY WITHOUT FUSION FOR CERVICAL DISC DISEASE

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INTRODUCTION: Anterior approach has been common treatment for to cervical disc disease if posterior elements no cause myelopathy findings of cervical spinal canal. The goal of this study was compresion to early results of anterior interbody cage fusion and anterior cervical discectomy without fusion for cervical disc disease.

MATERIAL AND METHODS: 80 patients who operated from cervical disc disease in our clinic, were invesgated between Januray 2001 and December 2003. This study is retrospective analysis.

RESULTS: Operated with patients for cervical disc disease to our clinic evaluated first day and 3 months postoperative results. There were 41 women (51,25%) and 39 men (48,75%). 37 anterior cervical discectomy without fusion (46,25%) and 43 anterior interbody cage fusion (53,75%) were application to these patients. Patients ranged age from 29 to 74 years (mean 46,53 years) Start complaints of our patients were 10(12,5%) only radiculopathy, 63 (78,75%) neck pain and radiculopathy, 7 (8,75%) myelopathy. Postoperative results of 80 patients; results of anterior cervical discectomy without fusion were 33 (89,18%) excellent and good, 4 (10,81 %) satisfactory. Results ol anterior interbody cage fusion were 42 (97,62%) excellent and good,1 (2,3%). There was no poor result lor all patients. Furthermore there were preoperative motor delicits 27 (72,97%) whereas postoperative, 14 (51,85%), defisits decrase or completly recovery who go anterior cervical discectomy without fusion. There were preoperative motor delicits 37 (86,04%) whereas postoperative, 27 (72,97%), deficits decrease or completely recovery who go anterior cervical discectomy with cage fusion.

CONCLUSIONS: The restricted results show that anterior cage fusion surgery has more successfully outcome than anterior cervical discectomy without fusion. For having accurate and satisfactory results, we need have to long period and large case series.

ORAL PRESENTATION

TRANSARTICULAR MEDIAL APPROACH WITH PARTIAL FACETECTOMY (TMAPF) FOR FORAMINAL STENOSIS AND SPONDYLOLYSTHESIS

FİGEN ASLAN (Antalya General Hospital, Turkey), ERGİN SAĞDAŞ

INTRODUCTION: Effect ol the TMAPF on the foraminal stenosis and spondylolysthesis has not been described previously. This study aims to evaluate the efficacy ol TMAPF on patients with foraminal stenosis and spondylolysthesis.

PATIENTS AND METHODS: Between March 2002 and 2004, 21 patients with foraminal stenosis and 13 patients with spondylolysthesis were operated with TMAPF technique. During operation a hole with 0,5-1 cm diameter was opened transarticularly at conjunction between facet and lamina after 5-10% of the inferomedial edge ol the superior facet and superomedial edge of the inferior facet were drilled away. Facet capsule left intact inferolateral edge of the yellow ligament was released, but ligament was not opened. Face of the inferomedial facet was separated from lateral edge ol the root and cleaned. By guidance of the disc space, the portions and osteolits compressing the root from disc space anteriorly, and medial face of the facet posteriorly were cleaned. Inferior and superior root conjunctions were exposed and interapophyseal space was released. We did not use any instrumentation system. The patients were evaluated with respect to the leg pain, paresthesia, weakness, and Oswestry pain scores 6 weeks alter surgery.

RESULTS: All patients were mobilized within 4-6 hr, discharged within 24-48 hr, sat down within 8-12 days, returned to daily activity and work within 15-25 days. Postoperative Oswestry pain scores (3,4±1,7) were significantly decreased when compared with the preoperative pain scores (38,8±5,01) in patients with loraminal stenosis ($p<0.001$). Preoperative and postoperative pain scores of patients with spondylolysthesis were 41,7±5,5 and 3,7±1,2 respectively ($p<0.001$).

CONCLUSION: TMAPF may be considered as a safe and effective procedure for patients with foraminal stenosis and spondylolysthesis. We believe that this technique may reduce the risk of epidural fibrosis.

ORAL PRESENTATION

TRANSARTICULAR MEDIAL APPROACH WITH PARTIAL FACETECTOMY FOR LUMBAR DISC HERNIATION

FİGEN ASLAN (Antalya General Hospital, Turkey), ERGİN SAĞDAŞ

INTRODUCTION: This study has aimed to evaluate the results of transarticular medial approach with partial facetectomy (TMAPF) as an alternative surgical approach for lumbar disc herniation. TMAPF has been used for lumbar foraminal stenosis.

MATERIALS AND METHODS: Between March 2002 to 2004, 104 patients with lumbar disc herniation underwent TMAPF. In this procedure, in order to expose facets of inferior articular edge 5-10% of the medial parts of superior and inferior facets were removed by a high-speed drill. The facet capsule was lelt intact by undercutting the facets and opening a hole as large as a thumb nail in the junction between facets and lamina (Fig.1). After finding the root, disc was removed without opening the yellow ligament (Fig.2). This approach was used in free disc fragments as well. Patients data included; leg and back pain, time to returning back to normal daily activity, Oswestry pain scores, and final outcomes were analysed.

RESULTS: Following the operation none of the patients had leg or back pain. All patients were able to mobilize at - to 4 hours, returned to daily activities at 5 to 7 days, and returned to their works at 15 to 21 days postoperatively. When compared with preoperative Oswestry pain scores (46±3,3), postoperative score (3,1±0,9) significantly decreased ($p<0,001$). The final outcomes alter TMAPF was excellent in 94 (90%), good in 10 (6%) patients. Only one patient had residual disc postoperatively.

CONCLUSION: These findings support the idea of TMAPF, which is very safe and effective by means of treating back pain and sciatica pain due to disc herniation. In the literature. we do not have any demonstration of this approach without opening the yellow ligament used as therapy of choice for the patients with lumbar disc herniation. We believe that this technique may reduce the epidural fibrosis risk.

ORAL PRESENTATION

PROSPECTIVE STUDY OF ANTERIOR LUMBAR INTERBODY FUSION AUGMENTATION WITH POSTERIOR PEDICLE SCREWS OR TRANSLAMINAR FACET SCREWS

ESAT KITER (Pamukkale University, Turkey), ENSOR TRANSFELDT, AMIR MEHBOD, TIMOTHY GARVEY, MANUEL PINTO

INTRODUCTION: Stand alone anterior lumbar interbody fusion (ALIF) is biomechanically unstable. The addition of posterior fixation such as pedicle screws (PS) or translaminar facet screws (FS) significantly and equally increase the initial stability of the construct as shown in vitro biomechanical studies. However, the difference between PS and FS has not been studied clinically. This prospective study compares the clinical outcomes and radiological results of 360° fusion consisting of ALIF and supplemented either with FS or PS.

MATERIALS AND METHODS: Inclusion criteria were adult patients with axial back pain and one or two level disc degeneration confirmed with MRI and provocative discography. Excluded were patients who needed an extensive decompression, and patients with prior fusion procedures. All patients underwent an ALIF with tricortical graft or femoral ring allograft followed by posterior fusion and instrumentation. Radiographs and functional out come questionnaires were collected preoperatively and at 1 year and 2 year follow-up. Presently there are 50 patients with minimum 2 year follow-up; 43% mal e and average age 43 years (18-70). There were 60 levels in 34 patients with supplemental PS fixation group, and 27 levels in 16 patients with supplemental FS fixation group.

RESULTS: The radiographic and clinical results are summarized in the table.

Postoperative complications were noted in 4 PS patients (11 %; 2 implant failures; 1 infection; and one misplaced screw with L5 root symptoms). Statistically significant improvements ($p<0.05$) in SF36 scores were noted in both treatment groups. In both groups, Roland-Morris scores have improved on average 8 points.

CONCLUSIONS: Despite biomechanical studies documenting that facet screw fixation has similar biomechanical properties with pedicle screws, there is a significantly higher pseudoarthrosis rate with use of FS, possibly due to lack of stability from cyclical loading. Both groups showed improvements in patient-rated functional outcome scores.

ORAL PRESENTATION

POSTERIOR LUMBAR INTERBODY FUSION VERSUS POSTEROLATERAL FUSION WITH INSTRUMENTATION IN TREATMENT OF ADULT SPONDYLOLISTHESIS

MOHAMMAD EL-SHARKAWI, OMAR REFAI, HASAN ALİ, ESAM EL-SHERIF (Assiut University, Egypt)

INTRODUCTION: Failure of posterolateral fusion with internal fixation (PLFs) has been attributed to the lack of anterior support as well as the persistence of the disc as a source of pain. Posterior lumbar interbody fusion (PLIF), in addition to the wider fusion surface that is placed under compression, eliminates the disadvantages of PLFs. However, PLIF is often accused of causing many complications, especially neurological ones.

METHODS: Forty patients suffering from spondylolisthesis (15 degenerative and 25 lytic) were operated on by either PLIF using tricortical iliac graft or PLFs, and were prospectively evaluated by an independent observer. The JOA score was used for the clinical assessment. Both groups were comparable as regards to the age, sex, smoking, working status, slippage percentage and local kyphotic angle. The follow-up period ranged from 6-30 months (mean 12.1).

RESULTS: The mean recovery rate by JOA score was 92% for PLIF and 84% for PLFs. The average slippage improved from 25% to 5% for PLIF and from 24% to 15% for PLFs. The average local kyphotic angle improved from 0 to 10 degrees for PLIF and from 0 to 3 for PLFs. Radiological fusion rate was 100% for PLIF and 65% for PLFs. Complications were minimal and most were transient. None of our patients had a neurological deterioration.

CONCLUSION: PLIF for adult spondylolisthesis seems to field better clinical and radiological outcomes than PLFs with comparable morbidity.

ORAL PRESENTATION

FLOATING DISCS: SHOULD THEY BE INCLUDED IN THE FUSION?

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INTRODUCTION: The development of degenerative pathology at the disc in between two noncontiguous fused segments has been termed "floating disc disease". The adjacent segment degeneration has already been studied; however the fate of a floating disc is yet to be researched.

MATERIALS AND METHODS: Retrospectively, patients diagnosed with lumbar degenerative disc disease or low grade spondylolisthesis who failed non-operative treatment and underwent anterior interbody spinal fusion of 2 or more noncontiguous spinal segments were included in this study. Fusion levels were declineated by MRI and provocative discography in correlation with history and physical examination. All surgeries were performed by one spine surgeon. The X-rays of the floating discs were graded using the modified Gore System (grade 0-III) preoperatively and at the last follow-up. Lumbar lordosis, pelvic incidence and segmental lordosis were measured. Groups were compared using the Wilcoxon-Signed rank test.

RESULTS: There were 20 patients (12 male, 8 female) with the mean age of 49.9 years old (range 31-75). The mean follow up was 4.2 years (range 2-11). Twenty seven floating discs were studied (13 one-level, 7 two-level). Five discs (18%) in 4 patients progressively degenerated. Three of the five degenerated discs had decreased segmental lordosis and two segments had no change ($p=0.08$). There was no significant correlation between the floating segment degeneration and lumbar lordosis ($p>0.10$) or pelvic incidence differences ($p>0.10$).

CONCLUSION: The floating discs can degenerate, however at a slow pace. At an average of 4 years of postoperative follow-up, none of the floating discs degenerated more than two radiographic grades and none needed additional surgery. Loss of the segmental lordosis may influence floating disc degeneration. Therefore, our recommendation would be to fuse symptomatic discs and not to include healthy discs even if they are a floating disc.

ORAL PRESENTATION

EARLY RESULTS OF LUMBAR DISC ARTHROPLASTY FOR SYMPTOTAMIC DISC

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INTRODUCTION: Traditional treatment method for symptomatic lumbar disc disease is conservative nonoperative therapy. In the cases in which the symptoms are nonresponsive to conservative therapy and there is at least 6 weeks in a year of rest requirement; the surgical treatment methods should be considered. There are two options in the surgical treatment; fusion or non-fusion techniques. As the fusion surgeries carry the risk of end fusion degenerative and instability problems. Today non-fusion surgeries become more popular. Purpose of this study is to present efficiency and the early results of lumbar disc prosthesis, one of the non-fusion treatment methods used in symptomatic lumbar disc diseases.

MATERIALS AND METHODS: Between April 2003 and July 2004, ten patients have been operated for symptomatic disc disease. Total of 17 disc prosthesis operation has been performed to 10 patients. There was 9 female and 1 mal e and mean ages of the patients was 43.2 (39-49). Levels of the operation were L2-L3 one, L3-L4 two. L4-L5 six and L5- S1 eight. In five patients one level, in four patients' two levels and in one patient 4 levels disc arthroplasty has been performed.

RESULTS: At mean follow up of 10 months (2-18 months), all patients were symptom free and satisfied from the operation. All the patients were ambulated at the first day af ter surgery. In one patient. 360 degrees fusion was performed due to end plate fracture. Neither infection nor neurological impairment was see n in the patients.

CONCLUSION: At early follow up, disc arthroplasty has encouraging clinical results. Motion preservation, short hospital stays and low complication rate is the main advantages of the operation. But we think of that. one needs studies with long term follow up for both assessment of adjacent segment degeneration and survival of lumbar disc prosthesis.

ORAL PRESENTATION

THE POSTERIOR ENDOSCOPIC DISCECTOMY FOR THE TREATMENT OF LUMBAR DISC HERNIATION

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PURPOSE: To evaluate our results of the posterior endoscopic discectomy (PED) for lumbar disc herniation and to discuss the advantages, disadvantages and clinical outcomes of this new technique.

MATERIALS AND METHODS: Between February 2000 and August 2004, 55 patients with a mean age of 43 years (range 24 to 73) underwent PED. The operated disc levels were L5-S1 in 31 patients, L4-L5 in 19 patients and L3-L4 in 5 patients. All surgeries involved only a single level and all disc herniations were located inside the canal.

RESULTS: Mean operative time was 86 min. (41-135 min). All patients experienced substantial relief of their leg pain immediately after the operation, mobilized very early after the recovery from the anesthesia and were discharged home in 24 hours of surgery with only oral NSAID +/- myorelaxants. Three complications were observed in the first 10 PED cases; two cerebrospinal fluid leakages which required open dural repair and early recurrence of the disc herniation at the same level at three weeks af ter the PED in one patient that was treated by open microdiscectomy. We have not seen any superficial or deep infections and systemic complications in any of our cases.

CONCLUSION: PED has advantages like better illumination, better magnification, and better visualization through the rotation of the 25º lens. minimal bone resection and minimal epidural fibrosis, less postoperative pain, better cosmoses, shorter hospitalization, early mobilization and shorter recovery. On contrary, PED has a longer learning curve (longer than open discectomy, 10-20 cases), the operative time is usually longer than the open procedures and bidimensional vision mav cause loss of depth sensation, and longer anesthesia time due to the preparation period of the system.

ORAL PRESENTATION

A COMPARISON OF THREE SURGICAL TECHNIQUES: CAGES, PEDICULAR SCREWS AND CAGES, PEDICULAR SCREWS

PARISINI PATRIZIO (1st Ortop Rizzoli, Italy), DI SILVESTRE MARIO, GREGGI TIZIANA, CIONI ALFREDO, GIACOMINI STEFANO

INTRODUCTION: To compare outcomes after posterior lumbar fusion by means of three different techniques.

MATERIAL AND METHODS: A cohort of 45 patients with one-level symptomatic degenerative disc disease or low grade spondylolisthesis who underwent lumbar or lumboscral fusion procedure between 1995 and 1998 was reviewed.

RESULTS: Group 1 - Cages alone group at a mean follow-up of 4 years, 5 patients (33%) presented uncertain fusion signs (reperated by posterior instrumentation); at a mean follow-up of 8 years, only one of the 10 patients without posterior instrumentation showed definite fusion signs. The clinical results 8 years after primary surgery were fair in 6 patients (40%) and poor in 3 (20%). Complications included two cases ol incomplete motor and sensory deficit of the nerve root due to intra-operative traction and one dural lesion.

Group 2 - Cages plus posterior synthesis group at a mean follow-up of 6.5 years, all patients (100%) presented definite fusion signs. The clinical results 6.5 years alter primary surgery were fair in 2(13%) patients and poor in 2(13%) . Complications included one incomplete motor and sensory deficit of the nerve root due to intra-operative traction and two dural lesions.

Group 3 - Posterior instrumentation without cages group at a mean follow-up of 6.5 years, 14 patients (93%) showed definite fusion signs. The clinical results 6.5 years alter primary surgery were fair in 2 cases (13 %) and no poor results were seen. Complications incluided one dural lesion.

CONCLUSIONS: The present findings have demonstrated that the use of posterior interbody cages alone is not a safe and effective procedure. The use of pedicle screw instrumentation alone presented similar fusion rates and clinical success but a lower complication rate when compared to the use of pedicle screws supplemented with posterior cages.

ORAL PRESENTATION

THE ASSOCIATIONS BETWEEN PAIN, MOOD, DISABILITY, QUALITY OF LIFE, TRUNK AND EXTREMITIES MUSCLE STRENGTH AFTER LUMBAR DISC SURGERY

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INTRODUCTION: The aim of this study was to assess the relationships of pain, disability, mood, quality of life, trunk and extremities muscle strength, patient satisfaction in the lumbar disc surgery patients.

MATERIAL AND METHODS: Forty patients that had surgery for lumbar disc herniation participated in this study. Back and leg pain on Visual Anologue Scale (VAS), Oswestry Disability Back Pain Ouestionnaire Index (ODBPQI), Roland-Morris Disability Questionaire (RMDQ), the Medical Outcomes Study 36 -Item Short-Form Survey (SF-36), Beck Depression Ouestionnaire (BDQ), manual muscle test ol trunk and extremities muscle, Patient Satisfaction Ouestionaire (PSQ) were applied to the lumbar disc surgery patients.

RESULTS: Postoperative duration (20,69+/-2,3 months) was negatively correlated with trunk extension muscle strength (3,06+/-0,12)($p<0.05$). There were contrary associations between VAS (32,07+/-3,99) and the effected leg muscle strength (31,08+/-0,45)($p<0.01$) the subscales scores of SF-36 and BOQ (14,17+/-1,53)($p<0.05$), positive associations between VAS and the scores of ODBPQI (13,3+/-1,39)($p<0.001$), RMDQ (12,25+/-1,06)($p<0.01$). BDO was correlated with subscale scores of SF-36 (negatively), and the scores of ODBPQI ($p<0.001$), RMDO ($p<0.01$) (positively). The scores of ODBPQI and RMDQ increased, while subscale scores of SF-36 decreased. There were negatively correlations between PSQ and some subscale scores of SF-36, BDQ ($p<0.05$), the scores of ODBPQI ($p<0.01$), RMDQ ($p<0.05$). No- patients had participated the physical therapy and rehabilitation program following lumbar disc surgery.

CONCLUSION: The results ol the lumbar disc surgery patients may be related to the restrictions of postoperative activity. A well designed rehabilitation program ollowing lumbar disc surgery can be performed safely with proper supervision and patient education, improving muscle strength, mental and physical function and quality of life.

ORAL PRESENTATION

CERVICAL FUSION RESULTS OF POLYETHERETHERKETONE (PEEK) CAGES

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OBJECTIVE: This study evaluates the effect of interbody polyetheretherketon (PEEK) cage fusion in 58 consecutive cases treated for discogenic cervical disorders.

METHODS: Between the years 2002-2003, 58 patients were treated with cervical interbody fusion using PEEK cage. There were 40 male and 18 female patients and the mean age was 42.6 years (range, 22-75 yr). PEEK cages were packed with demineralised bone grafts or synthetic bone grafts. Additional plating was not used in any case. The median duration of follow-up was 12 months (range, 6-24 months). Cervical x-rays were used in the follow-up to assess the fusion, pseudoarthrosis, kyphosis, cage migration, subsidence or breakage.

RESULTS: There was adequate fusion in the whole series and no implant insufficiency was observed except the patient who had a collapse fracture due to bone resorption in the superior corpus. One patient was reoperated due to primary failed decompressive surgery at three months and strong complete fusion was observed during the surgery.

CONCLUSION: Efticient fusion has stili been an ongoing problem in cervical surgery. Difterent techniques and materials have been developed to overcome this problem. The use of cervical PEEK cage seems to be a good alternative that do es not require additional anterior plating and bone graft harvesting for achieving cervical fusion.

ORAL PRESENTATION

POSTERIOR LUMBAR INTERBODY FUSION WITH TRICORTICAL LIIAC BONE GRAFT FOR TREATING ADULT SPONDYLOLISTHESIS

MOHAMMAD EL-SHARKAWI (Assiut University Medical, Egypt)

INTRODUCTION: The repeatedly reported noncorrelation between high fusion rate and lower clinical outcome rates following instrumented posterolateral fusion has been partially attributed to the lack of anterior support as well as the persistence of the disease as a source of pain. Posterior lumbar interbody fusion (PLIF), as an alternative, is reportedly associated with many neurological complications.

METHODS: This is a prospective analysis of the first 30 consecutive patients suffering from adult spondylolisthesis (21 lytic and 9 degenerative type) treated with PLIF using, at least 2 autogenous tricortical iliac grafts. The JOA was used for the clinical assessment. The mean follow-up period was 13 months.

RESULTS: The mean recovery rate by JOA score was 92%. The average slippage improved from 30% preoperatively to 13% postoperatively. The average local kyphotic angle improved from 0 degrees preoperatively to 10 degrees lordosis postoperatively Comparison between follow-up x-rays and postoperative x-rays did not show any significant degree of graft collapse, nor change in slippage angle or lumbar lordosis. Radiological fusion was achieved in all cases. None of our patients suffered from gri: retropulsion. Complications included superficial wound infection (2), transient donor site pain (2), transient numbness (7), and L5 paralysis (1) that occurred in a case of grade IV fallowing attempt at reduction.

CONCLUSION: PLIF for adult spondylolisthesis seems to give good clinical and radiological outcome with minimal morbidity. The success achieved using tricortical bone graft obviates the need for using the more expensive interbody cages.

ORAL PRESENTATION

BRYAN CERVICAL PROSTHESIS IN CERVICAL DISC HEMIATION: CLINICAL AND RADIOLOGICAL FOLLOW-UP

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INTRODUCTION: The authors review their series of cervical discectomies with the implant of Bryan cervical prosthesis (Medtronic Sofamor Danek). Clinical and radiological outcome is discussed at 1 year follow-up.

MATERIAL AND METHODS: From May 2003 to January 2005 a series of 47 patients were treated for degenerative cervical disc herniation. Thirty-two patients were female, mean age was 45 years old (range 24-61). Eleven cases required a multiple level operation, two of them at C4-C5 C5-C6, and nine at C5-C6 C6-C7. A total of 58 levels were operated on, including 37 at C5-C6 levels, 14 at C6-C7, 5 at C4-C5 and 1 each at C3-C4 and at C7-D1. In one case we observed only a partial improvement of the radicular symptoms, probably because the patient had bony osteophytes that were incompletely decompressed. At follow-up the clinical symptoms progressively improved. In one case we observed a transient recurrent nerve palsy resolved in less than 2 weeks. Assessment of outcome was obtained with a short clinical examination and interview, with dynamic cervical X-rays and with the Neck Disability Index scale and SF-36. Motion was evaluated by calculating the angle of motion at the operated level, the relative segmental alignement at the operated level and the overall sagittal alignment of the cervical spine.

RESULTS: A significant improvement of the Neck Disability Index score and SF-36 score was observed in all the patients individually and as a group. All the patients would undergo the same operation at 1 year.

None of the cases had a subsidence of prosthesis. A mean 8° (5°- 18°) degrees of motion with respect to flexion-extension was observed. In patients operated at two levels, the lower level granted less motion than the upper one.

The operated level showed radiologically a nonsignificant loss of lordosis (-1,2°) at one year, but the overall sagittal allignment of the cervical spine was preserved. Overall, this technique seems to provide results that at least match those of our cervical discectomies with arthrodesis.

ORAL PRESENTATION

COMPUTERIZED TOMOGRAPHY GUIDED TRANSFORAMINAL EPIDURAL STEROID INJECTION FOR LUMBOSACRAL RADICULAR PAIN IN SPINAL STENOSIS

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INTRODUCTION: Spinal and radicular pain due to spinal stenosis continues to be one of the most challenging musculoskelatal problems. Though several conservative modalities has been shown to be effective, there are significant number of patients who do not benefit enough. Epidural steroid injections has been used extensively since it was first described by Robecchi et all in 1952. Controversies discussed in the literature include the effectiveness and the use of radiographic guidance and the route of administration (caudal, translaminar or transforaminal). This study analyzed the efficacy of transforaminal epidural steroid injections under compulerized tomography in relieving lumbosakral radicular pain due to spinal stenosis.

MATERIALS AND METHODS: Between May 2003 and March 2004 a total of 41 patients with lumbosacral radicular pain due to spinal stenosis were treated by transforaminal epidural steroid injection under computerized tomography. For the assessment of pain severity, 100-mm visual analogue scale (VAS) was used in pre-injection, 1st day, 1st week, 3rd week, 6th month and the last follow-up. For the statistical analysis of VAS scores in terms of follow-up, Friedman's and Wilcoxin rank orders tests were used.

RESULTS: All the patients reported a serious degree of symptom relief with a mean follow-up of 12.09 months (min:6, max:25 months). The pre-injection median VAS score was 9 (min:6, max:10) and this was significantly higher than all the follow-up median VAS scores ($p<0.05$). The 1st day and 1st week median VAS score was found to be 0 (min:0, max:10) which increased to 2 (min:0, max:9) in the 3rd week and 6th month follow-up.

CONCLUSION: Computerized tomography guided, transforaminal epidural steroid injection is a safe and effective conservative treatment alternative for lumbosacral radicular pain due to spinal stenosis with all minimum 6-month follow-up period.

ORAL PRESENTATION

MOTION PRESERVATION - DISC REPLACEMENT FOR LUMBAR DEGENERATIVE DISORDERS WITH THE PRODISC® PROSTHESIS

RUDOLF BERTAGNOLI (St-Elisabeth-Klinikum, Germany)

PURPOSE: Chronic back pain, loss of the disc height and limited range of motion in the affected lumbar segments are basic symptoms of the degenerative disc disease. However, the degenerative changes of the facet joints, posterior segment instability, and the failed back surgery syndrome as well as the adjacent level degeneration alter fusion typically accompany this suffer. The aim of this prospective study is, to evaluate the follow-up clinical results after total disc replacement using the ProDisc® device.

MATERIALS AND METHODS: A total of 755 ProDisc® devices were implanted in 550 pts (282 female and 268 male, the average age is 45 years). The prosthetic disc replacement was performed at the following levels: L1/L2: 6 cases, L2/L3: 27 cases, L3/L4: 91 cases, L4/L5: 259 cases, L5/S1: 349 cases, L5/L6: 21 cases, L6/S1: 1 case.

There were 391 single-, 116 double-, 41 triple-level treated pts, one 4-level- and one 5-level treated pt. 253 pts have been controlled in time frames between 6 (339 pts) and 24 mos. (132 pts) alter surgery. The longest time-period after surgery is more than 5 yrs. (3 pts). Medical assessment based on the standard CRFs and the self administered assessment completed by the pts (Oswestry Questionnaire and the SF36 Health survey) were used for outcome evaluation.

RESULTS: The evaluation showed that the pain intensity was significantly reduced: the VAS preoperatively was 7.3 and 24 mos. after surgery 4.1. The number of pts complaining about continuous back pain dramatically declined from 87 % to 33 % two years postoperatively. 46 % of the pts reported to be completely satisfied and 42 % to be satisfied with the procedure two years after surgery.

CONCLUSION: The clinical results in our series have demonstrated that total lumbar disc replacement with a ProDisc® Prosthesis is a good treatment option far degenerative disc disease. We will continue our investigation in this group of patients to gather long term results.

ORAL PRESENTATION

CAUDA EQUINA SYNDROME: EARLY SURGERY IMPROVES OUTCOME

SALMAN SHARIF (Liaquat National Hospital, Pakistan), EJAZ ASLAM

INTRODUCTION: Cauda Equina syndrome is characterized by asymmetrical paralysis, sensory loss and areflexia including loss of bowel and bladder control. It happens as a result of injury to the nerve roots arising from the conus medullaris and is commonly seen with acute disc herniation. It has been almatter of considerable debate whether surgical interventions performed as an emergency alters the out come at all! We prospectively carried out a study to address this question.

MATERIAL AND METHODS: 60 consecutive cases that presented with CES to our hospital between Jan 2000 to July 2004, secondary to disc prolapse were included. Presentation, details of surgical intervention and outcome at discharge and at minimum of 6 months was looked at.

RESULTS: Majority of patients had L4/5 disc prolapse. All patients had improvement in their symptoms though three patients continued to have loot drop. All except two patients showed improvement in sphincter control. Patients with residual symptoms had acute onset of impairment and had duration of symptoms of over 3 months before surgery. Timing of surgery was statistically significant prognostic factor.

CONCLUSIONS: Early surgery meant early recovery in our patients, but delayed surgery may also provide satisfactory outcome.

ORAL PRESENTATION

RADIOGRAPHIC PREDICTORS OF OUTCOME AFTER POSTEROLATERAL FUSION AND INSTRUMENTATION IN THE TREATMENT OF DEGENERATIVE LUMBAR DISORDERS

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INTRODUCTION: A fusion to L5 carries the potential for accelerated subsequent advanced L5-S1 disc degeneration and radiculopathy. On the other hand, fusion to L5 offers the theoretical benefits of preserved lumbosacral motion, smaller surgery, lesser complications and decreased likelyhood of pseudoarthrosis.

MATERIAL AND METHODS: In this study, we compared group 1 (L5 fused) and group 2 (S1 fused) who had been operated for degenerative lumbar disorders. Clinical records and radiographic studies for consecutive degenerative lumbar disorders that underwent posterolateral fusion and instrumentation from thoracic or lumbar spine to either L5 or the sacrum were reviewed. Group 1 consisted of 17 patients and group 2 consisted of 13 patients. The average age of the 28 female and 2 male patients was 63,3 (34-80). The average follow-up of the patients was 26.8 months (13-54 months).

RESULTS: Group 1 and group 2 were nearly identical in terms of age, sex, number of levels fused and the radiographic follow-up (p=0,557, p=0,492, p=0,449 respectively). Only one patient in both groups were considered fair. Two group comparisons revealed significant differences for screw loosening (p=0,027). In group 1 (L5), one patient had lysis around distal screw. In group 2, 6 patients had distallysis (in 3 patients, the lysis disappeared in 2 year follow-up) and 1 patient had lysis around proximal screws. Although 12 patients (70%) in group1 and 3 patients (23%) in group 2 had inter-transverse process fusion, stable fusion was observed in all patients of the two groups. There was no significant difference in terms of complications between groups (p>0.05).

CONCLUSION: In this study, posterolateral fusion and instrumentation produced satisfactory fusion rat e and clinical results in the treatment of lumbar degenerative disorders. Alter 26.8 months of mean follow-up, the lumbar fusions to the sacrum had a higher frequency of distallysis around screws but later with fusion, the disappearance of lysis was noticed.

ORAL PRESENTATION

PREVALENCE OF SACROILIAC JOINT DYSFUNCTION IN NONSPESIFIC CHRONIC LOW BACK PAIN

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INTRODUCTION: The sacroiliac joint (SIJ) has been implicated as a possible cause of low back pain by some authors. While some author advocates for the SIJ being a major cause of low back pain (LBP), others suggest SIJ pain is uncommon source of LBP. Debate has continued over the existence of SIJ dysfunction. The aim of this study was to determine the prevalence of SIJ pain in patients with nonspecific chronic LBP

METHODS: 130 males, 232 females, a total of 362 patients suffering from chronic LBP and sciatica were studied. Their mean age was 40.1. Patients who had disc disease with neurological signs or disc protrusions, spondylolithesis, sacroiliitis and, previous surgery and pregnancy were excluded. Clinical examination and tests for SIJ pain were used for diagnosis of SIJ dysfunction. Pelvic asymmetry and hamstring muscle thightness were detected pain localization and intensity level were assessed.

RESULTS: 60.22 % of the patients (218 of 362) have showed positive signs for SIJ dysfunction. 76 patients have been involved bilterally. 98% of the patients with SIJ pain had lower lumbar and hip pain, 95% of them lower lumbar and buttock pain, whereas 15% had groin pain. Their pain intensity level was 7.79 cm in activity and 4.85 cm in rest according to visual anolog scale. 85% of them had accentuated lordosis with hamstring thightness and pelvic asymmetry. There was no degenerative changes in their SIJ in X-rays.

CONCLUSION: This study revealed the SIJ may have a big importance in source of LBP and must be taken consideration in teatment regimens. The accuracy of some clinical tests for SIJ have to be supported by diagnostic or provocative analgesic injections with further studies.

ORAL PRESENTATION

ANTERIOR INSTRUMENTATION IN TUBERCULOSIS SPONDYLITIS THE RESULTS OF MINIMUM 5 YEARS FOLLOW-UP

İ. TEOMAN BENLİ (Ankara Social Security Hospital, Turkey), SERDAR AKALIN, AHMET ALANAY, BÜLENT ATEŞ, ERBİL AYDIN

Information on the use of anterior instrumentation along with radical debridement and fusion is scarce. This study reports on the surgical results of 59 patients with Pott's disease that had anterior radical debridement and anterior fusion and anterior instrumentation with minimum 5 years follow - up. (23 patients with anterior titanium plate - screw system and 36 patients with double rod - screw system). Average age at the time of operation was 46.3±13.5 years. Average follow-up was 84.6± 11.3 months. Local kyphosis was measured as the angle between the upper and lower end plates of the collapsed vertebrae preoperatively, postoperatively and at the last follow-up visit. Vertebral collapse, destruction, cold abscess, and canal compromise were assessed in MR images. It was observed that, the addition of anterior instrumentation increased the rate of correction of the kyphotic deformity (78.5± 20.5 %), and was effective in maintaining it with an average loss of 1.5˚±1.9˚. Of the 24 (44.1 %) patients with neurological symptoms, 20 (83.3 %) had full and 4 (16.7 %) partial recoveries. There were very few intraoperative and postoperative (major vessel complication: 1.7 %, secondary non- - specific infection: 1.7 %) complications. Disease reactivation was not seen with the employment of an aggressive chemotherapy regimen. It was concluded that anterior instrumentation is a safe and effective method in the treatment of tuberculosis spondylitis. There were no significant differences between the two instrumentation systems in terms of sagittal alignment reconstruction and fusion rate. In rod-screw system, the disadvantage of scoliosis deformity creation through frontal plane in plate performing did not occur and it is thought to have the advantage of long instrumentation in multiple level deformities.

ORAL PRESENTATION

AN IMPLANT-RELATED INFECTION MODEL IN RAT SPINE

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OBJECTIVE: The rate of postoperative infections is approximately 1 % in spine surgery. However, infection rates significantiy increase and it was reported between 2.1 % and 8.5% postoperatively when metal implants are used. This study aim to set up an infection model in rat spine with and without a metal implantation, and use this model for treatment and prophylaxis of spinal infections.

MATERIAL AND METHOD: Fourty white male Sprague Dawley rats (6 months-old-age and weighing 300-350 grams) were divided in 4 groups. After intraperitoneal anesthesia using ketamin hidrocloride a laminectomy from T10 to T12 were performed, and a 3 mm titanium screw is implanted to the lateral of the laminae. In Group 1 (control group), physiologic saline solution is applied. In the other three groups, different concentrations of staphylococcus aureus were implanted (Group 2: 102, Group 3: 103, Group 4: 106) on the laminectomy site. All animals were sacrificed alter 2 weeks, then blood cultures, and cultures from fascia, muscle and bone were obtained. Bacterial number in each tissue was evaluated as CFU/gm tissue. Specimens of two animals from each group were subjected to histological examination.

RESULTS: Although blood cultures obtained by intraatrial punction after 2 weeks were negative in all groups, a significant osseous infection was confirmed in Groups 2, 3 and 4. Bacterial cultures were negative in all specimens of Group 1. Comparison of bacterial counts in bone at the laminectomy site showed no significant difference between Group 3 and Group 4 ($p<0.05$), while there was a difference in Group 2. Pathological changes in Group 4 was also more prominent than Group 2 and 3.

CONCLUSIONS: This study shows that inoculation of staphylococcus aureus in 106 concentration at the laminectomy site after implantation of a titanium screw in white rats is a reproducible model for spinal infection. Further studies for treatment and prophylaxis of postoperative infection can be performed on.

ORAL PRESENTATION

BRUCELLAR SPONDYLODISCITIS OF THE SPINE

ÖZKAN ATEŞ (Ege University, Turkey), MEHMET ZİLELİ, SEDAT ÇAĞLI, SÜLEYMAN ÇAYLI, SERTAÇ İŞLEKEL, MERİH İŞ

OBJECTIVE: Brucellosis, an important health problem in certain parts of the world, is caused by certain bacterial species of Brucella. It is a systemic disease in which a variety of tissues and organs can be affected; in particular, involvement of reticuloendothelial and musculoskeletal systems is common. The prevalence of vertebra involvement in brucellosis was lound to be 7.5%. This study reviews the results ol surgical management of this uncommon infection.

METHOD: Twenty three patients with brucellar spondylodiscitis were treated during a period from 1993 through 2003 were reviewed. There were 17 males and 6 females. Their ages ranged from 9 to 75 years, with an average of 49. Duration of symptoms was in average 10.5 weeks (1-25 weeks). Pain was the predominant symptom in all of the patients. Nineteen patients were neurologically normal, but had axial pain and difficulty in movements, while four patients had different levels of paresis. Five patients were surgically treated (2 cervical, 1 thoracic, 2 lumbar). Of those five patients 2 had paraparesis, one had angulation deformity, two had brucellar spinal epidural abscess in cervical region. One patient had positive culture by CT guided needle biopsy.

RESULTS: Serological tests were positive in all patients. ESR was 67,2±35 (between 21 and 116). Localization of spondylodiscitis was cervical in 4, thoracic in 7, lumbar in 12 patients. The patients were followed up for 5 weeks to 2 years, with an average of 31 weeks. Among four patients with neurological involvement, one patient did not change, and three had full recovery.

CONCLUSION: The principal treatment of brucellosis of the spine is conservative, namely, immobilization and antimicrobial therapy. Surgical intervention is reserved for biopsy, severe neurological impairment, or spinal instability. In chronic brucellosis, particularly in elderly patients who present with back pain or tenderness vertebral involvement should be remembered.

ORAL PRESENTATION

USING PERCEPTIONS OF PAIN SEVERITY IN A GENERAL POPULATION TO NORMALIZE VAS PAIN REPORTS

ROBERT L. KANE, BORIS BERSHADSKY, TODD ROCKWOOD, KHALED SALEH, NAZİR CİHANGİR İSLAM (Haydarpaşa Numune Hospital, Turkey)

INTRODUCTION: Pain is frequently measured by using a visual analog scale (VAS) for different purposes in medical practice including spine surgery. Several studies showed that this method is simple and useful in examining changes in pain level over short time intervals in the same subject. However it is not clear if these ratings are also useful in analyzing differences across subjects. This ambiguity influences the reliability of the results and interpretations of both the clinical outcomes and research studies, especially during the follow-up of a cohort and the comparison of different samples. The purpose of this study is to create a method for normalizing VAS pain reporting on a common metric in order to control for the variation between different populations due to the differences in perception or evaluation of pain.

METHOD: (Stage 1) A list of 226 pains was gathered from a convenience sample of lay persons on the street and patients waiting at medical and orthopedic clinics (n=313). Age ranged between 45 and 75 (Stage 2) These pains were ranked by performing questionnaire by level of severity by health professionals (n=75) and 19 pains with the most stable rankings were selected. (Stage 3) These 19 pains were rated by a sample of community-dwelling adults (n=1622) and a method of VAS standardization based on six selected pains was developed.

RESULTS: Individual variations in pain ratings were found to be independent of respondent's age and gender, but were correlated with having experienced the type of pain and self-reported health status. A new scoring method that takes these correlations into account is proposed.

CONCLUSIONS: It is possible to standardize VAS pain ratings to compare pain between different populations.

ORAL PRESENTATION

A NEW TITANIUM EXPANDABLE PROSTHESIS FOR VERTEBRAL DEFECT REPLACEMENT

MOHAMED EL-MESHTAWY (Assiut University, Egypt), HEINRICH BOEHM

OBJECTIVES: This study investigates the use of a new titanium expandable cage for vertebral defect replacement in the thoracic and thoracolumbar spinal pathologies.

METHODS: Between 1998 and 2002, 218 patients underwent reconstructive spinal surgery for pathologies affecting the anterior column of the spine; tumours (89 patients), trauma (59 patients), infections (48 patients), and collapsed osteoporotic vertebrae (22 patients). The posterior surgery entailed short or long segment screw-rod fixation. The excision of the affected vertebral body has been done through either two-portal thoracoscopic approach (128 patients) or standard open approach (90) patients). The intraoperative difficulties, the preoperative local kyphosis, the degree of correction achieved, and the degree of re-kyphosis have been studied carefully.

RESULTS: 130 patients were males and 88 patients were females. The average age at surgery was 43.7 years (range 22 to 87 years). The average follow-up period was 24 months (range 12- 48 months). The affected spinal level was thoracic in 153 patients and the lumbar spine in 65 patients. The average operative time of the anterior surgery was 120 minutes in thoracoscopic approach, and 110 minutes in open thoracotomy or lumbotomy approaches. Only one prosthesis dislodged, for which immediate revision surgery was done immediately postoperatively to re-place the cage. Two prostheses (0.8%) showed migration of more than 2 mm at the time of follow-up. However, migration stopped spontaneously after occurrence of solid fusion. Fusion rate was 89%.

CONCLUSIONS: The use of this distractable cage successfully combined the goals of solid fusion and long term anterior column stability with the restoration of vertebral height and normal spinal biomechanics. It could be easily and safely placed in different pathologies through thoracoscopic or open approaches. There is no need to distract the adjacent vertebral bodies before its insertion that safes time.

ORAL PRESENTATION

PAIN MANAGEMENT: CT GUIDED PERCUTANEOUS TRANSFORAMINAL AND TRANSLAMINAR STEROID INJECTIONS

ROBERT SEIGEL (Colorado Imaging, United States), JOHN WHITAKER

We present a new and accurate method for delivering particulate steroids and local anesthetics for palliative pain control in patients with herniated and/or extruded disc material, free fragments and spinal stenosis. This technique is especially effective in individuals with radicular complaints in the lower extremities and is more accurate and effective than traditional fluroscopically guided epidural blocks.

Patients are usually treated without the need for conscious sedation: They are prepaired and draped in usual sterile fashion in the prone position following obtaining pre-procedure axial CT images. MRI exams have been previewed along with appropriate clinical history and physical exam to determine best image guided approach and level for injection. The radiation exposure is dramatically reduced by utilizing the minimum milliamperage/axial image and number of slices are reduced lo the minimum (twenty case). The entire procedure normally takes about twenty minutes. A two needle technique with a 10 cm or occasionally 15 cm 21 gauge spinal needle is first introduced into the lateral neuroforamen under ct guidance from a posterior oblique approach. Subsequently a curved and steerable 25 gauge needle with "memory retantion of the curve" is directed into the medial aspect of the foramen and epidural space. A smail amount (1-2 cc) of non-ionic contrast is the introduced to document "spread" into the epidural space surrounding the disc material and/or thecal sac. If necessary a CT guided translaminar epidural may also be performed to obtain additional coverage (useful in large extrusions and/or free fragments extending cephalad or caudal to the disc space). Lateral discs are particularly amenable to this procedure.

The advantages of this more sophisticated and accurate technique for pain management (versus standard fluoroscopically guided translaminar approach) in a variety of settings will be demonstrated along with clinical follow up.

ORAL PRESENTATION

THE MANAGEMENT OF CERVICOMEDULLARY COMPRESSION IN PATIENTS WITH CONGENITAL AND ACQUIRED OSSEOUS-LIGAMENTOUS PATHOLOGIES; ANALYSIS OF 26 PATIENTS

KADİR KOTİL (Haseki Educational and Research Hospital, Turkey), MUSTAFA AKÇETİN, TURGAY BİLGE, NECMETTİN GÜZEL

OBJECTIVE: Congenital and acquired osseous-ligamenlous abnormalilies of craniovertebral junction may cause mechanical compromise, either from direct neural compression and/or from a secondary vascular impairment (arterial or venous), leading to the signs and symptoms of cervicomedullary compression.

METHODS: Between January 1995 to December 2004, 26 cases were managed at our Department. Three of these cases were RA, traumatic (2), congenital basillar impression (5, in 2 case a posteriorly oriented or retroflexed odontoid), infection (10; 9 cases were CVJ pott disease), os odonteideum (3), condyles tertius (1) and tumor (2). Six had a syringomiyelia. The magnetic resonance images and clinical histories ol 26 pediatric and young adult patients (15 female, 11 male; mean age 43.2 with CCA were analyzed for subjective grade of VBSC, neurovascular compression, clinical status, treatment. and outcome. Symptoms and signs included headache (72%), ataxia (38%), lower cranial nerve dusfunction (54%), quadriparesis (44%), hyperreflexia (76%), hoffman positivity (72), achiıes clonus (72%) nystagmus (33%), dysphagia (22%). The mean follow-up time was 44 months (range 3-85 months). Twelve (46.2 %) had undergone posterior fossa decompression, seven (26.6 %) had ventral decompression.

The pre- and postoperative radiology was compared to assess the adequacy of decompression and stability. The major morbidity included pharyngeal wound sepsis leading to dehiscence (5.2%), valopharyngeal insufficiency (2.6%), CSF leak (2.6%) and inadequate decompression (5.2%). Neurological deterioration occurred transiently in 2 (5.2%).

CONCLUSION: The optimal management of cervicomedullary compression is surgery if they have neurovascular compression syndrome. The surgical approaches are transoral surgery and posterior decompression in addition to spinal fixation.

ORAL PRESENTATION

MAJOR SURGICAL COMPLICATIONS IN SPINE SURGERY: IS AGE A SIGNIFICANT RISK FACTOR?

GARY LAM, MANUELPINTO (Twin Cities Spine Center, United States), JOHN LONSTEIN

INTRODUCTION: Spine surgery in the elderly continues to increase with the aging population. Our goal was to determine if age is a risk factor for major complications in spine surgery. Influences of comorbidities were explored.

METHODS: Adult patients undergoing spine surgery over a four-year period were included in this study. One independent observer reviewed charts. Major risk factors: cardiac disease, cancer, smoking, diabetes, substance abuse, obesity, respiratory problems, previous infections, hypercholesterolemia. Major complications were defined as death, CVA, embolism, pneumonia and deep wound infections.

A total ol 1937 patients age 18 to 91 (average: 48 years) were included: (605 age 18 - 39; 1001 age 40-64, 331 age 65+); 41% were male. Diagnosis included deformity (30%), degenerative (49%) and other (21 %). Thirty-five percent underwenl combined anterior-posterior procedure, 13% anterior alone; 34% posterior alone.

RESULTS: Major complication rate was 2.1% with no deaths. Major complications included 7 CVA (0.4%), 2 embolism (0.1 %), 3 deep wound infections (0.2%) and 28 pneumonia (1.4%). Comorbidities increased with age (any major comorbidity: 45.8% age 18 - 39; 62.4% age 40 - 64; 82.2% age 65+; $p<0.05$). Incidence of any major complications increased with age (1.7% age 18 - 39; 1.5% age 40 - 64 and 3.7% age 65+; $p<0.05$); pneumonia incidence also increased with age ($p< 0.05$). Patents with history of respiratory problems or infections had an increased incidence of major complications and pneumonia. When adjusted for the effect of these two comorbidilies, patients age was NOT a significant risk factor (multivariaıe regression, $p>0.05$).

CONCLUSIONS: Overall major complication rate is low. Although complication rate was higher in elderly, comorbidities are more important factor to consider in assessing surgical risks. In patients with similar comorbidity profile, age is not a significant risk factor.

ORAL PRESENTATION

CONTROLLABLE FACTORS ON DURATION OF SURGERY AND BLOOD LOSS IN ANTERIOR SPINE SURGERIES

NECDET SAĞLAM (Haydarpaşa Numune Hospital, Turkey), OSMAN EKİNCİ, İLHAN OCAK, NAZİR CİHANGİR İSLAM

INTRODUCTION: The purpose of this retrospective analytic study is to explore which factors influence duration of anterior surgery/blood loss and determine whether they are controllable factors by the surgeon/surgical team or not.

MATERIALS AND METHODS: Mean age of the patients (n=30) underwent anterior surgery by the same surgical team during last 12 month-period was 43. Fifty-three percent were male. 20% of the patients suffered from trauma, 10% from deformity, 40% from degenerative diseases, 17% from neoplastic diseases and 13% from infectious diseases. Mean number of corpectomies and discectomies were 1.23 and 0.73. Mean intubation-extubation time was 254 min and mean blood lass was 1906 ml. Mean blood pressure was measured as 92 preoperatively. The effects of age, sex, number of discectomy and corpectomy levels, primary or revision surgery, diagnosis, type of cage, no of screws, high speed burr use, and mean blood pressure on both duration of surgery and blood loss were studied.

RESULTS: Pearson's Correlation Coefficient was 0.79 (p=0.000) between duration of surgery and blood loss; 0.43 (p=0.019) between number of corpectomy levels and duration of surgery; and 0.54 (p=0.002) between number of corpectomy levels and blood loss. Differences in blood loss between deformity cases (992) and neoplastic cases (3380) (p<0.017); between trauma cases (1505) and neoplastic cases (3380) (p=0.032) were significant. High-speed burr shortened the duration of surgery (220) when compared with the other cases (333) (p=0.003). The effect of high-speed burrs on blood loss (1480 vs 2900) was also significant (p=0.03). When compared the differences in blood loss between the use of expansible cages (1356) instead of regular cages and the use of regular cages (2398), a statistical trend towards significance was observed (p=0.09) despite higher mean number of corpectomies for expansible cages (1,50 vs 1,33).

CONCLUSION: Two controllable factors for decreasing blood loss in anterior spine surgeries are the use of high-speed burrs and expansible cages instead of regular cages.

ORAL PRESENTATION

CONTROLLABLE FACTORS ON DURATION OF SURGERY AND BLOOD LOSS IN POSTERIOR SPINE SURGERIES

NECDET SAĞLAM (Haydarpaşa Numune Hospital, Turkey), OSMAN EKİNCİ, İLHAN OCAK, NAZİR CİHANGİR İSLAM

INTRODUCTION: The purpose of this retrospective analytic study is to explore which factors influence duration of posterior surgery/the blood loss and determine whether theyare controllable or not.

METHODS: Mean age of the patients (n=56) underwent posterior surgery by the same surgical team during last 12 month-period was 34.46% were male. 41 % suffered from trauma, 9% from deformity, 34% from degenerative diseases, 7% from neoplastic diseases and 9% from infectious diseases. Mean number of screws and hooks used in the fixation system were 8 and 1 respectively. Mean intubation-extubation time was 293 min and mean blood loss was 2151 ml. Mean blood pressure was measured as 89 mmHg preoperatively.

RESULTS: Pearson's Correlation Coefficient was 0.85 (p=0.000) between duration of surgery and blood loss; 0.47 (p=0.000) between number ol screws and duration of surgery; and 0.50 (p= 0.000) between number of screws and blood loss. Differences in duration of surgery between deformity and trauma cases ($p<0.001$); deformity and neoplastic cases (p=0.05); degenerative and trauma cases (p=0.038); degenerative and neoplastic cases (p=0.033) were significant. Differences in blood loss between deformity and trauma cases ($p<0.01$); degenerative and trauma cases (p=0.007) were also significant. Use of high-speed burrs shortened duration of surgery (254) and decreased blood loss (1676) significantly when compared with other cases (351 and 2884) (p=0.017, p=0.022). Differences in bath duration of surgery and blood loss between the use of allografts/synthetic bone grafts instead of iliac autograft (258 and 1724) and the use of iliac autograft (371 and 3129) were significant (p=0.010, p=0.011).

CONCLUSION: Controllable factors for shortening duration of surgery/decreasing blood loss for posterior spine surgeries are the number of screws, the use of high-speed burrs and the use of allografts/synthetic bone grafts.

ORAL PRESENTATION

COMPERATIVE STUDY OF PROPOFOL AND MIDAZOLAM EFFECTS ON IMMUNE FUNCTION AND WAKE-UP TEST IN PATIENTS WITH IDIOPATHIC SCOLIOSIS

BAHAR ÖÇ (Hacettepe University, Turkey), AHMET ALANAY, FATMA SARICAOĞLU, BİLGE ÇELEBİOĞLU, EMRE ACAROĞLU, MUHARREM YAZICI, FÜGEN ERSOY, ÜLKÜ AYPAR

INTRODUCTION: Propofol and midazolam are two most commonly used anesthetic agents in scoliosis surgery. These agents were suggested to contribute to postoperative immunosuppression and might increase the risk of nosocomial and wound infection. The purpose of this study is to investigate any possible immunosupressive effects of both anesthetics and to compare their efficancy for wake-up test.

MATERIALS AND METHODS: 30 patients with idiopathic scoliosis were prospectively randomized into two groups. Group P (n=15) operated by using propofol anesthesia and Group M (n=15) operated by using midazolam anesthesia. Preoperative and postoperative 24th hour blood samples were analyzed for whole blood count, blood culture. immune markers (ASO, CRP, RF, C3-C4, 19 A, M and G) and neutrophil chemotaxis index (NCI). All patients had the same type of antibiotic prophylaxis and the same number of peripheral and central catheters. Patients were asked whether they remember the wake-up test or not. All patients were treated either by posterior or combined anterior and posterior surgeries.

RESULTS: Both groups were similar according to age, gender, weight, classification of scoliosis, type of surgery, levels instrumented, duration of surgery and anesthesia and amount of blood transfusion ($p>0.05$). There was no significant difference between the pre and postoperative values of immunological markers both in Group P and Group M ($p>0.05$). Preoperative NCI was found to be similar in both groups (Group P: 3.82±0.89. Group M: 3.11±1.05, $p>0.05$) and it depressed to 3.61±1.38 (-2.42%) at postoperative 24th hour in Group P. In contrast to this, NCI increased to 3.28±0.81 (13%) in Group M. However the difference between the two groups was insignificant ($p=0.724$). Two patients (13%) from Group P had postoperative infections including one early nosocamial infection and one late deep wound infection, while there was no infection in Group M. There was no significant difference between the wake-up time while awareness of wake up was significantly ($p=0.002$) high in group P.

CONCLUSION: This study could not reveal a significant difference in terms of the majority of immunological parameters between the two groups. However, monocyte count was significantly higher in propofol group and two palients in this group had postoperative infections. On the other hand, midazolam was found to have a better amnesia effect for wake-up test.

ORAL PRESENTATION

OS ODONTOIDEUM: A REVIEW OF 10 PATIENTS

ERKİN ÖZGİRAY (Ege University, Turkey), MEHMET ZİLELİ, SEDAT ÇAĞLI, SERTAÇ İŞLEKEL, MERiH İŞ, ÖZKAN ATEŞ

INTRODUCTION: There is a few reports of os odontoideum in the literature. This study reviews the results of surgical management of this rare pathology.

METHODS: Ten patients with os odontoideum treated during the period 1995 through 2004 were reviewed. There were 6 males and 4 females. Their ages ranged from 15 to 73 years, with an average of 45. Five patients were neurologically normal, but had neck pain and difficulty in neck movements, while five patients had different levels of tetraparesis. Three patients described symptom development after a trauma, while five patients had a history of trauma 4 to 25 years (mean 14,4 years) before beginning of their symptoms.

All patients except one who did not accept surgery were surgically treated. Of those 9 patients 4 had occipitocervical fixation, 5 had posterior atlantoaxial fusions. Four patients with unreduced dislocations had additional transoral dens resections.

RESULTS: The preoperative reformatted CT seans of 7 patients were evaluated and all showed interdigitation and narrowing of the atlanto-axial joint line or the so-called jigsaw signs were positive. The patients were followed up for 2 months to 9 years, with an average of 3 years. All patients except one wilh failed occipitocervical fixation achieved solid arthrodesis. Among five patients with spastic tetraparesis. 3 did not change, and 2 had partial improvement after surgery.

Reduction of atlantoaxial dislocation is a prerequisite for posterior fixation alone. In case of nonreduced dislocations, transoral dens resection and occipitocervical fixation would be necessary for decompression.

CONCLUSIONS: Posterior atlantoaxial or occipitocervical fusion is the procedure of choice in most cases with os odontoideum. If, however atlantoaxial dislocation does not fully reduce in extension, transoral decompression with additional posterior fixation is necessary.

ORAL PRESENTATION

EARLY RESULTS OF NEW TECHNIQUES OF MINIMAL INVASIVE METHODS: PERCUTANEOUS INSTRUMENTATION AND PERCUTANEOUS INTERBODY FUSION

MAHİR GÜLŞEN (Çukurova University, Turkey), CENK ÖZKAN, SUNKAR BİÇER, CÜNEYT KAVAK

INTRODUCTION: Purpose of this study is to introduce and to present early results of new techniques of minimal invasive methods: Percutaneous instrumentation and percutaneous interbody fusion.

METHODS: These new techniques are applied 8 cases. There were 4 males and 4 females. Mean age was 45.4 years (17-70 years). Etiologies were as follows: Degenerative disorder; 2 cases, thoracolumbar trauma; 2 cases, Pott's disease; 4 cases. Sextant and B-Twin Expandable Spinal Systems were used. All operations were done under general anesthesia. In trauma, kyphoplasty with injection of bioactive cement was followed by percutaneous pedicle screw fixation on one level above and below the fracture. Instruments were removed six months later. Other cases were managed with single level percutaneus discectomy, grafting (allogralt spongious chips), bilateral expandable cage implantation and posterior percutaneous pedicle screw fixation. Plastic corsets were used for 4 months alter the procedure.

RESULTS: Mean operation time was 80 minutes (65-125 minutes). Hospital stay was 1 day. There were no early and late complications. Mean follow-up was 8 months (6-17 months). Trauma cases were also followed for 10 and 4 months alter removal ol the implants. No loss of correction was observed in these cases. Solid fusion was obtained in all other cases.

CONCLUSION: Percutaneous instrumentation and percutaneous interbody fusion may provide successfull results with short hospital stay and less morbidity in selective cases.

ORAL PRESENTATION

POSTEROLATERAL APPROACH FOR POSTERIOR STABILIZATION, FUSION AND TRANSFORAMINAL INTERBODY FUSION IN LUMBAR SPINE

UFUK AYDINLI (Uludağ University, Turkey), BURAK AKESEN, MEHMET KARAKAYALI, AYVAZ BAKUNOV, ÇAĞATAY ÖZTÜRK

INTRODUCTION: In classic approach fibrosis and atrophy was shown in paravertebral muscles due to retraction of erector spine muscles to reach posterior elements. In this paper, modified Wiltse approach was used in cases for spinal fusion and transforaminal interbody fusion (TLIF) that wide decompression is not necessary.

MATERIALS AND METHODS: The paraspinal approach was performed in 16 patients. Nine of the patients have degenerative spine, 3 patients have vertebra fracture and 2 patients have spondylolisthesis and one patient have vertebra metastasis. In 10 patients, anterior - posterior procedures were performed. Transforaminal interbody fusion or discectomies were performed in 3 patients and posterior stabilization was performed without decompression in 3 patients.

RESULTS: The mean duration of the posterior procedures with this approach was 72 min. The mean blood loss for the posterior procedures was 405 ml. The patient satisfaction was determined with VAS scores preoperative, during discharge and at postoperative 2 months.

CONCLUSION: In our study, we performed the paraspinal approach with single midline incision and also with longer incisions in all the cases as necessary, compared with previous studies. In our experience, this approach was used between Th12 and S1 levels. The mean blood loss was 405 ml and the mean duration ol surgery was 72 minutes. In two patients that TLIF at the L4-L5 and foraminotomy at the L4 level was perlormed, the time for surgery was 135 minutes and 180 minutes and blood loss was 580 ml and 750 ml respectively. We believe that these two procedures increased the mean surgery time and the mean blood loss in this study. The paraspinal approach can be used in patients who need posterior instrumentation, minimal spinal decompression with foraminotomy, discectomy and multilevel fusion. The area of fusion and instrumentation can be reached easily and directly without much blood loss and with the decreased time for surgery.

ORAL PRESENTATION

TURKEY IN SPINAL SURGERY

SAİT NADERİ (Dokuz Eylül University, Turkey), ALİ ARSLANTAŞ

OBJECTIVE: To designate the place of Turkish spine surgery all over the world and to look over the various journals of spinal surgery to expose the activity of scientific branches regarding mostly Neurosurgery and Orthopedic Surgery.

MATERIALS AND METHODS: In this study some spinal journals including Journal of Neurosurgery (Spine), European Spine Journal, Spine, Spinal Cord, and The Spine Journal were searched on the Pub Med database between the year of 2000-2004, and the number of articles of the countries and scientific branches (i.e. neurosurgery, orthopedic surgery, physical therapy) are documented and classified to reveal the contribution proportion of the countries and these brances.

RESULTS: Turkey has a considerable number of articles after United States and Japan at the "Journal of Neurosurgery (Spine)". In 2000, with significant support of neurosurgeons, Turkey was the second most article sending country with the number of 10. At the following years, Turkey was at the 6th, 4th, 3rd and again 4th place until 2004.

We observed that Turkey was at the 11 th place in the "Spine" journal in 2000, 2001 and 2002. But in 2003, with the number of 13 articles, Turkey was at the 6th place and, in 2004 at the 5th place with 22 articles. The reason of these increasing numbers of scientific papers at the last two years is attributed to important support of neurosurgeons and orthopedic surgeons.

In "Spinal Cord" journal, Turkey was at the 4th, 3rd, 5th, 6th and 5th place between 2000-2004. The majority of the articles were belong to Neurosurgery and Physical Therapy disciplines.

And finally in "European Spine Journal" with the support of neurosurgeons and orthopedic surgeons, we observed that Turkey has increased the number of articles from 5 to 9, until the year of 2004.

COMMENT: The scientists in Turkey, especially the ones interesting in spinal surgery have to make effort to increase the number of these scientific articles.

ORAL PRESENTATION

PERCUTANEOUS TRANSPEDICULAR SCREW FIXATION (TPSF) OF THE THORACIC AND LUMBAR SPINE: INTRODUCTION OF A NEW TECHNIQUE

MOHAMED EL-MESHTAWY (Assiut University, Egypt)

This is a prospective study aiming to evaluate the technical aspects and safety of percutaneous application of non-canulated transpedicular screws in the thoracic and lumbar spine. This study included 50 patients with thoracolumbar fractures 38 males and 12 females with mean age 34 years (16-64). All of them had had thoracolumbar spinal fractures and all of them were neurologically free preoperatively. The operative interference was done in the Trauma Unit-Assiut University Hospital. The posterior fixation stage was through the percutaneous approach. One segment fixation was done in 42 patients, two segments in 8 patients. The total number of screws was 217 (5 screws in one patient). The screws and all instruments used were non-canulated. Every screw is inserted under fluoroscopic control through a key-hole incision (1- 1.5 cm). The rods are applied sub-muscular and every hole is closed with one stitch. Preoperative and postoperative CT analysis of the pedicular dimensions and violation of the screws were recorded. 11 patients underwent fixation in the thoracic spine (from T5 to T12) and 39 patients in the lumbar spine (from L1 to L5). The mean operative time was 50 minutes (35-110). The mean operative blood loss was 60 ml (40-100). No suction drain was applied. One day analgesia was required in most of our patients. No preoperative or postoperative antibiotics were used. There was no neurological deterioration in any of our cases. Only two screws violated the medial wall of the pedicle (0.9 %), and 6 screws violated the lateral wall of the pedicle (2.8 %). The pre-operative local kyphotic angle was 9° in average that has been improved to 2° postoperatively. As a Conclusion, it is a new report about using the usual non-canulated transpedicular screws percutaneously for thoracolumbar spinal fractures. The percutaneous TPSF using the non-canulated screws is a safe less expensive, and real minimal invasive method.

ORAL PRESENTATION

SPINAL SHORTENING FOR THORACOLUMBAR BURST FRACTURES

MOHAMMAD EL-SHARKAWI (Assiut University, Egypt)

INTRODUCTION: Posterior distraction and fixation for unstable thoracolumbar burst fractures further destabilizes the spine by creating a defect in the anterior load-sharing column resulting in late collapse and metal failure. Anterior surgery to reconstruct the anterior column with tricortical bone graft is difficult, with lengthy patient recovery and relatively high morbidity, especially from the graft donor site. Posterior spinal shortening and fixation is a new surgical technique that combines the simplicity of posterior surgery and the biomechanical advantage of anterior surgery.

PATIENTS AND METHODS: The technique details complete laminectomy, discectomy, and spinal shortening by posterior fixation and compression opposing the fractured vertebra to the adjacent one aiming at fusion. No graft is harvested. Twenty-one patients with unstable thoracolumbar burst fractures (18 A3 & 3 C3) were prospectively treated and evaluated at mean of 19.2 months.

RESULTS: All patients with incomplete neurological affection improved at least by one Frankel grade except one. At the latest follow-up, 16 patients (76%) patients reported no or minimal back pain, 14 (67%) returned to their previous job, and 5 (24%) returned to a less strenuous job. Radiologically, the median kyphotic angle improved from 24.1 to (-2.1). Post-operative CT confirmed canal decompression in all patients. Complications were minimal.

CONCLUSION: Posterior spinal shortening and fixation restores sagittal alignment, decompresses the neural canal, and reconstructs the anterior load-sharing column. This new surgical technique seems to yield excellent clinical and radiological outcome with minimal morbidity.

ORAL PRESENTATION

EFFECT OF ADDING INTERSPINOUS WIRING TO THE POST. SPINAL LMPLANTS IN THE SURGICAL TREATMENT OF THORACOLUMBAR FRACTURES WITH RUPTURED POSTERIOR LIGAMENT COMPLEX

ERHAN SESLİ, TAHİR SADIK SÜĞÜN, AHMET DURAN KARA (Ege University, Turkey), MURAT ÖZTÜRK

INTRODUCTION: Post.lig.complex of spine may be ruptured depend of the vertebra fractures. Biomech. properties of the spine are decreased by the tears of the posterior ligament of spine. Interspinous wiring(isw) during the surgical treatment of the thoracolumbar vertebra fracture increases the stabilisation effect of spinal implants. The aim this radiologic retrospective study; to analyzed of the effect of adding isw technique to thoracolumbar fractures with ruptured interspinous and supraspinous ligaments.

PATIENTS/METHODS: 66 thoracolumbar vertebra fractured patients who had stabilized by post. Spinal implants had included to this study. 2 groups patients were identified. Group 1 consisted of 33 thoracolumbar vertebra fractured without any ligamentous lesion patients who were treated by only post.stabilisation systems, while Group 2 consisted of 33 with posterior ligamentous lesion patients who were treated by post.stabilisation systems adding isw. The compared both groups as radiologic measurement methods in pre-op, post-op and follow-up periods statistically. The method of measurements was ratio of interspinous space between lesion level and adjacent level (Label was named -X-). Than each three period of two groups were compared in all.

RESULTS: Preop X value was me an 1,26 (min: 0,72 max: 2) In group 1; while, was mean 1,88 (min: 1,16 max: 4) in group 2 after fracture. In Post-op period; mean 1,17 (min: 0,58 max: 1,85) in group 1 and mean 1,21 (min: 0,66 max: 2) in group 2 . In follow-up mean 1,16 (min: 0,6 max: 2,2) in group 1 and mean 1,25 (min: 0,66 max: 2,5) in group 2. The differences between both groups were meaningful ($p<0,05$) statistically.

CONCLUSION: The adding isw to posterior spinal implantation was fascilitate reduction manuever and balance the distractive forces of spinal implant with effect of hinge; in this manner stabilisation of spinal implant is increased.

ORAL PRESENTATION

CORRELATION BETWEEN GRADE OF PAIN RELIEVE AND COMPLICATIONS OF VERTEBROPLASLY IN PATIENTS WITH OSTEOPOROTIC, METASTATIC VERTEBRAL FRACTURES

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INTRODUCTION: The aim of the study was to assess the back pain relieve and possible complications alter vertebroplasty (VP) in patients with osteoporotic (OVCF), metastatic vertebral compression fractures (MVCF) and painful haemangiomas (PH).

MATERIAL/METHOD: 111 VP were performed in 62 patients with OVCF, MVCF and PH. All patients were divided in 3 groups. Group A included 34 patients with OVCF, group B - 15 patients with MVCF, group C - 13 patients with PH. In all cases diagnosis was established morphologicaly (simultaneous biopsy of damaged vertebral bodies). The severity of pain before and after PVP was estimated using visual analogue scale (VAS).

RESULTS: Average VAS indices before PVP in group A were 8,6 points, in group B. 9,1 points, in group C - 6,8 points. The effect of pain relieve after VP was divided in 3 groups: good (VAS <3 points), satisfactory (VAS 3-5 points) and poor (VAS >5 points). In group A 33 patients characterized their pain relieve as good, 1 patient characterized his pain as satisfactory. Average VAS value in group A - 2.9 points. In 1 patient alter VP a reversible irritation of LS root was diagnosed. In group B good results were obtained in 6 patients, satisfactory in 13 and poor - in 2 patients. Average VAS value in group B --4,7 points. Significant cement leakage into spinal canal was diagnosed in 2 patients from group B (without neurologic sequences). In group C good results were reached in 10, and satisfactory results - in 3 patients. Average VAS value in group C - 1.8 points No method-associated complications in group C were detected.

CONCLUSIONS:

1. PVP provides good pain relief in all groups of patients.

2. Vertebroplasty in patients with OVCF and PH is most effective and associated with minimal risk of complications.

3. In cases of MVCF VP must be done in carefully selected groups of patients.

ORAL PRESENTATION

RADIOGRAPHIC MEASUREMENT OF THE SAGITTAL PLANE DEFORMITY IN PATIENTS WITH OSTEOPOROTIC SPINAL FRACTURES: EVALUATION OF INTRINSIC ERROR

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INTRODUCTION: Cobb method has been shown to be the most reliable technique with a reasonable measurement error to determine the kyphosis in fresh fractures of young patients. However, measurement errors may be higher for elderly patients as it may be difficult lo delermine the landmarks due to osteopenia and the degenerative changes. The aim of Ihis study is to investigate the intrinsic error for different techniques used in evaluation of sagittal plane deformily caused by OVCF.

MATERIALS AND METHODS: Lateral X-rays of OVCF patients were randomly selected. Patient group was composed of 28 female and 7 male with a mean age of 62.7 (55-75) years. Kyphotic deformity was measured by using four different techniques, measuring the angle between the superior and the inferior endplates of the fractured vertebral body; the inferior endplate of the vertebral body just above the fracture and the inferior endplate of the FVB; the inferior endplate of the vertebra above and the superior endplate of the vertebra below the FVB; the superior endplate of of the vertebral body below; and the vertebral body heights (VBH) were measured at three different points.

RESULTS: The mean intra-observer agreement intervals of measurement techniques ranged from ±7.1 degrees to ±9.3 degrees for kyphosis angle and from ±4.5mm to ±6.6mm for VBH measurement techniques. The mean interobserver agreement interval for kyphosis angle ranged from ±8.2 degrees to ±11.1 degrees and between ±4.5mm to ±6.5mm for vertebral body height measurements.

CONCLUSION: This study revealed that although the intra and interobserver agreement were similar for all techniques, they are still higher than the generally accepted measurement error of 5 degrees. These high intervals for measurement errors should be taken into account when interpreting the results of correction in sagitlal plane deformities of OVCF patients alter surgical procedures such as vertebral augmentation techniques.

ORAL PRESENTATION

PENETRATING SPINE INJURIES

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BACKGROUND: Penetrating spine injuries, although not as common as blount trauma, have special problems which should be addressed seperately. There are two types of penetrating injuries: gunshot wounds and stab wounds. This report describes the clinical characteristics of a personal series.

CLINICAL MATERIAL: Between 1994 to 2004, 28 cases with penetrating spinal injuries (21 civilian gun shot injury, 7 stab wounds of the spine) were admilted to Ege University Neurosurgery Department. Their demographics (mean age 32,3, range 9-65, 24 male, 4 female) and localization of injuries (cervical 7, thoracic 13, lumbar 8) did not show significant difference between gunshot injuries and stab wounds.

RESULTS: Severity of spinal cord injury was almost same in both groups: ASIA scores were A in 8, C in 7, D in 5 and E in 1 patient with gunshot injuries, while A in 3, B in 1, C in 2 and D in 1 patient with stab wounds.

Other organ injuries presented in gunshot wounds (7 cases), but in none of the stab injuries. CSF fistulae was also a problem in one patient with gunshot injuries, but none of the stab wounds had a CSF fistulae. We performed surgery in 4 patients with gunshot injuries and 2 patients with stab wounds.

CONCLUSION: Surgery does not play a significant role in penetrating spine injuries unless there is an incomplete myelopathy due to a surgically correctable cause, such as hematoma, or CSF fistulae. Stab wounds have a better prognosis and surgery plays a much larger role. Retained foreign objects should belter be removed after a stab injury, whereas bullet fragments may be left in place. For prophylaxis against infection, antibiotics should be administered for a few days alter penetrating injuries, and this period should be longer in case of CSF fistulae.

ORAL PRESENTATION

THE SURGICAL TREATMENT OF THORACOLUMBAR VERTEBRA FRACTURES BY POSTERIOR INSTRUMENTATION WITHOUT FUSION

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INTRODUCTION: Most spine surgeons advocate posterior fusion as the treatment of choice for unstable thoracolumbar vertebra fractures. On the other hand; posterior spinal fusion procedures have been reported to have various adverse effects including pseudoarthrosis, spinal stenosis, spondylolysis, accelerated degeneration of the adjacent unfused segments and donor area problems. We prefer the technique of open correction and stabilisation by posterior spinal instrumentation without fusion for the surgical treatment of thoracolumbar vertebra fractures since 1990 in our clinic. The aim of this retrospective study was to evaluate the results of our procedure radiologically, and compare to the instrumented posterior fusion modalities in the literature.

PATIENTS AND METHODS: 64 thoracolumbar burst fractures of 57 patients were included to current study. The patients average age was 33.5 (range 15- 62 years) year old on time of surgery. All fractures were classiffied according to Denis' Burst Fracture Classification. The posterior hook, screw and rod systems were used. No fusion was performed. The patients were followed clinically and radiologically for average 12.4 months (range 3-72 months). The implants were removed for average 13.4 months (range 6-21 months) after surgery. The sagittal plane contour was assessed by measuring the Vertebral Body Angle (VBA), the Sagittal Index (SI), and the Vertebral

Kyphosis Angle (VKA) The frontal plane contour was assessed by the Vertebral Scoliosis Angle (VSA).

RESULTS: The results of radiographic measurements were evaluated. There was statistically a significant decreasing of VKA, VBA angles and SI, against no significant decreasing ol VSA angles in the post-operative and follow-up period (p<O,05)

CONCLUSION: Posterior internal fixation by spinal instrumentation without fusion is preferable treatment modality of the treatment of thoracolumbar vertebra fractures

ORAL PRESENTATION

MISSED THORACIC SPINAL FRACTURES IN MULTIPLE TRAUMA PATIENTS

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PURPOSE: To assess the need for repeated x-ray and CT of the thoracic spine for routine clearance of multi-trauma cases in Intensive Care Unit (ICU).

METHODS: Five cases were consulted by Orthopedic Surgeon at mean 3 days (range 1-6) after admission to the ICU. The median age was 31,6 years (range 23-50). The charts and first chest radiographies of cases were reviewed. The neurological assessment was done using the Frankel scale and fractures were classified according to Magerl.

RESULTS: Thoracic spine fractures were not shown initially on chest radiographs. Repeated x-rays and CT of the thoracic spine showed fractures of the vertebrae with great accuracy. The average Injury Severity Scare was 35. Other injuries noted at the time of presentation included: Lung contusion (2), lung laceration (1), haemothorax (5), multiple rib fractures (4), maxillofacial trauma (1) and extremity trauma (1). The mean duration of artificial ventilation was 5 days (range 2-5) and of ICU treatment was 10 days (range 2-19). One case died. Missed thoracic fractures were consisted of type A3 in two cases (T7 and T8), type 82 in one case (T9), type 83 in one case (14) and gunshot injury in one (T9). Neurologicallesions were Frankel A in 4 cases and Frankel E in 1 case. Four of 5 cases were operated, 3 presenting complete paraplegia and one neurologically normal, only one case made a neurological improvement from Frankel A to E and one case's status has remained normal. One case who had complete paraplegia was treated conservatively and there was no difference his neurological status at follow up.

CONCLUSION: The radiological signs may be minimal or absent during the first assessment of thoracic spinal fractures. Most importantly, cases in whom a full neurological examination is not feasible at the time of injury should be regarded as having a thoracic spinal fracture even in the absence of clear plain film features. This fact has implications for the nursing care of such cases in the ICU. CT is warranted in these cases.

ORAL PRESENTATION

UPPER CERVICAL SPINE INJURIES: A REVIEW OF 101 PATIENTS

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OBJECTIVE: Injuries of the atlantoaxial complex account for roughly one fourth of all cervical spine injuries and are notorious for causing diagnostic and therapeutic problems because of the complexity of structures and trauma mechanisms involved. This is a retrospective analysis of a series of upper cervical spine injuries in a single institute.

CLINICAL MATERIAL: Hundred one patients (22 female, 79 male, mean age 44 years) were admitted during a 12-year period (1993-2004) for injuries of the upper cervical spine. Eighty one were followed for a mean time of 32 months. Twelve isolated C1 fractures, 11 combined C1-C2 fractures, 57 isolated odontoid fractures, 20 hangman fractures, 1 isolated ligamentous instability were diagnased. Forthy-seven patients were treated conservatively and 54 patients were undergone surgery. Nine ventral odantoid screw fixations, 45 darsal stabilizations were performed. Stability was evaluated using flexion-extension radiography. Pain levels and neurological outcome were also assessed.

RESULTS: There were no operative mortality. Complications were wound infectians (5), CSF fistulae (1), instrument failure (3: one Halifax clamp dislodgement, 2 failure after C1-C2 wiring for odontoid fracture), which then needed dorsal restabilization. Of those 22 patients with neurological deficits, 20 have improved in different levels. One patient with severe tetraplegia (ASIA-A) has died before stabilization surgery.

CONCLUSIONS: Patients with type II odontoid fracture, type III hangman's fracture and combined C1/C2 fractures were candidates to surgery. The determinents for surgery were dislocation more than 5 mm, angulation and dislocation during flexion-extension radiographs, canal compromise and lack of decompression and reduction during traction.

ORAL PRESENTATION

TOTAL SPONDYLECTOMY FOR A CERVICAL SPINE TUMOR

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OBJECTIVES: Malignant or aggressive benign tumors arising in the thoracolumbar spine can be resected en bloc. However, this technique is difficult in tumors of the cervical spine, and there are a few previous reports of successful en bloc resectian of such tumors. This study documents the surgical technique used for en bloc excision of an aneurysmal bone cyst arising in the midcervical spine.

METHODS: Using a posterior-anterior-posterior approach, a tumor invading C6 and C7 vertebral bodies and soft tissue mass on the left side was removed en bloc, by making troughs in the vertebral body and endplates of C6 and C7 using high speed drill. Left vertebral artery, C6, C7 and C8 roots and brachial plexus were preserved. Anterior and posterior fixations were performed.

RESULTS: En bloc excision of an aneurysmal bone cyst in the cervical spine was achieved using 540 degrees surgery. The surgical margin was intralesional in a small area.

CONCLUSION: The technique used in this case study indicates that en bloc excision of such tumors can be used with a safety margin even in the cervical spine.

ORAL PRESENTATION

PRIMARY TUMORS OF THE CERVICAL SPINE: A REVIEW OF 35 SURGICALLY MANAGED CASES

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OBJECTIVE: This study aims to analyse the surgical management and results of 35 patients of primary bone and soft tissue tumors involving the cervical spine.

MATERIAL: During an 13-years-period, 35 cases with primary tumors of the cervical spine have been operated on: chordoma (8), aneurysmal bone cyst (2), plasmocytoma (3), chondrosarcoma (2), eosinophilic granuloma (2), osteoid osteoma and osteoblastoma (2). osteochondroma (3), hemangioma (2), aggressive fibroma (2), giant cell tumor, schwannoma, malignant peripheric nerve sheat tumor, desmoplastic fibroma, synovial sarcoma, spindle cell sarcoma, angiosarcoma, lipoma, lymphoma (each 1 case). Age distribution was 7-70 years.

RESULTS: The indication, timing and type of the operation were depended on the neurological status, situation of spinal canal, and stability of the spine. Marginal excision or subtotal excision used as method of tumor removal depending on location, size and type of the tumor. Twelve patients had residual tumors or recurrences which required repeat surgeries. A total of 66 surgeries (average 1.88 for per patient) were performed. Posterior (26), anterolateral (24), retropharyngeal anterolateral (9), combined anterior-posterior (4) transmandibular (1), and lateral cervical approach (2) were used. Instrumented fusions were applied to 16 patients. One patient died three weeks alter the surgery.

CONCLUSION: Whether benign or malignant, surgery of the primary tumors of the cervical spine should aim to total tumor removal. However, anatomic constraints of the cervical spine make en bloc tumor excision extremely difficult. In our cases, incomplete removals led recurrences and successive operations, especially for chordoma cases. Neverthless, despite recurrences, surgery of primary tumors of the cervical spine results in acceptable mortality-morbidity rates and symptom-free years, even for histologically malignant tumors.

ORAL PRESENTATION

ANEURYSMAL BONE CYSTS OF THE SPINE

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BACKGROUND: Aneurysmal bone cyst is a benign, relatively uncommon lesion, representing 1.4% of primary bone tumors. The vertebral column is involved in 3-20% of cases. This report describes clinical charactheristics and treatment results of 9 patients with aneurysmal bone cyst of the spine.

CLINICAL MATERIAL: Between 1995 to 2004 nine patients with aneurysmal bone cyst of the spine were surgically treated in Ege University Neurosurgery Department. The clinical records, radiographs, histologic sections, and operative reports were analyzed.

There were 5 male and 4 female patients, mean age was 21.7 years (range 7 to 45 years). Localizations were cervical (2), thoracic (2), lumbar (3), and sacral region (2). The two most common clinical features were pain (9 patients) and neurological symptoms resulting from spinal cord or nerve root compression (5 patients). Neurological signs were paraparesis in 2, monoparesis in 3. The mean duration of symptoms was 12.1 months (range 3 months 3 years).

All patients underwent surgery. Gross total removal in 7, subtotal resection in 2. A total of 12 surgeries (two and three consecutive surgeries in two patients) were performed because of residiye tumors. A posterior (5), anterior (2) or combined anterior-posterior (2) approaches were used. The mean follow-up is 93 months (range 1 88 months). There were no recurrences.

CONCLUSION: Treatment options for aneurysmal bone cysts are simple curettage with or without bone grafting, complete excision, embolization, radiation therapy, or a combination of these modalities. Complete excision of aneurysmal bone cysts offers the best chance of cure and spinal decompression. In this series complete tumor removal II-provided cure for this agressive pathology.

ORAL PRESENTATION

CURRENT TREATMENT OF METASTATIC SPINAL TUMORS

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INTRUDUCTION: Metastatic spread to the spinal column is a growing problem in patients with cancer. It can cause a number of sequelae including pain, instability, and neurologic deficit. If untreated, progressive myelopathy results with the loss of motor, sensory, and autonomic functions. Except in rare circumstances, treatment is palliative. Traditionally, conventional fractionated external beam radiotherapy has been the choice of treatment. Surgery for metastatic spinal disease was, and generally continues to be, equated with laminectomy by many physicians. Today, the goal of surgery is to achieve circumferential decompression of the neural elements while reconstructing and immediately stabilizing the spinal column.

METHODS: Twenty-three consecutive patients with metastatic spinal tumours that underwent microsurgical treatment were retrospectively studied. All patients underwent magnetic resonance imaging and had histological confirmation of spinal tumours.

RESULTS: There were 15 men and 8 women with a mean age of 50.05 years (range 10 to 68 years). The location of the tumours was thoracic in 17 cases, lumbar in 2 cases, and multilevel in four cases. The mean tumour size was 2,7 cm (range 1,2 to 7cm) and mean duration of symptoms was 4 months. Complete excision was achieved in 12 cases and incomplete removal in 13 cases. Twenty cases recieved conventional external beam radiotherapy and chemotherapy. The mean follow-up period was 14 months (range 15 days to 2 years). Immediate post-operative improvement was noted in 10 (43 percent) patients, 6 (26 percent) improved within three months, 6 (26 percent) had no improvement and a patient died.

CONCLUSION: The number of treatment options for metastatic spinal disease grows, it has become clear that effective implementation of treatment can only be achieved by a multidisciplinary approach. Postoperative outcome is correlated to duration of symptoms and the histological type of primary cancer.

ORAL PRESENTATION

RECONSTRUCTION WITH CHEST TUBE-PMMA IN METASTATIC TUMORS OF THE VERTEBRA

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INTRODUCTION: Metastatic tumours of the spine may cause pain and/or neurologic compromise necessitating decompression and major reconstruction despite the short life expectancy. This study introduces a new and cheaper reconstruction method.

MATERIALS & METHODS: All patients treated for metastatic vertebral tumor by using chest tube reconstruction between 2002 and 2004 were included in the study. Symptoms, findings, affected level, neurological status (Frankel grade) of each patient were noted. Alter resection of the tumor chest tube of adequate length was prepared based on the distance between the end-plates, was filled with PMMA and placed vertically at the resected area. Operative and postoperative complications, need of reeoperation, implant failure, and neurological status at the latest f/u were investigated.

RESULTS: 12 patients (9 male, 3 female) were included in the study. Mean age was 53.3 years (28-73). Indication for surgical intervention was myelopathy in 10 patients and radiculopathy in two of them. Preoperative Frankel grades were A in 2, B in 7, D in 2, and E in 1 patient. Primary tumours were multiple myeloma (4), lung (3), gastrointestinal (2), kidney (1), breast carcinoma (1) and malignant mesenchymal tumor (1). The lesion was at the thoracic level in 11, and lumbar level in 2 patients. One level-resection was performed in 6 while two levels-resection was done for the remaining 6 patients. Anterior instrumentation was done for all patients.

Nine of the patients died alter a mean follow-up of 8.2 months (1wk-19 mnths). 3 patients who were alive at the time of evaluation had a flu of 19.3 months (10-24). Postoperatively 8 patients were free of spinal pain while 4 had considerable improvement. Improvement of three-grades in Frankel classification was observed in 2, two-grades in 6 and one-grade in 4 patients. No implant failure has occurred.

CONCLUSION: Reconstruction with chest tube-PMMA is nonexpensive and easily applicable, is as safe and effective as the previous methods.