

SÖZLÜ SUNUMLAR (SS) / ORAL PRESENTATIONS

SS-1. ENDOSCOPIC TRANSFORAMINAL DISCECTOMY FOR RECURRENT LUMBAR DISC HERNIATION

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Aim:

Recurrent disc herniation is a significant problem as scar formation and progressive disc degeneration may lead to increased morbidity with re-operation. The advantage of the ETD is that there is no need to go through the old scar tissue. The disadvantage may be a long learning curve for the surgeon. Purpose of this prospective study was to review complications and results of the Endoscopic Transforaminal Discectomy (ETD) for recurrent herniated discs.

Methods:

262 consecutive patients over a four year period with a MRI proven recurrent disc-herniation in the lumbar spine with primarily radicular symptoms who did not respond satisfactory to conservative treatment over were included in this prospective clinical study. From a lateral approach first the intervertebral foramen was enlarged and a working cannula was inserted into the spinal canal. The prolapsed or extruded part was removed under endoscopic view with special forceps's. With a special reamer

the inferior endplate was perforated, abraded and all loose intradiscal fragments were removed.

Results:

3 months post-operative all patients underwent a clinical evaluation and at two years post-operative 90.8 % returned an extensive questionnaire including VAS Scores, MacNab Score as well as subjective satisfaction assessment. At two years 85.7 % of the patients rated the result of the surgery as excellent or good. 9.7 % reported a fair and 4.6 % patients an unsatisfactory result. Patients recorded an average improvement of their leg pain of 5.9 points and 5.7 points of their back pain on the VAS scale (1-10). According to Mac Nab criteria 30.7 % of the patients felt fully regenerated, 50 % felt their efficiency to be slightly restricted, 16.8 % felt their efficiency noticeably restricted and 2.5 % felt unaltered. All patients had a 3-month follow-up where possible complications were registered. 3 transient nerve root irritations and 6 (2.3 %) early recurrent herniations (<3 months) were reported. There was no case of infection or discitis. 11 patients have been re-operated for recurrence, after 3 months and within 2 years (4.6 %).

Conclusion:

Endoscopic Transforaminal Discectomy appears to be an effective treatment for recurrent disc herniation with only few complications and a high patient satisfaction.

SS-2. ENDOSCOPIC TRANSFORAMINAL DISCECTOMY (ETD)

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Aim:

Microscopic dorsal lumbar discectomy is the gold standard treatment for lumbar symptomatic disc herniation. Recently an increase of surgeon and patient interest in minimally invasive procedures could be observed, as they seem to reduce the complication rate and eliminate the risks of general anaesthesia. Purpose of this prospective study was to evaluate the effectiveness and complication rate of the Endoscopic Transforaminal Discectomy (ETD).

Methods:

252 consecutive patients with a MRI-proven disc-herniation in the lumbar spine, with radicular symptoms, positive Lasègue (<45°) or neurological symptoms that did not respond satisfactory to conservative treatment of at least three months were included. From a lateral approach first the intervertebral foramen was enlarged and a working cannula (of 7,5mm) was inserted into the spinal canal. The prolapsed or extruded part was removed under endoscopic view with special forceps's. With a special reamer the inferior endplate was perforated, abraded and all loose intradiscal fragments were removed.

Results:

The patients had a clinical evaluation 3 months postoperative and 95.6 % returned an extensive questionnaire at two years including VAS Scores, MacNab Score as well as subjective satisfaction assessment. At the two year follow-up 96.4 % of the patients reported an excellent or good result, 2.8 % a fair and 0.8 % unsatisfactory

result. Patients reported a significant improvement in leg- and back-pain according to the VAS scale. According to MacNab criteria 44.8 % of the patients felt fully regenerated, 48.8 % felt their capacity slightly restricted, 5.6 % felt they were noticeably restricted and 0.8 % felt unaltered. In 6 (2.4 %) cases an early recurrent disc herniation (<3month) occurred. 3 patients (1.2 %) had a temporary paraesthesia and foot weakness (which disappeared within 3 months). There were no cases of discitis or other complications. 12 patients (4.7 %) were treated for recurrent disc herniation. 10 of those patients endoscopically, 2 had microdiscectomy. 9 patients were very satisfied or satisfied after second surgery, one was unchanged and two were unsatisfied.

Conclusion:

The Endoscopic Transforaminal Discectomy appears to be a safe, effective procedure without significant complications and is an alternative to open microdiscectomy.

SS-3. CERVICAL PERCUTANEOUS NUCLEOTOMY COMBINED WITH CHYMOPAPPAINE

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Aim:

Because of the fear of complications related to conventional treatment for cervical disc herniations, minimal invasive procedures gain significant interest in patients and spine surgeons. The purpose of this prospective study was to evaluate the effectiveness and complication rate of an anterior percutaneous minimally invasive surgical treatment.

Methods:

267 consecutive patients over a 4 year period with a MRI or CT proven cervical disc herniation, with or without foraminal stenosis, predominantly radicular symptoms, no previous neck surgery and not responding to conservative treatment were included in this prospective clinical study. In all cases a confirmative discography of the affected level was performed. If discography did not reveal massive epidural dye leakage, 500 I.U. chymopapain was injected. Subsequently a mechanical Percutaneous Foraminal Decompression was performed with a 2 mm reamer and mechanical forceps, removal of protruded and extruded disc material under control of an X-image intensifier.

Results:

Patients underwent a clinical evaluation 3 months after surgery and at two years 95.5 % completed an extensive follow-up questionnaire including VAS Score, MacNab Score as well as subjective satisfaction. After two years 89.8 % of the patients

reported excellent or good results. 9 % of the patients had a fair or unaltered result and 1.2 % reported no improvement at all. According to the VAS scale patients reported a significant improvement for arm pain (6.7 pts) as well as neck pain (6.2 pts). In 3 cases an early recurrent disc herniation (<3 months) appeared (1.2 %). There was one dural puncture and two cases with subcutaneous haematoma. One patient had temporary hoarseness for 2 weeks. One patient developed a stress-ulcer from previous long term steroid use. All patients recovered without residual symptoms. There were no infections. 11 patients (4.3 %) had a recurrence within 2 years. 3 patients (1.2 %) again underwent a percutaneous treatment, 1 patient (0.4 %) underwent a micro-discectomy and 7 patients underwent a fusion operation.

Conclusion:

Cervical percutaneous nucleotomy combined with chymopapaine is a delicate, yet save and effective treatment for cervical disc herniations or even in case of foraminal stenosis.

SS-4. THE USE OF SCREW AT THE FRACTURE LEVEL IN THE TREATMENT OF THORACO-LUMBAR BURST FRACTURES

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Aim:

In this prospective randomized study, the results of treating unstable thoracolumbar burst fractures by pedicle instrumentation with and without fracture level screw combination were given. Our aim was to evaluate the efficacy of fracture level screw combination in achieving and maintaining correction in the treatment of unstable thoracolumbar burst fractures.

Methods:

Seventy two patients with unstable thoracolumbar burst fractures were randomized into four groups with equal number of patients. In Group 1, patients treated by segmental posterior instrumentation with two levels above and two levels below the fracture level fixation, in Group 2 they were treated as in Group 1 with fracture level screw incorporation. In group 3, patients treated by short segment posterior instrumentation with one level above and one level below, in Group 4 they were treated by short segment posterior instrumentation with fracture level screw incorporation. Clinic and radiological parameters were evaluated before, after surgery and at follow-up.

Results:

The average follow-up was 50 months. The preoperative KA as measured according to Cobb's method was statistically similar between Groups. The percentage of intra-operative KA correction in Group 3 was calculated to be the lowest ($p=0,042$). During follow-up, KA correction was more maintained in Groups 1, 2 and 4. The average preoperative percentage of the anterior body height compression (AVHC) was similar in group. AVHC was highest in Group 3 after surgery. Anterior vertebral height was more maintained in Group 1, 2 and 4 during follow-up. There were no significant changes in AVHC in Group 1, 2 and 4, but anterior vertebral height decreased in Group 3 and the difference was statistically significant. Fracture level screw combination provided better intra-operative correction and maintenance in the treatment of unstable thoraco-lumber burst fractures which was more prevalent in short segment fixation group.

Conclusion:

Data showed that fracture level fixation had lowered the rates of correction failure and this was most significant on short segment fixation. Fracture level screw combination can achieve and maintain kyphosis correction. This approach increases and maintains anterior vertebral height in patients with thoracolumbar burst fracture. According to our assumption, it can be used in short segment fixation as an additional transpedicular procedure to reduce the risk of failure. Although we were not able to find any clinical difference, reinforcement with fracture level screw combination can help in providing better kyphosis correction at studied parameters in patients treated with short segment fixation. Long term follow up study is needed to consider its' clinical benefit.

SS-5. ADOLESAN İDİOPATİK SKOLYOZDA SPİNECOR UYGULAMALARIMIZ (ERKEN SONUÇLAR)

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Amaç:

Adolesan idiopatik skolyozda breyslerin kullanıldığı pek çok konservatif tedavi yöntemi mevcuttur. Breysleme yapılacak hastaların çalışmalara dahil edilme kriterlerindeki farklılıklar ve breysin etkinliği konusundaki tanımlama farklılıkları alınan iyi sonuçlara şüphe ile yaklaşılmasına sebep olmuştur. Dinamik SpineCor breysi 1992-1993 senelerinde geliştirilmiş, eğriliğin tipine göre spesifik düzeltici etki yapan, hafif ve orta eğriliklerde etkili bir şekilde kullanılan bir breysdir. Bu çalışmamızda biz adolesan idiopatik skolyozlu olgularımızda SpineCor breysinın uygulama kolaylıklarını, tedavi sırasındaki eğrilikler üzerine olan erken etkilerini değerlendirmeyi amaçladık.

Yöntem:

Kliniğimizde 33 hastaya adolesan idiopatik skolyoz tanısıyla SpineCor breysi ile tedavi başlandı. Çalışmamıza idiopatik skolyoz tanısı almış, daha önce skolyoz tedavisi görmemiş, 10 yaş üstü, 15 yaş altı, Risser 0,1 ve 2, premenarş ya da menarş üzerinden 1 yıldan az zaman geçmiş, başlangıç Cobb açısı 25 dereceden büyük, 40 dereceden düşük olan, SpineCor breys ile tedavi edilen ve en az 9 aylık takipleri mevcut bulunan 17 hasta dâhil edildi. Omurgasında ciddi patolojik malformasyon, spina bifida aperta, spondiloliztezis, nöromüsküler ve postural skolyozu olan hastalar bu uygulamaya ve çalışmaya dahil edilmediler. SpineCor uygulanan hastalardan 15 yaşından büyük 2 hasta, tedavi süreci 9 aydan daha az olan 10 hasta, başlangıç

Cobb açısı 40'den büyük olan 4 hasta çalışma dışında bırakıldı. Eğrilikler SpineCor sisteminde kullanılan spesifik klinik ve radyolojik sınıflamaya göre ayrıldı. Beş RT1 (Right Thoracic 1), 2 RTL2 (Right Thoracolumbar 2), 2 RL (Right Lumbar), 1 LT11 (Left T 11 Curve), 3 RT2 (Right Thoracic 2), 1 RTEu (Right Thoracic "European" Curve), 1 LL (Left Lumbar) eğrilikli 16 hastanın takipleri yapıldı. Eğriliklere spesifik düzeltme hareketi ve breysleme SpineCor yardımcı yazılımına uygun bir şekilde günde 20 saat uygulandı. Breyslemeden maksimum 1 ay önceki PA ve lateral radyografi, breysle uygulamanın yapıldığı gün ayakta PA grafi ve 1., 3., 6., 9. ve 12. ay grafileri çekildi.

Bulgular:

RT1 eğrilikli 5 hastada başlangıç ortalama Cobb açısı 36.8 (31-40) dereceden 12. ay takiplerinde 24.6 (10-38) dereceye, RT2 eğrilikli 3 hastada 30 (24-38) dereceden 11.3 (5-20) dereceye, RTL2 eğrilikli 2 hastada ortalama 36 dereceden 23.5 dereceye, RL eğrilikli 2 hastada ortalama 26.5 dereceden 13.5 dereceye, 1 LT11 olgusunda 26 dereceden 5 dereceye, 1 RTEu olgusunda 40 dereceden 28 dereceye, 1 LL olgusunda 22 dereceden 14 dereceye, 1 RT3 olgusunda 40 dereceden 24 dereceye azalma gösterdi. Hiçbir hastada breys uygulama güçlükleri, hastanın breysi tolere edememe problemi izlenmedi.

Sonuçlar:

Adolesan idiopatik skolyoz olgularında breys kullanımının etkinliği konusunda tartışmalar devam etmektedir. Değişik tiplerde, uygulama farklılıkları bulunan ortezlerin etkinlikleri konusunda halen fikir birliği bulunmamaktadır. Çalışmamız hasta sayısının sınırlı olması ve halen hastaların tedavisinin sürüyor olmasına rağmen hastaların bu ortezi daha rahat tolere edebilmelerini, erken tedavi süreci takiplerinde skolyoz eğriliklerinde ciddi düzelmeler görülebilmesini vurgulamak açısından önem göstermektedir. Homojenize, karşılaştırmalı, daha fazla sayıda ve uzun takip süresi olan hasta gruplarıyla SpineCor uygulamalarının diğer ortezlerle karşılaştırmaları yapıлып, etkinlikleri ortaya konulmalıdır.

SS-6. SALVAGE OF FAILED SACRAL PEDICLE SCREW: BIOMECHANICAL COMPARISON OF ALA SCREW, BIGGER PEDICLE SCREW, POLYMETHYLMETHACRYLATE AUGMENTED PEDICLE SCREW

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Aim:

To determine biomechanical differences ala, larger and polymethylmethacrylate (PMMA) augmented pedicle screws as salvage techniques for failed primary sacral pedicle screw.

Methods:

Polyaxial primary pedicle screws were inserted to 21 fresh frozen calf's first sacral vertebra (S1) pedicle bicortical fashion. The screws were pulled out in a random order at 5mm/min Instron Materials Testing Machine. The pull-out strength (POS) was measured. Afterwards, these pedicle screws were randomly assigned to be replaced by PMMA augmented screws (group 1), larger screws (group 2) and ala screws (group 3) as a revision technique. Finally, POS of the revision screws were recorded.

Results:

The mean POS of all primary screws was 1981 N/m². Group 1: The mean POS of primary screws was 1650 N/m². After PMMA augmentation, mean POS was 1295 N/m² (p=0.139). The mean POS ratio (primary POS/revision POS) was 1.54±0,24. Group 2: The mean POS of primary screws was 2046 N/m². After larger screw replacement, mean POS was 1320 N/m² (p=0,007). The mean POS ratio was 1.84±0,22. Group 3: The mean POS of primary screws was 2247 N/m². After ala screw insertion, mean POS was 1290 N/m² (p=0,011). The mean POS ratio was 2.98±0,91. There was no statistical differences between POS (p=0.381) and POS ratio (p=0.185) of revision pedicle screws

Conclusion:

There were no biomechanical differences between ala, bigger or PMMA augmented screws to salvage of failed S1 pedicle screw.

SS-7. POSTTRAVMATİK KİFOZ NEDENİYLE OPERE EDİLEN HASTALARIN PARÇALANMA SKORLARININ DEĞERLENDİRİLMESİ

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Amaç:

Posttravmatik kifotik deformiteye sahip hastalarda, kırık omurganın parçalanma miktarı ile kifotik deformitenin şiddeti, ağrı miktarları, fonksiyonel kapasiteleri ve klinik durumları arasındaki ilişkinin ortaya konması amaçlanmıştır.

Yöntem:

Bu çalışmada, cerrahi tedavileri için anterior vertebrektomi, anterior destek greftleme ve anterior enstrümantasyon yapılan postravmatik kifozlu, yaralanma anındaki grafileri ve bilgisayarlı tomografileri olan 44 hastanın retrospektif olarak değerlendirilmiştir. Tüm hastalarda, McCormack, Karaikovic ve Gaines'in tariflediği "Yük Paylaşım Sınıflaması" (Parçalanma Skoru - PS) hesaplanmıştır. Bu çalışmaya operasyon endikasyonu konulmuş ve opere edilmiş 30° üzeri kifotik deformiteye sahip hastalar dahil edilmiştir. Ortama yaşları 40.4 ± 16.8 (21-66) olup, 26 (% 59.1)'si erkek ve 18 (% 40.9)'i kadındır. Operasyon öncesi çekilen yan grafilerde lokal kifoz açıları Cobb metodu ile ölçülmüş ve daha sonra "Sagittal İndeks" (SI) olarak kırığın bulunduğu vertebral bölgeye göre düzeltilmiştir. Hastaların ağrı ve fonksiyonel kapasiteleri "Ağrı ve Fonksiyon Değerlendirme" (PFA) skalası kullanılarak 0-20 arası puanlanmıştır. Hastaların klinik durumları SRS-22 anketi kullanılarak ağrı, fonksiyon, mental durum, görünüm ve memnuniyet duraklarında 5'er soru sorularak

0-5 puan arasında skorlanmıştır. Hastaların PS skorları ile SI değerleri, PFA ve SRS-22 skorlarının arasında istatistiki açıdan bir korelasyon olup olmadığı araştırılmıştır.

Bulgular:

Preoperatif ortalama SI, $49.7^{\circ} \pm 14.7^{\circ}$ (30° - 80°) olduğu saptanmıştır. PS, tüm hastalar dahil edildiğinde 7.9 ± 1.1 olduğu, PS değerleri ile SI değerleri arasında istatistiki olarak anlamlı olacak şekilde pozitif bir korelasyon olduğu belirlenmiştir ($r: 0.799$, $p < 0.01$). Tüm hastalar dahil edildiğinde preoperatif PFA skorunun ortalama 16.3 ± 2.4 olduğu görülmüştür. Preoperatif SRS-22 skorlarının, ağrı, fonksiyon, mental durum, görünüm ve tedaviden tatmin durakları için sırasıyla 2.9 ± 1.1 , 3.4 ± 0.9 , 3.3 ± 0.9 , 3.1 ± 0.9 ve 2.8 ± 1.0 ve PFA ile SRS-22 skorları arasında istatistiki olarak anlamlı olacak şekilde pozitif bir korelasyon olduğu görülmüştür. PS skorunun istatistiki olarak önemli olacak şekilde PFA skoruyla pozitif ($r: 0.899$, $p < 0.01$) ve total SRS-22 skorları ile negatif ($r: -0.885$, $p < 0.01$) bir korelasyon olduğu saptanmıştır.

Sonuç:

Bu çalışmanın verilerine göre, torakolomber bölge kırıklarında parçalanma skorunun, ihmal edilmiş kırıklarda ortaya çıkan posttravmatik kifotik deformitenin şiddetiyle, ağrı ve fonksiyonel kapasiteyle ve klinik durumla ilişkili olduğu saptanmış, tedaviyi belirlerken kırığın değerlendirilmesinde oluşması muhtemel ağrılı ve hasta memnuniyetini ortadan kaldıran posttravmatik kifotik deformitenin önlenmesi açısından önemli bir rehber olduğu fikri elde edilmiştir.

SS-8. OMURGA ATEŞLİ SİLÂH YARALANMALARINDA CERRAHİNİN YERİ

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Amaç:

Omurga ateşli silah yaralanmalarıyla gün geçtikçe daha sık karşılaşılmakta, eşlik eden diğer organ yaralanmalarıyla birlikte tedavilerinde büyük güçlükler yaşanmaktadır. Omurgaya cerrahi yaklaşımlarla ilgili değişik görüşler mevcuttur. Bu retrospektif çalışmamızda omurga ateşli silah yaralanmalarında cerrahi tedavinin fonksiyonel iyileşmeye olan etkisini değerlendirmeyi amaçladık.

Yöntem:

2000-2008 yılları arasında omurga ASY bağlı vertebra kırığı nedeniyle kliniğimizde cerrahi olarak tedavi edilen 27 erkek hastanın bilgileri retrospektif olarak değerlendirildi. Hastaların ortalama yaşı 21, ortalama takip süreleri 28 aydı. Yaralanmalarından itibaren ortalama 29 saatte (7-98) hastalar kliniğimize getirildi. Hastaların nörolojik durumları Frankel fonksiyonel sınıflamasına göre değerlendirildi. 6 hastada komplet yaralanma (Frankel A), 21 hastada inkomplet yaralanma mevcuttu (Frankel B-D). Kırıklar 10 hastada torakal, 17 hastada lomber yerleşimliydi. 8 hastada eşlik eden toraks ya da batin yaralanması mevcuttu. Hastaların tümüne immünizasyon durumlarına göre tetanoz profilaksisi yapıp, geniş spektrumlu antibiotik tedavisi başlandı. Antibiotik batin içi organ yaralanması olan 7 hastaya iki hafta, diğer hastalara 72 saat süreyle verildi. Enfeksiyonu artırma ve gastrointestinal komplikasyon potansiyelleri nedeniyle hastalarımıza steroid uygulanmadı. Hastaların direk grafi, BT, gerekli olgularda MR ile incelemeleri yapıldı. 22 hastaya progresif

nörolojik defisit nedeniyle akut dönemde debridman, laminektomiyle dekompresyon ve enstrümantasyonla stabilizasyon, iki ya da üç kolonun birden etkilendiği 5 hastaya spinal instabilite nedeniyle kısa segment debridman ve füzyon uygulandı. Cerrahi girişim yaralanmadan ortalama 2 (1-12) gün sonra uygulandı. Cerrahi sırasında debridman ve dura tamirine özellikle önem verildi.

Bulgular:

Onyediyedi hastada muhtemelen mermilerin termal ve blast etkilerine bağlı olarak yaralanma seviyesi ile nörolojik lezyon seviyesi birbirine uyum göstermiyordu. Takip süresinin sonunda cerrahi uygulanan 18 (% 66) hastada nörolojik olarak bir seviye kazanımı, 2 (% 7) hastada kötüye gidiş saptanırken, 7 (% 25) hastada herhangi bir nörolojik değişiklik izlenmedi. Nörolojik düzelmeler özellikle lomber tutulumlu yaralanmalarda gözlendi. Cerrahi uygulanan hastaların 22'sinde nörolojik tutulum inkomplet, 5'inde kompletti. Sadece 1 hastada kanal içine kaçmış mermi parçası ulaşımı kolay olduğu için çıkarıldı. 3 hastada kanal içinde bulunan parçalar ulaşım zorluğu nedeniyle çıkarılmaya çalışılmadı. Cerrahi uygulanan hastalardan 1'inde BOS kaçağı sonrası, 1'inde kontamine fragmana bağlı menenjit, 2'sinde lokal enfeksiyon gelişti.

Sonuçlar:

Omurga ASY'larının cerrahi tedavisiyle ilgili farklı görüşler bulunmaktadır. Ancak yaralanmanın akut döneminde gelen, nörolojik defisiti ilerleme gösteren ya da spinal stabiliteyi bozacak şekilde birkaç spinal kolonun etkilendiği kırıklarda erken cerrahi müdahale gerekliliği genel olarak kabul görmektedir. Kauda equina yaralanmaları ve inkomplet spinal kord yaralanmaları cerrahi uygulamalara daha iyi yanıt vermektedir. Bizim hastalarımızda da fonksiyonel ilerleme görülenler çoğunlukla lomber bölge tutulumlu ve inkomplet lezyonlardı. Omurga ASY'larında en iyi tedavi seçeneği hala tartışmalı olsa da özellikle inkomplet ve kauda equina yaralanmalarında erken cerrahi uygulama fonksiyonel ilerleme ve prognozu olumlu etkilemektedir. Hastalarımızda elde edilen fonksiyonel ilerlemeler bu tip yaralanmalarla gelen hastalarda yapılan erken cerrahi müdahalenin iyi sonuçlar verdiği tezini desteklemektedir.

SS-9. ANATOMICAL COMPARISON BETWEEN HUMAN AND CALF SACRAL SPINE: FIRST SACRAL VERTEBRA PEDICLE MORPHOLOGY

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Aim:

To determine quantitative anatomic data of the first sacral vertebra of calf and compare to the human cadaver. The database generated in this study may be helpful for developing new lumbosacral fixation techniques using a calf sacral spine model.

Methods:

Twelve fresh frozen calves (2 years old) and twelve female human cadavers' first sacral vertebrae (S1) were compared using 3 linear and 2 angular measurements. W distance: Anterior-posterior width of S1 pedicle. XP distance: Pedicle length is the distance from entrance point (X) to promontorium (P). H distance: Cephalad-caudad height of S1 pedicle. T angle: Transverse angle of S1 pedicle. S angle: Sagittal angle of S1 pedicle.

Results:

The mean cephalad-caudad height of pedicle (H) were measured 13.6 ± 2.3 mm in the human and 44.4 ± 4.34 mm in the calf ($p < 0.05$). Anterior-posterior width (W) of the S1 pedicle was measured as 22.5 ± 2.6 mm on an average in the human. In the calf, width was measured as 26.02 ± 1.95 mm ($p < 0.05$). The mean length of S1 pedicle

(XP) was measured 50.7 ± 3.7 mm in the human, and 76.1 ± 4.3 mm in the calf ($p<0.05$). The mean S and T angles of S1 pedicle were measured $19^\circ\pm 2.9^\circ$ and $43^\circ\pm 2.3^\circ$, respectively in the human. In the calf, the mean S and T angles were $16.37^\circ\pm 2.5^\circ$ and $44.04^\circ\pm 5.84^\circ$, respectively ($p_S<0.05$, $p_T>0.05$).

Conclusion:

Although there were some statistical differences between the human and calf S1 vertebrae, the good comparability with the human spine encourages the use of the two years old calf S1 spine as a model for human sacral spine research.

SS-10. POSTERİOR LUMBAR İNTERBODY FÜZYON TEKNİĞİ İLE SPONDİLOLİSTEZİS CERRAHİ TEDAVİSİ UYGULANAN HASTALARIN FONKSİYONEL VE RADYOLOJİK SONUÇLARININ DEĞERLENDİRİLMESİ

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Amaç:

Posterior lumbar interbody füzyon (PLIF) tekniği ile cerrahi tedavisi uygulanan spondilolistezis vakalarının fonksiyonel skorları ve radyolojik ölçümlerinin değerlendirilmesidir.

Yöntem:

Lumbar spondilolistezis bulunan, 2004-2007 yılları arasında PLIF tekniği ile cerrahi tedavi uygulanan, 12 hasta (1 hastada çift seviyeli spondilolistezis; L4-L5 ve L5-S1 düzeylerde) çalışmaya dahil edildi. Çalışmaya dahil edilen tüm hastalar bayandı, ortalama yaş 50.5 ± 12.7 (34-76) yıl, ortalama takip süresi 17.4 ± 15.0 (9-47) aydı. Hastaların operasyon öncesi ve sonrasında fonksiyonel değerlendirmelerinde "Oswestry skoruması", ağrı düzeylerinin değerlendirilmesinde "Visüel Analog Skala" (VAS) kullanıldı. Ayakta yan pozisyonda çekim yapılan operasyon öncesi ve sonrası direkt grafilerde kayma düzeyi (Wiltse sınıflaması), kayma açısı, sakral inklinasyon ve pelvik insidansın ölçümleri yapıldı. Hastaların operasyon öncesi ve sonrası fonksiyonel skorlar, VAS değerleri ve radyolojik ölçüm değerleri arasındaki istatistiksel değerlendirilme eşleştirilmiş örneklerde t-testi ile yapıldı.

Bulgular :

Hastaların Oswestry fonksiyonel değerlendirme skoru operasyon öncesi ortalama 76.9 ± 9.4 , sonrasında 16.8 ± 14.3 'e ve VAS değerinin 8.7 ± 0.8 'den 2.0 ± 1.3 'e geriledi ($p < .01$). L4-L5 vertebra arasında kayma vakaların %53.8'inde, L5-S1 arasında kayma ise vakaların %46.2'sinde belirlendi. Disk yüksekliği kaybolmamış 8 (%61.5) düzeyde interbody füzyon için implant (titanyum örgü kafes veya titanyum mono-blok kafes) kullanıldı, füzyon allogreft ve otogreftler ile desteklendi. Dejeneratif disk bulunan 5 (%46.2) vakada füzyon için yalnızca allogreft ve otogreft kullanıldı. Operasyon öncesi kayma miktarı ortalama 1.8 ± 0.7 'idi (1-3), cerrahi düzeltme sonrası kayma miktarı 0.2 ± 0.4 (0-1) olarak belirlendi ($p < .01$). Kayma açısı ortalama -18.2 ± 10.9 'dan -17.5 ± 9.0 'a gerilediği belirlendi ($p > .01$). Sakral inklinasyon değerleri cerrahi sonrasında ortalama 50.2 ± 4.2 'den 46.0 ± 3.9 'a ($p < .01$), pelvik insidans değerleri ortalama 61.7 ± 5.9 'dan 56.9 ± 5.6 'ya geriledi ($p < .01$).

Sonuçlar:

Operasyon öncesi tüm hastalarda kayma açısı negatif (lordotik) olduğundan operasyon ile anatomik redüksiyon sağlandığında normal lordoza ulaşıldığından operasyon sonrası kayma açılarındaki negatif değerler azalarak korundu. Bu nedenle operasyon öncesi ve sonrası kayma açılarındaki anlamlı değişiklik saptanmadı. Pelvik insidans ve sakral inklinasyon ölçümlerinde operasyon sonrası değerlerin operasyon öncesine göre anlamlı değişimin, operasyon sonrasında ağrı ve fonksiyonel skorlarda belirlenen iyileşme ile ilgili olduğu düşünülmüştür. Bu nedenle spondilolistezis olgularında anatomik redüksiyon ile füzyon sağlamanın kliniğe olumlu etkileri olduğu ve tedavide posterior enstrümantasyon ve PLIF'nun uygun cerrahi seçenek olduğu kanısındayız.

SS-11. CALMODULIN ANTAGONISTS DECREASE THE RATE OF PROGRESSION OF SCOLIOSIS: A PINEALECTOMIZED CHICKEN MODEL

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Aim:

Calmodulin probably has a regulatory role in muscle contraction and its' antagonism may decrease the magnitude as well as the progression of scoliosis. Tamoxifen and trifluoperazine are known calmodulin antagonists. This study aimed to analyze whether the natural course of idiopathic like scoliosis in pinealectomized chicken may be altered by the administration of calmodulin antagonists and it was seen that progression of curves can be significantly decreased and even reversed by the administration of tamoxifene (TMX).

Method:

72 female chicks underwent pinealectomy within 72 hours of hatching. Three groups of Control (Gr I), Tamoxifen 0.1mg/kg/day p.o. (Gr II) and trifluoperazine 0.1mg/kg/day p.o (Gr III) were formed. At 7th and 10th weeks scoliotic curves were identified and measured on AP X-rays. Cobb angles and progression or regression of curves were compared using ANOVA whereas incidences were compared using Pearson Chi-square.

Results:

21 chicks in Group I, 22 chicks in group II and 23 chicks in group III were evaluated. There were no statistically significant differences in mean Cobb angles and scoliosis rates between groups at 7th and 10th weeks. When progression/regression of the curves were evaluated, there were statistically significant decreases in the upper cervical (TMX, 77 % to 45 %, $p=0.039$; TFP, 91 % to 52 %, $p=0.004$) and lower cervical (TMX, 82 % to 36 %, $p=0.006$; TFP, 78 % to 43 %, $p=0.021$) curve magnitudes in groups II and III compared to control group. Group-II also showed a significant decrease in combined lower cervical, thoracic and lumbar curve incidences (86 % to 59 %) when compared to control ($p=0.031$). Group-II showed a significant decrease in lower cervical curve Cobb angle from $17.50^\circ \pm 7.67^\circ$ to $8.88^\circ \pm 3.98^\circ$; significantly more than group-I, from $13.33^\circ \pm 7.37^\circ$ to $10.93^\circ \pm 7.16^\circ$ ($p=0.009$). In addition to that, group-II also showed a regression in thoracic curve Cobb angle (from $18.22^\circ \pm 8.41^\circ$ to $14.63^\circ \pm 11.48^\circ$) whereas group-I showed progression (from $20.70^\circ \pm 14.06^\circ$ to $21.33^\circ \pm 15.64^\circ$) ($p=0.05$).

Conclusion:

Daily oral administration of tamoxifen resulted in a decrease in cervical curve incidences compared to control group and a significant regression in thoracic Cobb angles. Moreover, combined lower cervical, thoracic and lumbar Cobb angles regressed not only with tamoxifen but also with trifluoperazin administration. This study has proven that it is possible to change the natural history of scoliosis by way of oral medications antagonizing calmodulin. Studies on mammal models may be warranted.

SS-12. CALMODULIN ANTAGONISTS DECREASE THE RATE OF PROGRESSION AND SEVERITY OF SCOLIOSIS: A MELATONIN DEFICIENT C57BL6 MICE MODEL

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Aim:

Calmodulin probably has a regulatory role in muscle contraction and its' antagonism may decrease the magnitude as well as the progression of scoliosis. A separate study has shown especially tamoxifene (TMX), a known antagonist to be effective in altering the natural history in an avian model, it remains to be seen whether the same effect is conceivable in mammals. This study aimed to analyze whether the natural course of idiopathic like scoliosis in pinealectomized chicken may be altered by the administration of calmodulin antagonists and it was seen that progression of curves can be significantly decreased and even reversed by the administration of tamoxifene (TMX).

Methods:

60 female 3-week-old C57BL/6 mice underwent amputations of forelimbs and tails. Available 57 were grouped as Gr C, no medications; Gr TMX, 10mg-TMX/lit drinking water and Gr combined, 10mg TMX+10mg trifluoperazine (TFP)/lit drinking water. PA scoliosis X-rays were taken at 20th and 40th weeks and evaluated for presence and magnitude of spinal curves. Pearson Chi-square test to compare curve incidences

between and within the groups, ANOVA and Kruskal Wallis tests were used to compare the Cobb angles. Curve incidence changes within groups by time were compared by paired t-tests.

Results:

4 mice were lost in the TMX group. Overall scoliosis rate was significantly lower in this group (33 %) compared to control (90 %) and combined drug groups (68 %) ($p = 0.001$) at 40th week. Likewise, upper thoracic scoliosis rate (27 %) compared to control (74 %) and combined drug groups (47 %) ($p = 0.01$); lower thoracic scoliosis rate (7 %) group compared to control (63 %) and combined drug groups (26 %) ($p = 0.001$) were lower in TMX group. Combined drug group had lower thoracic and lumbar Cobb angles ($17.50^\circ \pm 3.45^\circ$) compared to control group ($29.40^\circ \pm 5.98^\circ$) ($p = 0.031$). Furthermore, double curve incidence at 40th week was lower in TMX group (12 %) compared to control (74 %) and combined drug groups (47 %) ($p = 0.001$), triple curve incidence was also lower in combined (0 %) and TMX drug groups (6 %) compared to control group (15 %) but was not significant ($p = 0.167$).

Conclusion:

Tamoxifen is shown to effectively decrease the incidence and magnitude of the scoliotic curves in C57BL/6 mice scoliosis model. This study has proven that it is possible to change the natural history of scoliosis by way of oral medications antagonizing calmodulin in a mammal model. This is a novel finding, and may be very important in opening a pathway for the conservative treatment of idiopathic scoliosis by oral medications.

SS-13. A COMPARISON OF THE MELATONIN AND CALMODULIN IN PARAVERTEBRAL MUSCLE AND PLATELETS OF PATIENTS WITH OR WITHOUT ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS)

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Aim:

Calmodulin (Cal) is a neurotransmitter regulating the release of, and second messenger of Melatonin (Mel). Platelets are thought to be mini muscles, Cal and Mel levels of which may be projections of muscle values. This study investigated the tissue concentrations of melatonin and calmodulin in platelets as well as paraspinal muscles of patients with AIS and compared with no-scoliotic patients.

Methods:

Twenty-two patients undergoing posterior surgery for AIS and 9 thoracic-lumbar trauma patients undergoing posterior surgery constituted the population. Autologous bloods were collected and processed to obtain platelets. Paravertebral muscle tissue samples from both sides were obtained at T12-L1 level. Homogenization was performed for both platelets and muscle tissues to obtain supernatants. Homogenized muscle and platelet samples were analyzed for the levels of Mel by RIA and for Cal by ELISA. Groups, concave (Cv)(left side for the control group) and convex (Cx) side (right side for the control group) muscles and platelet values are compared by Mann-Whitney U test as median protein concentrations and optic densitometry(OD) ratios.

Results:

AIS group consisted of 2 male and 18 female patients with a mean age of 16.1 ± 3.78 (11 – 29), whereas control group consisted of 5 male and 4 female patients with a mean age of 35 ± 13.47 (16 – 55). Platelet Cal OD/Supernatant's OD ratios, and both Cx and Cv sides muscle Cal OD/supernatants OD ratios were not significantly different among groups. On the other hand, Cx side muscle Cal to total muscle Cal ratios were higher in AIS group compared to Cv ($p=0.048$), concave side Cal to total Cal ratios were lower in AIS group compared to control ($p=0.035$). Cx side Cal to Cv side Cal ratios were significantly different among groups ($p= 0.048$). Neither platelet Mel to total protein ratios nor Cx or Cv side muscle Mel to total protein ratios were significantly different among groups. Cx to Cv side Mel ratios were not different between control and AIS groups. Cx or Cv side muscle Cal or Mel values were not correlated with platelet values.

Conclusion:

AIS group had an asymmetric distribution of calmodulin in paraspinal muscle as the higher convex side and lower concave side. Neither platelet melatonin nor platelet calmodulin was found to be representative of the muscle protein values. It was seen that the levels of tissue melatonin or calmodulin levels were not different in the scoliotic population. Muscle calmodulin concentration was significantly asymmetric in scoliotic patients. These suggest that neither of the proteins could be proven to be involved in causative mechanisms whereas muscle calmodulin concentrations reflect the asymmetrical loading of the paravertebral muscles and may be very important for the progression of the scoliotic curves.

SS-14. POSTERİOR ENSTRUMENTASYON YÖNTEMİYLE CERRAHİ TEDAVİ UYGULANAN TORAKAL VE LOMBER VERTEBRA KIRIKLI OLGULARIN 10 YIL VE ÜZERİ UZUN DÖNEM TAKİP SONUÇLARININ DEĞERLENDİRİLMESİ

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Amaç:

Posterior enstrumentasyon yöntemi değişik modifikasyonlarla torakal ve lomber vertebra kırıklarında kabul görmüş sık uygulanan bir cerrahi yöntemdir. Bu bölge kırıklarında posterior enstrumentasyonun etkinliği erken dönemde kanıtlanmışken uzun dönem takip sonuçlarını belirten yayınlarda yetersizlik ve mevcut olanlar arasında çelişkiler mevcuttur. Çalışmanın amacı kliniğimizde torakal ve lomber vertebra kırığı nedeni ile posterior enstrumentasyon uygulanan olgularda 10 yıl ve üzeri takip sonrasında klinik ve radyolojik sonuçlarını değerlendirmektir.

Yöntem:

Çalışmaya Kasım 1989-Aralık 1996 tarihleri arasında torakal ve lomber vertebra kırığı nedeni ile kliniğimize başvurup posterior enstrumentasyon yöntemi ile cerrahi tedavi uygulanan 45 hasta dâhil edildi (30 erkek, 15 kadın, op. anı ortalama yaş 30,1, son kontrolde 42,4). Ortalama takip süresi 147,5 aydır (128-204). Magerl sınıflamasına göre olguların 19' da A tipi, 18'de B tipi, 8'de C tipi kırık saptandı. 25 olguda torakolomber bölgede, 8 torakal, 8 lomber, 4 segmenter kırık mevcut idi. 7 olguya Harrington Distraksiyon Sistemi (HDS), 1 olguya MSS A1, 20 olguya MSS A3, 16 olguya MSS A4, 1 olguya AO internal fiksatorü uygulanmıştır. Enstrumentasyon 4 olguda 2 segment, 10 olguda 3 segment, 19 olguda 4 segment, 9 olguda 5 segment, 3 olguda ise 6 ve daha fazla segment seviyesinde uygulanmıştır. Amerikan Spinal Kord Yaralanma Derneği (ASIA) skalasına göre yaralanma anında 21 olgu A, 3 olgu B, 7 olgu C, 5 olgu D ve 9 olgu E olarak saptanmıştır. Olgulara fizik muayene sonrasında Hannover Omurga Skoru, Oswestry Sakatlık Skoru, Amerikan Omurga Yaralanma Birliği formu dolduruldu. Subjektif olarak Vizüel Analog Skala (VAS) ile değerlendirildi. Direk grafileri çekilerek olguların preop., erken postop., son kontroldeki direk grafilerinde sagittal planda Cobb yöntemi ile Sagittal Plan Kifoza (SPK), Anterior Kamalanma Açısı (AWA), koronal planda skolyoz açısı ölçümü yapıldı. Sagittal İndeks (SI) hesaplandı. Olguların preop. ve son kontrollerindeki

bilgisayarlı tomografileri (BT) çekilerek kanal işgali değerlendirildi, kanal çapları arasındaki fark hesaplanarak spinal kanal remodelasyonu kantitatif olarak değerlendirildi.

Bulgular:

Olguların Hannover Omurga Skorları ile kırık seviyesi ve kırık tipi arasında istatistiksel anlamlı ilişki saptanmadı. Olguların bel ve sırt ağırları VAS sonucuna göre kırık tipi, kırık seviyesi ve post op. dönemde kullanılan korse tipi, implantın çıkarılmış olması, radyolojik ölçümlerdeki SPK dereceleri arasında istatistiksel anlamlı ilişki saptanmadı. Olguların yapılan ölçümlerinde preop. ile erken postop. ve son kontrollerindeki SI, SPK, AWA ve frontal plan deformitesi değerlerinde istatistiksel olarak anlamlı düzelme saptanmıştır ($p<0,05$). Tüm bu düzelme değerlerinde olgulara uygulanan implantlar arasında ve kırık seviyesi ile kırık tipi arasında anlamlı bir ilişki saptanmamıştır. SI ve AWA değerlerinde erken post op. ve uzun dönem değerleri arasında azalma saptansa da bu istatistiksel olarak anlamsız bulunmuştur. SPK değerindeki erken post op. ve son kontrolde azalma ise istatistiksel olarak anlamlı bulunmuştur ($p<0,05$). SI ve AWA değerlerinde kayıp en fazla Harrington uygulanan olgularda saptansa da diğer implantlarla karşılaştırıldığında istatistiksel olarak anlam teşkil etmemektedir. İmplantı çıkarılmış olan olgularda çıkarılmayanlara oranla istatistiksel olarak anlamlı olmamakla birlikte daha fazla SI, SPK ve AWA değer kaybı saptanmıştır. Ameliyatla düzeltilmiş SPK kaybı en fazla MSS A4 uygulanan olgularda tespit edilmiştir ($p<0,05$). Uzun dönem takipte ameliyat sonrası saptanan SPK kaybı ile enstrümente edilen seviye arasında istatistiksel ilişki bulunamamıştır. Olguların kanal çapındaki artışı preop döneme göre post op. istatistiksel olarak anlamlı bulunmuştur.

Sonuçlar:

Posterior enstrümantasyonla kırık bölgesindeki SPK, AWA, SI değerlerinde belirgin düzelme saptanmıştır. Füzyonsuz posterior enstrümantasyon uygulanan olgularda ameliyatla elde edilen düzeltmede bir miktar kayıp görünmekle birlikte bu implant çıkartılmasıyla da ilişki göstermektedir. Elde edilen düzelmelerin takip süresince SPK ve AWA değerlerindeki kayıp vertebra cisminde çokmeden çok disk mesafesindeki daralmadan kaynaklanmaktadır. Posterior enstrümantasyonda kullanılan implanta göre deformite düzeltmede anlamlı fark izlenmezken korreksiyon kaybı daha yeni nesil bir implant olmasına rağmen A4'te daha belirgindir. Daha eski bir tasarım olan A3'te istatistiksel anlam taşımamakla birlikte spinal kanal dekompresyonu, SI ve SPK düzeltilmesi daha iyi ancak VAS değeri daha yüksektir. Bu durum sistemin yüksek profilli olmasıyla ilişkilendirilmiştir. Posterior enstrümantasyon öncülerinden Harrington Rod Sistemindeki indirekt spinal kanal dekompresyonu ve deformite düzeltilmesindeki başarı sistemle birlikte interspinöz telleme ve ortez ile olguların postop. desteklenmesiyle ilişkilendirilmiştir. Posterior enstrümantasyonda füzyonsuz kısa segment enstrümantasyon uygulanan olgularda 3 ve daha fazla segment uygulananlara göre istatistiksel anlam olmamakla birlikte daha fazla korreksiyon kaybının saptanması oluşturulan yapının stabilitesine bağlanmıştır.

SS-15. 270 DEGREES FUSION FOLLOWING DECOMPRESSION WITH UNILATERAL HEMILAMINECTOMY IN THE SURGICAL TREATMENT OF DEGENERATIVE LUMBAR SPINAL STENOSIS IN MIDDLE-AGED PATIENTS

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Aim:

The purpose of the study is to present a new surgical technique in the surgical treatment of degenerative lumbar spinal stenosis in middle-aged patient population in whom there is central canal stenosis requiring intervertebral disc removal and stabilization with or without involvement of the nerve roots.

Methods:

Fifteen patients with symptomatic degenerative lumbar spinal stenosis were treated in our center. Plain X-rays including dynamic views, CT, myelo-CT, axial loading CT, axial loading MRI and neurophysiologic studies were performed. Postoperative follow-up data were gathered by means of VAS, Oswestry score and patients' declaration of satisfaction. In the surgery, after posterior pedicle screw instrumentation of the effected levels; following procedures were done in order: unilateral hemilaminectomy in the effected or symptomatic side, removal of ipsilateral ligamentum flavum, removal of the contralateral ligamentum flavum as well as cortical bone on the ventral surface of the spinous processes, ipsilateral facetectomy, intervertebral disc removal and interbody fusion then finally contralateral posterior fusion.

Results:

The patients comprised 9 women and 6 men with a mean age of 57 (range; 52 to 63) years. The mean postoperative follow-up was 36 months. Nine patients underwent hemilaminectomies at two adjacent levels, 4 at three levels, one at four levels and one at five levels. The average hospital stay was 5.8 days. The VAS score decreased from 9.6 to 2.8 and Oswestry Score from 28.5 to 8 at follow-up review. All patients had satisfied with the procedure. During the follow-up period; no pseudoarthrosis, no infection and no neurological events were seen.

Conclusion:

The results from this initial study of a new surgical intervention for the treatment of lumbar stenosis appear encouraging. Discectomy and interbody fusion, and contralateral decompression via unilateral approach prevents the formation of dead space. The procedure appears safe with very few complications, minimal blood loss, and brief hospital stays. However, more definitive conclusions about its success will require a long-term follow-up review and a prospective randomized study of the procedure.

SS-16. COMPARISON OF COSMETIC AND FUNCTIONAL OUTCOMES AFTER ANTERIOR PARAMEDIAN VERSUS ANTEROLATERAL RETROPERITONEAL APPROACHES IN LUMBAR SPINAL STENOSIS SURGERY

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Aim:

This study aimed to compare the cosmetic and functional outcomes of the patients undergoing anterior and posterior combined surgery via either anterior paramedian or anterolateral retroperitoneal approach.

Methods:

This study reviewed 41 patients with lumbar spinal stenosis surgically treated by combined anterior and posterior route between 2002 and 2006. In addition to posterior instrumentation, decompression and fusion; anterolateral retroperitoneal approach was performed in 14 patients (Group 1) and anterior paramedian retroperitoneal approach was done in 27 patients (Group 2) for anterior interbody fusion. An access surgeon was used in all cases. Postoperative evaluation of the patients consisted of modified SRS-30 questionnaire (maximum score of 25) and specific questions related with patient satisfaction.

Results:

For group 1; the female to male ratio was 8/6 and average age was 62 (49-78) years. The mean follow-up was 31 (24-64) months. For group 2; the female to male ratio

18/9 and the mean age was 67 (48-81) years. The average follow-up period was 28 (24-64) months. The interbody fusion was performed at meanly 3.8 levels in group 1 and 3.2 levels in group 2. The mean SRS score was 22.4 for anterolateral approach and 24.2 for anterior paramedian approach ($p < 0.05$). The largest difference was observed in self-image and pain control items of SRS questionnaire and there was no difference observed in function and daily activities. There were 4 patients having wound problems in group1 whereas this number was 1 in group 2. All these patients were recovered by local wound debridement and primary closure. There were 5 patients developing abdominal swelling in anterolateral approach regarded as abdominal herniation. There were no intraoperative complications seen and no pseudoarthrosis or implant related problems during follow-up period.

Conclusion:

The anterior and anterolateral surgical approaches to the lumbar spine can be used safely if the surgeon is familiar with the anatomy and is aware of potential complications. Patients undergoing anterior paramedian approach to lumbar spine have higher quality of life and cosmetic outcomes compared with patients having anterolateral retroperitoneal approach.

SS-17. PERCUTANEOUS REDUCTION AND STABILIZATION OF THORACOLUMBAR FRACTURES WITHOUT NEUROLOGICAL DEFICIT

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Aim:

The purpose is to evaluate early outcomes of a technique in which neurologically intact thoracolumbar fractures were first reduced indirectly by patient positioning in the operation table and directly by kyphoplasty, preservation of bony stock by biological spacers and application of posterior percutaneous instrumentation. This provides fracture treatment without fusion.

Materials and Methods:

The technique was applied to 12 patients. The ages of the patients range from 24 to 81, average of 53 years. Fracture level was Th12 in 3 patients, L1 in 4 patients, L2 in 4 patients and L1 and L4 in one patient. After prone positioning and placement of silicon pillows in transverse position for fracture reduction, the kyphoplasty was performed. The cavity created by kyphoplasty balloon was filled with mixture of autogenous bone graft harvested from posterior superior iliac spine and biphasic calcium phosphate granules (BCP). After filling, pedicle screws and rods were inserted percutaneously to one above and one below levels.

Results:

All patients except one, who had associated tibia fracture, could walk in one day after surgery without any difficulty. The pain reduced progressively during the first week and the patients became pain free within 2-3 weeks. The average follow-up time was 12 months. The correction rate in local kyphosis angle was measured as 5.50 and all but one patient showed no loss of correction. There were neither implant failure nor infection. All the patients were satisfied with the procedure.

Conclusion:

The use of autogenous bone graft instead of bone cement to fill kyphoplasty cavity is a biological process that promotes bone healing. Percutaneous instrumentation provides internal fixation. The removal of instrumentation after bone healing preserves the motion segments since the fusion is not performed. During the follow-up, fracture healing can be monitored by the help of CT and when it is stated, the instrumentation can be removed. This type of treatment result in earlier pain cessation and earlier return to normal daily life when compared to orthosis or cast treatment. However, long term follow-up studies are necessary to evaluate the exact efficacy of the technique.

SS-18. THE EFFECT OF SINGLE-MULTILEVEL CERVICAL DISC ARTHROPLASTY TO THE SEGMENTAL AND TOTAL LORDOSIS OF CERVICAL SPINE

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Aim:

One of the main goals of cervical spine surgery is the restoration of impaired sagittal alignment. Sagittal malalignment of cervical spine causes pain and disc degeneration on the affected level and adjacent levels. Preservation of motion and lordosis can be accomplished by cervical disc replacement (CDR). The purpose of this study is to investigate the effects of CDR on the segmental and global lordosis of cervical spine.

Materials and Methods:

Thirty-one disc levels of 19 patients were treated by CDR. Standing lateral radiographs of patients were obtained both preoperatively and postoperatively at the latest follow up. The patients were divided to two groups as single (Group 1) and multiple levels (Group 2). There were 11 patients in group 1 and 8 patients in group 2. In x- rays; global cervical lordosis, segmental lordosis of the affected level, cranial and caudal lordosis of adjacent levels, disc height of the operated level and proximal-distal levels of operated site were measured both preoperatively and postoperatively. All measurements were performed with the use of digital media (Magicweb, VA42C-0106, SIEMENS) by two orthopaedic surgeons.

Results:

In group 1, the average age was 44.5 (30-52) years and there were 5 female and 6 male patients. Distribution of operated levels was as follows: C5-6 in 7, C6-7 in 2 and C7- T1 in 1 patient(s). Global cervical lordosis was 17.22 degrees (2-47) preoperatively and 20.22 degrees (11-39) postoperatively. In Group 2, average age was 42.2 (30-63) years with a gender distribution of 3 female and 5 male. In 5 patients 2 levels, in 2 patients 3 levels and in 1 patient 4 levels CDR were performed. Global cervical lordosis was 5.75 degrees (2-16) preoperatively and 22.6 degrees (10-42) postoperatively.

Conclusion:

The increase of segmental lordosis was reflected to global lordosis as 50 % less in Group 1 and 71 % more in Group 2. This situation can be explained as compensation of segmental lordosis between adjacent segments. But, increase of cranial and caudal segmental lordosis gives rise to belief that this increase was probably due to result of a complex interaction. If whole sagittal spinal balance was assessed in the same study, one can reach to more decisive results. Increase of disc height at the postoperative period is closely related to prosthesis design and size. In our study, we did not get a decisive change to explain the sagittal alignment.

SS-19. THE ROLE OF HYPEREXTENSION FULCRUM GRAPHIES TAKEN UNDER GENERAL ANESTHESIA IN THE EVALUATION OF FLEXIBILITY OF KYPHOSIS IN SCHEUERMANN DISEASE

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Aim:

The flexibility of kyphosis has primary role in the decision making of surgical technique in Scheuermann kyphosis. The aim of this retrospective study was to compare the efficacy of different preoperative radiological studies in the assessment of flexibility of kyphosis in Scheuermann disease and related decision on surgical technique.

Methods:

Between the years of 2002 and 2006, 16 adolescents with Scheuermann disease undergoing surgery were included in the study. Measurements were obtained from the preoperative standing posteroanterior and lateral radiographs, preoperative hyperextension fulcrum graphies and intraoperative hyperextension fulcrum graphies taken under general anesthesia (HFGUGA). Routine dorsal magnetic resonance imaging was done to all patients to exclude thoracic disc disease. All patients underwent surgical correction with posterior segmental instrumentation with pedicle screws. If local kyphosis could not be corrected with HFGUGA, posterior Chevron osteotomies for single or multiple levels were added to surgical procedure. Postoperative standing posteroanterior and lateral direct radiographies of the spine were examined to evaluate the maintenance of correction.

Results:

The mean postoperative follow-up was 40 (20-60) months. All patients were male and the average age was 17 years. The mean preoperative kyphosis angle was 86.5 degrees. The flexibility of kyphosis was 35 % with preoperative hyperextension fulcrum graphies and 58% with HFGUGA ($p<0.05$). The mean postoperative kyphosis angle was 30.7 (65 % correction ratio). Posterior Chevron osteotomy was performed at 3 levels in 2 patients, at 2 levels in 4 patients and single level in 3 patients. There were no infection, pseudoarthrosis and neurological complications seen during follow-up period.

Conclusion:

HFGUGA is significantly more effective than other graphies in the assessment of kyphosis flexibility in Scheuermann disease. It provides correction with posterior instrumentation only with or without posterior osteotomy by avoiding anterior surgery in patients having no asymptomatic thoracic disc disease. It has the advantages that it does not need patient compliance and it provides full muscle relaxation. In our opinion, this is the best radiological modality in decision making of surgical technique in Scheuermann kyphosis.

SS-20. THE ROLE OF ROUTINE MAGNETIC RESONANCE IMAGING IN THE PREOPERATIVE EVALUATION OF ADOLESCENT IDIOPATHIC SCOLIOSIS

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Aim:

The routine use of magnetic resonance imaging (MRI) in adolescent idiopathic scoliosis remains controversial, and current indications for MRI in idiopathic scoliosis vary from study to study. This prospective clinical study aimed to demonstrate the prevalence of neural axis malformations and the clinical relevance of routine MRI studies in the evaluation of patients with idiopathic scoliosis undergoing surgical intervention without any neurological findings.

Methods:

A total of 380 patients with a diagnosis of idiopathic scoliosis was treated surgically between the years 2002 to 2007. Plain radiographs of the spine imaging were analyzed preoperatively. Curve magnitudes in the coronal plane were measured with the Cobb method. Coronal plane curve patterns were classified as thoracic, thoracolumbar, lumbar, or double curves on the basis of the location of the apices and the magnitudes of the curves. A routine whole spine MRI analysis was performed in all patients. The indication for surgical correction of scoliosis was a magnitude of curvature of more than 45°, if the patient and family wish to undergo radical surgery. A total of 361 of 380 patients received an isolated posterior spinal fusion and 19 patients received an isolated anterior spinal fusion.

Results:

The female to male ratio of the patients was 342 to 38. Their mean age at first visit was 14.6 (range; 9 to 18) years. According to Lenke classification; 172 of the patients were Lenke type I, 20 were type II, 24 were type III, 7 were type IV, 148 were type V and 9 were type VI. On the preoperative clinical examination, all the patients were neurologically intact. There were 30 (8 %) patients (4 males and 26 females) who had neural axis abnormalities on MRI. MRI revealed isolated hydrosyringomyelia in 24 patients, syringomyelia with Arnold-Chiari malformation type I in 4 patients, isolated Arnold-Chiari malformation type I in 2 patients. Four of those 30 patients needed additional neurosurgical procedures before corrective surgery, the remaining underwent corrective spinal surgery without any neurosurgical operations. Radiologically, the preoperative mean Cobb angle of the major curve was 55.6° (range; 45 to 80) and it was 10.7° (range; 4 to 14) after surgery (with a correction rate of 80 %).

Conclusion:

The magnetic resonance imaging should be done for all patients with presumed idiopathic scoliosis even in the absence of neurologic findings and it should be performed from the level of the brainstem to the sacrum. In our opinion, the presence of intraspinal anomaly will effect the surgeon behaviour during correction and instrumentation technique.

SS-21. ANTERIOR AND POSTERIOR COLUMN RECONSTRUCTION BY SUBTOTAL VERTEBRECTOMY VIA POSTERIOR ONLY APPROACH IN OSTEOPOROTIC FRACTURES OF THE SPINE CAUSING NEUROLOGIC INJURY

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Aim:

Vertebrectomy and instrumentation via posterior approach can be especially useful in elderly patients with severe osteoporotic fractures causing neurological injury. Those patients usually have significant medical problems and may not tolerate anterior surgery. The purpose of this retrospective study was to evaluate the posterior only subtotal vertebrectomy procedure in a group of patients who were older than 70 and had either thoracic or thoracolumbar osteoporotic fractures as neurological deficit.

Method:

18 patients with an average age of 74.7(70-84) years have undergone vertebrectomy and posterior instrumentation via posterior approach only. Fracture levels were between T1-10 in 10 and between T11-L2 in 8 patients. Those patients with thoracic fractures had severe spinal cord compromise and spastic paraparesis and pain unresponsive to medication. 3 of these 8 patients had previous kyphoplasty. Cement and bone fragments caused spinal cord compromise. All patients underwent pedicle screw fixation two level above and below augmented with vertebroplasty. Hemilaminectomy and costatransversectomy were performed at lesion level to facilitate subtotal vertebrectomy and placement of titanium mesh cage for interbody fusion. Contralateral posterior elements were preserved for fusion.

Results:

Average follow-up was 3.5 (2-5) years. Neurologic recovery was achieved in all patients and completed by 1.4 (1-3) weeks. An average VAS was 8.0 and 2.1 preoperatively or postoperatively respectively. We did not confront any implant related complications or infections.

Conclusion:

Surgical treatment via posterior approach only is helpful to lower the rate of mortality and morbidity in this patient population. Thus, it is possible to perform vertebrectomy, anterior fusion and posterior instrumentation via posterior approach only. We believe this approach provides definitive and effective treatment with minimal morbidity.

SS-22. MULTILEVEL TOTAL LUMBAR DISC REPLACEMENT FOR SYMPTOMATIC LUMBAR DISC DISEASE

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Aim:

Multilevel symptomatic disc disease (MSDD) is one of the most common causes of chronic low-back pain. Total disc replacement (TDR) for degenerative disc disease (DDD) in the lumbar spine has recently become an alternative treatment option to fusion procedures. This study aimed to evaluate the clinical and radiological results in patients who underwent multilevel TDR for DDD in the lumbar spine.

Methods:

Sixteen patients underwent TDR for 36 levels for lumbar DDD from 2004 to 2007. The average follow-up was 28 (18-42) months. Pre-operative dynamic radiographs, provocative discography + CT and BMD measurement were also routinely performed before surgery. VAS and Oswestry Disability Index (ODI) were used for clinical evaluation. All cases analyzed at follow-up for implant position, interface ingrowth, segmental angular motion, heterotopic ossification, facet joint degeneration and adjacent segment abnormalities.

Results:

Ten were female and 6 were male and the average age was 44.6 (38-53) years. TDR was performed at two levels in 13, three levels in 2 and four levels in one patient.

Level of surgery was L2-L3 in 4, L3-L4 in 7, L4-L5 in 14 and L5-S1 in 11 patients. Results of clinical evaluation by ODI and VAS are given in the table.

	Preop	3.mo	6.mo	12.mo	Latest f-up
ODI (%)	58.1 (50.2-66.3)	29.0 (20.2-37.2)	20.3 (18.4-22.8)	20.1 (19.0-21.2)	19.3 (18.2-20.8)
VAS	7.5 (5.7-11.1)	1.7 (0.9-2.9)	1.4 (0.8-2.8)	1.3 (0.8-2.6)	1.1 (0.6-2.4)

Average preop disc height was 4.6 (4-6) mm and it was improved to 12.1 (11-13) postoperatively. Average preoperative flexion-extension angle was 2.2° (2°-4°) and it improved to 7.1° (6-8) postoperatively. We did not confront any complications like implant malposition, subsidence, loosening, implant failure and dislocation or heterotrophic ossification, facet joint degeneration and adjacent segment abnormalities.

Conclusion:

Multilevel TDR seems to be safer and more effective than fusion in the surgical treatment of multilevel DDD. Advantages are preservation of motion, shorter hospital stay and lower complication rate. However, studies with larger patient populations and much longer follow-up are needed to determine the rate of adjacent segment degeneration and preservation of motion.

SS-23. MULTILEVEL CERVICAL TOTAL DISC REPLACEMENT FOR SYMPTOMATIC DEGENERATIVE DISC DISEASE

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Aim:

In recent years, cervical disc replacement (CDR) for degenerative disc disease (DDD) has gained popularity against classical fusion procedures. Although there are few reports about multilevel lumbar total disc replacement, there is no study in literature about multilevel cervical disc replacement. The purpose of this study is to report the clinical and radiological results of multilevel cervical disc replacement for degenerative disc disease.

Methods:

Eighth patients with 20 levels of DDD underwent CDR with Prodisc- C disc prosthesis. There were 3 female and 5 male patients and average age was 42.2 (range; 30 to 52) years. In 6 patients, additional radicular signs were present. Preoperatively dynamic radiographs, CT and MRI were routinely performed and EMG only to with radicular symptoms. CDR was performed on two levels in 5, three levels in 2 and four levels in one patient. Level of surgeries were 2 at C3-C4, 6 at C4- C5, 7 at C5-C6, 4 at C6- C7 and 1 at C7- T1 level. Average follow-up was 22.3 (range; 12 to 33) months. VAS and Oswestry Disability Index (ODI) were used for clinical evaluation both preoperatively and 6 weeks, 3, 6 and 12 months postoperatively. All cases were analyzed at follow-up for implant position, interface overgrowth, segmental and global cervical lordosis, segmental angular motion, segmental lordosis of adjacent segments and heterotopic ossification.

Results:

Average global cervical lordosis has increased to 5.7° (range; 2° to 16°) preoperatively to 22.6° (range; 10° to 42°) postoperatively. Average preoperative flexion-extension angle was 8.4° (6°-11°) preoperatively and 6.3° (6°-8°) postoperatively. We did not have any complications such as implant malposition-failure, subsidence, loosening, dislocation, heterotopic ossification, facet joint and adjacent segment degeneration.

Conclusion:

Clinical and radiological results obtained with CDR show that this treatment choice is effective for multilevel DDD. Advantages of this method are motion preservation, short hospital stay and lower complication rate. However, studies on large patient series with longer follow-up periods are needed to determine the rate of adjacent segment degeneration and preservation of motion.

SS-24. ANTERIOR VERSUS POSTERIOR SURGERY IN LENKE TYPE V ADOLESCENT IDIOPATHIC SCOLIOSIS

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Aim:

The selection of distal fusion level (L3 or L4) is often a controversial issue in the surgical treatment of Lenke type 5 curves to save more motion segments. The aim of this prospective randomized study was to analyze if we can perform posterior surgery instead of anterior surgery by limiting the instrumentation and fusion within the Cobb levels.

Methods:

Between the years of 2002 and 2006, 33 patients with Lenke type V AIS were included in the study. The patients were divided randomly to posterior (PS) and anterior surgery (AS) groups. Measurements were obtained from the preoperative standing posteroanterior and lateral, side bending, traction and traction taken under general anesthesia radiographies. Periodic follow-up visits were done at postoperative 6th week, 3rd and 6th months and per year thereafter. Postoperative standing posteroanterior and lateral direct radiographies of the spine were examined to evaluate the maintenance of correction. The clinical results were evaluated with SRS-22 questionnaire.

Results:

The mean postoperative follow-up was 38 (24-60) months. Age, sex, curve magnitude, curve flexibility, correction rates and fusion levels were similar in both groups. Anterior surgery was done in 15 patients and posterior surgery in 18 patients. The mean preoperative Cobb angle in AS group was 45 degrees. They underwent anterior discectomy, fusion and instrumentation (single or dual rod) with derotation maneuver between Cobb levels. Postoperative correction ratio was 68 %. Thoracolumbosacral orthosis was utilized for 3 months. The average Cobb angle in PS group was 47 degrees. They underwent segmental instrumentation and fusion with derotation and compression-distraction maneuvers between the Cobb levels. The mean correction was 74%. There were no significant difference between both groups in terms of operation time, blood loss and hospital stay. The SRS-22 scores were meanly 0.90 for PS and 0.93 for AS ($p>0.05$). There were no infection, pseudoarthrosis or neurological complication seen during follow-up period.

Conclusion:

This study showed that it is possible to perform posterior surgery instead of anterior surgery in Lenke type V curves by staying at the same instrumentation and fusion levels as anterior surgery to save same number of mobile segments and achieving same rate of correction by avoiding the morbidities of anterior surgery.

SS-25. SELECTIVE THORACIC FUSION IN ADOLESCENT IDIOPATHIC SCOLIOSIS WITH LENKE TYPE 1C, 3C OR KING TYPE 2 LUMBAR CURVES OF MORE THAN 50 DEGREES IN MAGNITUDE

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Aim:

Previous reports on the results of selective thoracic fusion have not specifically focused on deformities with widely deviated compensatory lumbar curves. The aim of this retrospective clinical study was to evaluate the outcome of selective thoracic fusion for adolescent idiopathic scoliosis in the presence of compensatory lumbar curve of more than 50 degrees.

Methods:

Between the years of 1991 and 2000, 29 of 122 patients undergoing selective thoracic fusion have been documented as having preoperative lumbar compensatory curve of more than 50 degrees. Measurements were obtained from the preoperative standing posteroanterior and side-bending radiographs. The Cobb angles of both thoracic and compensatory lumbar curves and translation of the lumbar apical vertebra from midline were measured pre and postoperatively. All patients underwent selective thoracic fusion by posterior approach. Postoperative standing posteroanterior and lateral direct radiographies of the spine were examined to evaluate spontaneous correction and decompensation in lumbar curves.

Results:

The mean postoperative follow-up was 12 (7-16) years. All patients were female and the average age was 16.5 years. The mean preoperative Cobb angle of thoracic curve was 65 degrees and of lumbar curve was 55 degrees. The flexibility was 60% in thoracic curves and 76 % in lumbar curves. 23 of 29 patients were Lenke type IC, and the remaining 6 were Lenke type IIIC. Postoperatively, 61 % correction in thoracic curve and 50 % correction in lumbar curve were achieved. The mean preoperative apical lumbar vertebra displacement was 3.1 cm and it declined to 1.8 cm. The lowest level of instrumentation and fusion was the stable vertebra (same as neutral vertebra) or the neutral vertebra if it is one level cephalad to stable vertebra in 20 patients. In the remaining patients, fusion and instrumentation was stopped at stable vertebra although neutral vertebra was one level above. The spontaneous correction in the lumbar curve was 56 % in former group and 40 % in later group. There were neither decompensation seen during follow-up period nor re-operations applied in the patient group.

Conclusion:

Posterior selective thoracic fusion works in Lenke type 1C, 3C or King type II curves with more than 50 degrees lumbar curves if the flexibility of lumbar curve is more than 50 %. If the neutral vertebra and the stable vertebra is not the same vertebra, it is better to stop instrumentation and fusion distally at the neutral vertebra to obtain better spontaneous compensatory lumbar curve correction.

SS-26. THE ROLE OF TRACTION RADIOGRAPHS TAKEN UNDER GENERAL ANESTHESIA IN SURGICAL DECISION MAKING OF TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS

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Aim:

In this study, we aimed to compare the corrective ability of traction radiographs taken under general anesthesia (TrUGA) with conventional flexibility radiographs in different curve types and curve magnitudes.

Methods:

Between the years 1999-2007; preoperative standing AP, side-bending (SB), supine traction (Tr), fulcrum (F), TrUGA and postoperative AP graphies of 586 consecutive patients with adolescent idiopathic scoliosis having surgical treatment were reviewed in terms of Cobb angle measurements. The curves were divided into proximal thoracic (PT), main thoracic (MT) and thoracolumbar/lumbar (TL/L) curves.

Results:

The average age was 15.2 years and the male to female ratio was 73 to 513. For PT curves, TrUGA showed greater curve correction than SB and Tr X-rays. For MT curves of less than 65 degrees (329 patients), flexibility rates were 67 % for TrUGA, 61 % for F, 59 % for B, 53 % for Tr ($p>0.05$); whereas TrUGA showed greater correction for curves more than 65 degrees in magnitude in 98 patients (50 % versus 34 %, 26 % and 29 % for F, Tr and SB graphies respectively, $p<0.05$). For TL/L

curves of less than 65 degrees (423 patients); SB graphies showed higher curve correction with the flexibility rate of 77 % which was statistically insignificant from flexibility rate of TrUGA (71%). For TL/L curves greater than 65 degrees (102 patients), TrUGA showed greater flexibility than others with flexibility rate of 59% versus 50 %, 45 % and 44 % for SB, Tr and F graphies ($p < 0.05$). 67 of 98 patients with MT curves of more than 65 degrees showed the necessity of anterior surgery according to SB graphies but, this possibility was eliminated as a result of TrUGA. According to SB films, it would be planned to be stopped at L4 in double major curves of 74 patients, but, after the evaluation of TrUGA films, the fusion was stopped at L3 distally in all of them.

Conclusion:

TrUGA graphies are superior to SB, F and Tr graphies in determination of flexibility of proximal thoracic and main thoracic curves, especially statistically more valuable in MT curves more than 65 degrees in magnitude. For TL/L curves, it is almost equal to SB in curves less than 65 degrees and more corrective than SB for curves more than 65 degrees in magnitude. In conclusion; fulcrum and supine traction graphies are useless in the flexibility assessment of scoliotic curves, TrUGA helps to eliminate anterior surgery that would be necessary according to SB x-rays in larger and rigid curves, it also helps to save one more mobile segment distally in double major curves, it provides best knowledge about postoperative global balance.

SS-27. CAN WE SAVE ONE MORE MOBILE SEGMENT DISTALLY IN THE POSTERIOR SURGICAL TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS WITH DOUBLE MAJOR CURVES: ROLE OF TRACTION GRAPHIES TAKEN UNDER GENERAL ANESTHESIA

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Aim:

When instrumentation of both the thoracic and the lumbar curves in double major curves (Lenke Type 3C and 6C) is required, the distal extension of fusion is usually L4 or rarely L3 level. The purpose of this study is to determine preoperative radiological criteria to stop the fusion distally at L3 level instead of L4 in double major curves (Lenke 3C and 6C) even when CSVL does not touch L3.

Methods:

This study reviewed 76 patients with adolescent idiopathic scoliosis surgically treated between 2001 and 2006. Included in the study were patients who underwent an instrumented posterior spinal fusion for adolescent idiopathic scoliosis with Lenke type 3C and 6C curves. Preoperative radiological evaluation consisted of standing anteroposterior and lateral, supine lateral bending, traction radiographs, and also supine traction radiographs with the patient under general anesthesia just before surgery. The distal fusion was stopped at L3 in all patients.

Results:

The average follow-up period was 4.8 years, ranging from 2 to 7 years. There average age at surgery was 15.2 years, ranging from 13 to 19 years. There were 66 female and 10 male patients. The curve types were Lenke type 3C (36 patients) and Lenke Type 6C (40 patients). The preoperative thoracic curves of 48 degrees (range; 30 to 60) was corrected to 10 degrees (range; 4 to 17) showing the correction of 73 % (range; 53 to 90). The preoperative lumbar curves of 49 degrees (range; 40 to 68) was corrected to 8 degrees (range; 4 to 14) showing the correction of 85 % (range; 70 to 93). In 26 of the cases, CSVL does not touch L3 but L3 becomes level to pelvis at bending radiographs and traction radiographs, especially when taken under GA. In the remaining 50 cases, CSVL does not touch L3 and it does not become level at bending radiographs. Traction radiographs are especially helpful in these cases because L3 becomes level, CSVL touches or bisects L3 and L3 is completely in Harrington's stable zone. None of the patients required additional surgery for decompensation (trunk imbalance) and there was no correction loss seen during follow-up.

Conclusion:

In our study, in nearly two thirds of cases, CSVL does not touch L3 and it does not become level at bending radiographs. Traction radiographs taken under general anesthesia are especially helpful in these cases because L3 becomes level, CSVL touches or bisects L3 and L3 is completely in Harrington's stable zone. Thus, according to bending radiographs you can not stop at L3 but you can do so according to traction radiographs taken under general anesthesia. These findings encouraged us to stop the fusion distally at L3 level instead of L4. Thus, it is possible to save one more mobile segment distally without unbalancing the vertebral column in double major curves.

SS-28. DYNAMIC INTERSPINOUS STABILIZATION WITH COFLEX DEVICE IN THE TREATMENT OF SYMPTOMATIC LUMBAR SPINAL STENOSIS

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Aim:

Dynamic interspinous stabilization device (DISD) limits extension of spine, allows mild flexion posture, decreases overloading of facet joints and intradiscal pressure. The study aimed to report the clinical short term results of Coflex DISD.

Methods:

Coflex device was used for 62 levels of 50 patients between the years 2005-2007. There were 28 females and 22 males and the average age was 65 (36-82). The mean follow-up was minimum 18 months. In all patients decompression (laminotomy, foraminotomy) was firstly performed then Coflex device was implanted. Care was taken about to leave at least 5 mm distance between device and dura. Patients were evaluated both clinically and radiologically at preoperative and 6 and 18 months postoperative follow-up periods. Oswestry Disability Index (ODI) and VAS scores were used for clinical evaluation.

Results:

In 2 patients 3 levels, in 8 patients 2 levels and in 40 patients 1 level Coflex device were implanted. Distribution of levels was one, L1- L2; seven, L2- L3; nine, L3- L4 and forty-five, L4- L5. In two patients, spinous processes were too thin and broken

during implantation therefore a different type of dynamic stabilization was performed. In one case five levels vertebroplasty above Coflex and in another one coflex implantation above the posterior instrumentation level were performed to prevent the adjacent segment level degeneration. Clinically, ODI was improved from preoperative 47.2 (44-56) to 25.3 (22-40) in sixth months and 22.1 (18-36) in twelve months. VAS score was also improved from preoperative 7.7 (6- 9) to 4.1 (3-5) in sixth months and 3 (2-4) in eighteen months.

Conclusion:

Clinical and radiological results that we obtained show middle-aged lumbar stenosis patients with minimal instability and elderly patients with co-morbid pathologies in whom major spinal surgery is not feasible and risky, coflex interspinous instrumentation is an effective method both clinically and radiologically. Easy use and low risks of operation are other advantages of this device and Coflex prevents recurrence in disc herniations with large annular tears.

SS-29. THE PEDICLE SCREW FIXATION WITH VERTEBROPLASTY AUGMENTATION IN THE SURGICAL TREATMENT OF LUMBAR SPINAL STENOSIS ASSOCIATED WITH DEFORMITY IN THE PRESENCE OF SEVERE OSTEOPOROSIS

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Aim:

The surgical treatment lumbar spinal stenosis associated with scoliosis in patients requiring spine surgery due to neurological deficit and having no sufficient time for the medical treatment of severe osteoporosis is controversial. The aim of this study is to present the clinical and radiological results of pedicle screw fixation augmented by vertebroplasty using polymethylmetacrylate in severely osteoporotic patients undergoing surgery due to lumbar spinal stenosis associated with deformity.

Methods:

Between the years 2004-2007, pedicle screw placement with vertebroplasty augmentation was performed in 32 patients who had severe osteoporosis, had the diagnosis of lumbar spinal stenosis associated with scoliosis and who require spine surgery due to progressive neurological deficit or severe pain that is refractory to nonoperative treatment. Immediately after cement injection through vertebroplasty procedure, the pedicle screws were tried to be placed adjacent to superior end plate. Preoperative and postoperative direct radiographies were examined and early and late postoperative complications were recorded during follow-up.

Results:

The mean postoperative follow-up was 44 (24-72) months. The average age of the patients was 69 (62-78) years. There were 28 female and 4 male patients. The instrumentation was done meanly at 5 (range; 3 to 8) segments and vertebroplasty was done averagely at 7 (range; 5 to 10) segments. Preoperative scoliosis angle of meanly 32 degrees improved to meanly 8 degrees postoperatively (75 % correction rate) and there was no correction loss at the last follow-up. All patients were evaluated as good in terms of frontal and sagittal balance. There were no extravasation and subsequent thermal neural injury in the patients. There was one pulmonary embolus due to cement and treated by medical therapy. Postoperatively, all patients with neurological symptoms had complete relief of their nerve compression symptoms.

Conclusion:

The decompression and correction with pedicle screw fixation with vertebroplasty augmentation and prophylactic vertebroplasty in segments proximal and distal to the instrumented segments are good alternative methods to provide well fixation and fusion while preventing proximal and distal junctional problems.

SS-30. VALUE OF AXIAL LOADING MAGNETIC RESONANCE IMAGING AND COMPUTERIZED TOMOGRAPHY-MYELOGRAPHY IN DECISION MAKING IN THE TREATMENT OF DEGENERATIVE LUMBAR SPINAL STENOSIS

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Aim:

The degenerative lumbar spinal stenosis (LSS) is a dynamic phenomenon. Changes in posture and physical activities as standing and walking can aggravate symptoms. The aim of the study was to evaluate the results of post axial loading Computed Tomography Myelography (CTM) versus Magnetic Resonance Imaging (MRI) in patients undergoing surgery for multilevel degenerative lumbar spinal stenosis.

Methods:

Thirty patients with multilevel degenerative LSS scheduled for elective surgery were enrolled in the study. Preoperatively, all patients underwent both MRI and CTM, in supine psoas relaxed position and post loading by axial compression in slight extension. Quantitative evaluation for LSS was conducted by two experienced radiologists. The parameters included dural sac cross sectional area, lateral recess and foraminal evaluations for stenosis, on CTM and MRI. Statistical analysis of the data was performed to evaluate relative advantages and additional information depicted by axial loaded CTM versus MRI.

Results:

In 21 of 30 of patients, axially loaded images demonstrated additional information, such as findings of spinal canal encroachment, deformation of the dural sac and nerve roots, reduction in cross sectional dural sac area, narrowing of the lateral recess, increased number and severity of affected stenotic sites particularly in borderline cases after axial compression. In 11 patients, borderlines for stenosis were passed in at least one level. CTM and MRI findings were comparable.

Conclusion:

Axial loading mimics erect posture on CTM and MRI, thus partially eliminating the diagnostic dilemma associated with the dynamic nature of LSS. The study demonstrated underestimation of extent and severity of LSS on preloading images. Post axial loaded CTM and MRI added valuable information to the preoperative assessment of patients of multilevel spinal stenosis by identifying additional levels and severity of stenosis, particularly in borderline cases.

SS-31. SACRAL TILT: AN ETIOLOGICAL FACTOR IN IDIOPATHIC SCOLIOSIS?

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Aim:

The aim of this prospective radiological study was to evaluate the role of sacral tilt and associated pelvic girdle anomalies in the etiology of idiopathic scoliosis.

Methods:

Between the years of 2006-2007, 119 patients from outpatient clinics of two centers were included in the study. In all patients, standing PA and lateral spinal column and Ferguson graphies were routinely taken. Limb-length inequality was assessed by digital computed tomography (dCT). If direct radiographies suggested iliac bone asymmetry, hemipelvis volume measurements were done by the help of CT. Curve type, sacral tilt, L5 tilt, iliac asymmetry and limb-length differences were measured.

Results:

The mean age of patients was 14.21 (2-25) years and all but 14 were female. The curve types were lumbar in 21 patients, thoracolumbar in 32 patients, double major in 45 patients, thoracic in 17 patients and triple in 4 patients. Sacral tilt towards to convex side of TL/L curve was present in 87 (73 %) patients with the average of 7° measured from Ferguson graphies. L5 tilt towards to convex side of TL/L curve and

limb length inequality being shorter lower extremity on the convex side of TL/L curve were more prevalent in sacral tilt positive patients (p: 0.021). 8 of 32 patients with no sacral tilt underwent hemipelvis volume measurement and revealed no difference in both sides. 49 of 87 patients with sacral tilt underwent volume measurement and revealed significant difference with both sides being the smaller in convex side. It was found that there was a correlation between L5 tilt and sacral tilt (p: 0.048) and between sacral tilt and hemipelvis volume (p: 0.024). There was no correlation between sacral tilt and pelvic asymmetry, age, sex, curve type or amount of limb length inequality.

Conclusion:

This preliminary study revealed significant association between sacral tilt and hemipelvis hypoplasia independent from age. Answer regarding if sacral tilt is a primary factor in the etiology of idiopathic scoliosis or it is an only an adaptive change during the natural course of idiopathic scoliosis is not known. Being independent from age in the current study suggested that it may have a primary role in the etiology. The scoliosis surgeons should consider L5 tilt over sacral tilt and limb length inequality while performing instrumentation extending to low lumbar region for appropriate re-alignment of the segments below the instrumentation and for proper global balance over the pelvis.

SS-32. THE EFFECT OF A NEW MODIFICATION OF THE GROWING ROD TECHNIQUE ON THE SUCCESS RATE: DISTAL AND PROXIMAL PEDICLE SCREW FIXATION, DUAL ROD APPLICATION AND ROUTINE LENGTHENING AT EVERY 6 MONTHS

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Aim:

High complication rates and the failure of the growing rod to control transverse and sagittal plane deformities have led to controversy regarding its effectiveness. Though claimed to allow growth, its precise effect on such has not previously been documented. In this study, the effectiveness and safety of the growing rod method was investigated on a homogenous group of patients from a single institution who had been instrumented with pedicle screws on both ends and dual rods and routine lengthenings performed every 6 months.

Material and Methods:

Between 03/2004 and 05/2007, 27 patients were treated with growing rod systems. Five patients were excluded based on a purely kyphotic deformity or hook fixation as proximal anchor, or failure to appear for a routine lengthening procedure. All patients were followed for a minimum of 1 year (12-51 month).

Results:

The average age of 22 patients (17 G, 5 B) was 70.5 (27-105) months. The patients underwent lengthening an average of 3.9 times. Radiologic progress of patients is as follows:

	Preindex	Postindex	%	Postfinal	%
Scoliosis:	50 (25-98)	24 (16-46)	52	27 (8-52)	46
T2-5(Kypho):	12 (0-30)	14 (0-30)		16 (0-34)	
T5-12(Kypho):	31 (0-88)	13 (0-37)		11 (0-28)	
Rotation:	20.5 (0-45)	15 (0-25)	29	14.2 (0-25)	33

During follow up, patients' sitting heights increased an average of 26mm/ year whereas their standing heights increased an average of 32mm. Vertebral body height at uninstrumented levels increased from an average of 17.6 (14.5-23)mm to 19.5 (17-22)mm ($p=0.017$) while vertebral body height within instrumented levels increased from 16.2 (12.5-22)mm to 18.6 (14-24.5)mm ($p=0.000$). There was no significant difference between the height of instrumented and uninstrumented levels both on preoperative x-rays (0.101) and those made at final follow-up (0.271). There were no neurological events in any of the patients during primary surgeries or lengthenings. Wound problems were also not encountered. There was no loss of correction due to implant failure. One rod breakage was encountered that was discovered at a pre-lengthening visit and the rod was exchanged during the routine procedure, avoiding unplanned surgery. A loose screw was determined in another patient during lengthening and it was exchanged for a larger diameter one.

Discussion:

The growing rod instrumentation when performed with pedicle screws on both ends is a safe and effective method in controlling deformity in all three planes. There was no increase in transverse plane deformity during follow-up. With careful technique and sufficient experience, previously reported high complication rates can be lowered. The use of pedicle screw at the top can decrease the rate of implant related complications. Equal rates of growth in instrumented and uninstrumented areas of the spine can be achieved with planned lengthening every six months.

SS-33. SPİNAL ENFEKSİYONLU OLGULARIN ETİYOLOJİK, KLİNİK VE LABORATUVAR OLARAK KARŞILAŞTIRILMASI

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Amaç:

Bu çalışmada etken üretilmiş olan spinal enfeksiyonlu olguların, klinik, laboratuvar ve radyolojik olarak birbirleri ile karşılaştırılması ve etken üretilmeyen spinal enfeksiyonlu olgularda olası etiyolojiyi belirlemede bunların rolünü araştırmak amaçlanmıştır.

Yöntem:

Ocak 2003- Ocak 2008 tarihleri arasında spinal infeksiyon tanısıyla takip edilen 61 hasta prospektif olarak incelemeye alındı. Hastalar tuberküloz spondilodiskiti (TS), brusella spondilodiskiti (BS) ve piyogen spondilodiskit (PS) olarak 3 gruba ayrıldı. Kültürler standart prosedürlerle yapıldı. Bakteriyel izolatların tanımlanmasında APİ sistemi kullanıldı. Serolojik testlerden standart tüp aglütinasyon testi kullanıldı.

Bulgular:

Olguların 32'si (% 52.5) erkek, 29'u (% 47.5) kadın ve yaş ortalamaları 52.1±14.2 (23-84) idi. Brusella spondilodiskit oranı % 45.9 (n=28), piyogen spondilodiskit oranı % 31.1 (n=19) tüberküloz spondilodiskit oranı % 23 (n=14), olarak saptanmıştır. Olguların % 59'unda spinal enfeksiyona abse eşlik etmekteydi. Olgularda gözlenen başlangıç şikayeti % 92 sıklıkta bel ağrısı idi, bunu % 28 sıklıkta ateş takip

etmekteydi.Üç grubun yaş, cinsiyet, abse varlığı, ALT (Alaninaminotransferaz), ALP(Alkalin fosfataz) düzeyi açısından karşılaştırmasında istatistiksel olarak anlamlı farklılık saptanmadı. Bununla birlikte; beyaz küre (p=0.003), hemoglobin (P=0.006), total protein (P=0.023), C reaktif protein (CRP) (p=0.001), sedimentasyon (p=0.003), albumin(p=0.001) değerleri gruplar arasında istatistiksel olarak anlamlı farklılık gösterdi. BK, sedimentasyon, CRP değerleri PS grubunda anlamlı yüksek bulunurken, albumin, hemoglobin değerleri bu grupta en düşüktü. Total protein ise TS ve PS grubunda anlamlı olarak düşük bulundu. Başlangıç şikayetinde ateş varlığı BS grubunda istatistiksel olarak anlamlı yüksekti (p=0.01). Spinal tulum açısından da gruplar arasında fark anlamlıydı (0.047) TS'de en sık torakal, BS ve PS'de ise en sık lumbal tutulum görüldü. Risk faktörü varlığı (vertebral travma ve/veya cerrahi, DM, KBY) en sık PS grubunda, ardından TS grubunda ve en düşük ise BS grubunda saptandı (p=0.002). Cerrahi tedavi gereksinimi en fazla PS grubunda görüldü (p=0.005).

Sonuçlar:

Spinal ağrı ile başvuran hastalarda zaman zaman etken izolasyonunda zorluklar yaşanmaktadır. Bu çalışma böyle bir durumda en olası etkeni tahmin etmede klinik, laboratuvar ve radyolojinin yardımı ve yönlendirmesinin yerini değerlendirmek için yapılan bir ön çalışmadır.Altta yatan risk faktörü varsa ve enfeksiyona sekonder gelişen laboratuvar parametrelerde de (ESR; CRP; BK) yükselme varsa öncelikle PS düşünülmesi gerektiği sonucuna varılmıştır.

SS-34. IS IT NECESSARY TO OPERATE ALL SPLIT CORD MALFORMATIONS BEFORE LONG SEGMENT CORRECTIVE SURGERY IN PATIENTS WITH CONGENITAL SPINE DEFORMITIES?

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Aim:

After the introduction of MRI in routine diagnostic work-up, Split cord malformations (SCM) in patients with Congenital spinal deformities (CSD) is more easily diagnosed and probably overtreated. The aim of this study is to evaluate the necessity of neurosurgical management of SCM before corrective spinal surgery.

Methods:

Thirty-two patients aged 12 (6-18) with CSDs with a follow up of 50 months (24-144) were analyzed. SCM were classified as Type I (septum dividing the spinal cord and dura into two separate hemicords) and Type II (two hemicords within single dura) according to Pang. Eighteen patients with type I underwent neurosurgical intervention (spur excision and creating a single dural cuff) before corrective surgery (15 sequential and 3 simultaneous). Fourteen patients with type II were treated with posterior instrumentation without dealing with the intraspinal abnormalities. The basic maneuvers were translation, compression and shortening to realign spinal column, avoiding distraction forces and intrusion of any instrument into the spinal canal around anomalous segments. Neurological monitoring was done by the wake-up test.

Results:

At final follow up, scoliosis improved from 63° (42°-98°) to 35° (45 %) in type I and from 73° (45°-114°) to 39° (47 %) in type II. One patient with type I SCM had paraparesis resulting from a misplaced upper thoracic pedicle screws with total recovery after revision. Another patient with type I SCM who had simultaneous surgeries had deterioration of her preoperative neurological deficit only to recover partially. Two patients with type I SCM and one patient with type II SCM developed deep wound infections and needed multiple debridements. Two patients with type I SCM had dural leakage that needed repair.

Conclusion:

Although it is a common practice to operate all SCMs before corrective surgery in CSD, it may not be necessary in type II which can be managed safely without any neurosurgical intervention with potential risks.

SS-35. ANTERIOR VS POSTERIOR INSTRUMENTED SPINAL FUSION IN THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS WITH LENKE TYPE I CURVES

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Aim:

Significant correction can be achieved through both anterior (ASF) and posterior instrumented spinal fusion (PSF) in the treatment of adolescent idiopathic scoliosis. The possible advantage of anterior instrumented fusion is providing better correction and derotation while sparing distal segments. There are only a few studies comparing two methods on similar curves

Method:

Radiographic and medical records of 40 patients treated by either ASF or PSF for Lenke I type curves were reviewed. 20 patients underwent ASF at an average age of 14,4 years and 20 others underwent PSF at an average age of 15,4 years. Minimum follow-up was 24 months. Standing AP and lateral roentgenograms were evaluated. Frontal and sagittal Cobb angles, apical vertebral transposition(AVT), apical vertebral rotation (AVR), C7-CVSL shift, trunk shift and number of fused segments were compared. Changes in scoliosis correction parameters were compared using student's t test.

Results:

Two groups were similar regarding age, gender, magnitude and flexibility of curves. Preoperative average coronal curve of $55.2^\circ \pm 9.3^\circ$ was corrected to $18.7^\circ \pm 9.8^\circ$ (% 66 correction) in the ASF group while average coronal curve of $60.6^\circ \pm 9.8^\circ$ was corrected to $25.6^\circ \pm 8.5^\circ$ (% 57 correction) in the PSF group ($p < 0.05$). Correction of trunk shift and AVR was also significantly better in the ASF group. The number of fused segments were 7.4 in the ASF and 9.1 in the PSF group. No significant difference was observed regarding the sagittal profile, AVT and C7-CVSL shift. No pseudoarthrosis occurred in either group.

Conclusion:

Anterior instrumented spinal fusion provided better correction of coronal curve, apical vertebral rotation and trunk shift through fusion of lesser segments.

SS-36. SPINAL CANAL EXPANDING PEDICULOPLASTY

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Aim:

The treatment alternatives in Lumbar spinal stenosis intends to expand volume for neural tissue. Most of the used surgical techniques are major procedures, and difficult to tolerate by the candidates those are commonly elderly persons. In this study accuracy of a novel-described minimal invasive technique for expanding of a narrowed spinal canal with distraction pedicle osteotomy was tested.

Material and Method:

The technique, based up on osteotomizing of pedicle internally, was tested on 14 lumbar spinal levels of 7 male cadavers unilaterally. A special pedicle screw was designed to distract the osteotomized pedicle and to recreate stability in broken osseous frame of the medullary canal. The efficacy and amount of expanded spinal-canal volume were measured under CT. Two lumbar spinal levels (L4 and L5) of each selected cadavers were operated in this study. Whole lumbar regions (L1-S) of the cadavers were dissected and resected for transport to CT examinations. Pedicle screws were slacken for measurement of spinal canal at pre-expansion. Then the screws were tightened and expanded spinal canal were visualized with computerized tomography. The distances (A and B) were measured at inner neural foramina of the spinal canal. The sagittal diameter (C) of the spinal canal were taken between posterior corner of the vertebral body and anterir border of the spinous process and the area of the canal were measured aswell (Area) with an elips. The datas were listed and mean values are calculated.

Results:

Initial preexpansion measurements at foraminal recesses were as follows: A 2.1 mm (1–3 mm); B 2.1 (1–3 mm); sagittal canal diameter C 13.4mm (11-17mm) and Area: 98 mm² (71–104 mm²). After expansion of the osteotomized pedicle the values were improved to A 5,6 mm (4–9 mm); B 2.1 (1-3mm); C 15.9 mm (14–22 mm) and D 129 mm² (107–194 mm²). Canal expansion were improved A:167 %, B: 0 % no change, C:19 %, D: 31 %.

Conclusion:

The technique described here is a novel, minimal invasive technique. Our results showed that it provided mean 19 %, expansion in the spinal canal diameter and 31% expansion in canal slice area. It is concluded that the pediculoplasty technique provides a canal expansion in a minimal invasive way. Further surgical studies supplemented with the radiological measurements should be performed in animal before the human use of this technique.

SS-37. ADÖLESAN İDİOPATİK SKOLYOZ NEDENİ İLE CERRAHİ TEDAVİ GÖREN HASTALARDA HAYAT KALİTESİ DEĞERLENDİRİLMESİ

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Amaç:

Adölesan idiopatik Skolyoz sonrası cerrahi değerlendirmeler genellikle cerrahi kriterlere göre yapılmış olup hastaların bu durumla ilgili yaşadığı subjektif durum ile ilgili çalışmalar kısıtlıdır. Bu çalışmada, kliniğimizde adölesan idiopatik skolyoz nedeniyle cerrahi tedavi uygulanan hastalarda cerrahi tedavi ve bunun hayat kalitesi üzerindeki etkileri değerlendirildi.

Gereç ve Yöntem:

Retrospektif olarak hastaların eğrilik bilgileri, Cobb açıları, King sınıflaması, Risser işareti, ameliyat tipi, enstrumantasyon teknikleri, füzyon yapılan seviyeler değerlendirildi. Hastaların ameliyat öncesi ve son kontrollerinde standart skolyoz fotoğraf çekim tekniği ile fotoğrafları çekildi. Daha sonra hastalara hayat kalitelerinin tespiti amacıyla SRS 24 anketi yapıldı.

Bulgular:

Bu çalışmada 45 hasta değerlendirildi. Hastaların 37'si (% 82.22) kadın idi. Hastaların ameliyat edildikleri tarihteki ortalama yaşları 16.31 ± 3.65 yıl, ortalama takip süresi 68.20 ± 46 , ay olarak saptandı. 14 hastada korse tedavisinin yetersiz

olması nedeniyle cerrahi tedavi uygulandı. 31 hastada sadece cerrahi tedavi uygulandı. Anterior release yapılan grupta takip primer Cobb açıları yalnız posterior yapılan gruptan anlamlı olarak yüksek bulundu ($p=0.005$). Anterior release yapılanlarda ağrı skorları ($p=0.018$) ve tedavi sonrası kendi görünümünü değerlendirme skorları ($p=0.041$), yalnız posterior enstrumantasyon yapılan grupta ise omurga fonksiyonları skoru ($p=0.014$) anlamlı olarak daha yüksek bulundu. Ameliyat öncesi primer eğrilik derecesi ile tedavi sonrası kendi görünümünü değerlendirme arasında ($p=0.013$), korreksiyon oranı ile genel görünümünü değerlendirme skorları arasında ($p=0.003$) istatistiksel olarak anlamlı pozitif bir korelasyon saptandı. Takip primer eğrilik derecesi ile genel görünümünü değerlendirme skorları arasında negatif bir korelasyon saptandı ($p=0.015$, $p=0.037$).

Sonuç:

Füzyon yapılan vertebra seviye sayısı ile tedavi sonrası kendi görünümünü değerlendirme skorları ve enstrumante edilen üst torakal seviye yeri ile tedavi sonrası kendi görünümünü değerlendirme skorları arasında anlamlı pozitif korelasyon saptandı.

SS-38. ERKEN BAŞLANGIÇLI OMURGA EĞRİLİKLERİNDE TEKLİ UZAYABİLEN SUBKUTAN ROD UYGULAMALARIMIZ

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Amaç:

Tek rod ve pedikül vidası ile uygulanan subkutan rod sisteminin, erken başlangıçlı omurga eğriliklerinde, eğriliğin kontrolü, sagittal denge üzerine etkisi, karşılaşılan komplikasyonların ve sonuçlarının değerlendirilmesi.

Yöntem:

Kliniğimizde 2002-2007 tarihleri arasında infantil, juvenil, konjenital ve sendromik tip skolyotik eğrilik nedeniyle ameliyat edilen 11 hasta çalışmaya alındı. Eğrilikler torakal, torakolomber ve çift major olarak sınıflandırıldı. Eğrilikler ameliyat öncesi ve takipleri boyunca Cobb açıları ölçülerek değerlendirildi. Her uzatma ameliyatı sonrasında hastalara koruyucu breysleme yapıldı.

Bulgular:

Tedavi başlangıcında ortalama yaş 8.24 (5.1-10.3) olan hastaların 6'sı kız, 5'i erkekti. Hastalar ortalama takip edilme süreleri 34ay (14 ay- 62ay) olarak hesaplandı. Eğrilikler 3 adet çift major, 5 adet torakal ve 3 adet torakolomber olmak üzere sınıflandı. Hastalar ortalama 1.65 (1-3) defa ameliyat edildi. Uzatma aralıkları ortalama 9.8 (2-22) ay oldu. Her uzatmada ortalama 17.2° (7°-36°)'lik Cobb açısı

düzelmesi sağlandı. Tedavilerin başlangıcında ortalama 69° (44° - 100°) ölçülen Cobb açısı son takiplerinde 40.8° (25° - 70°) olarak ölçüldü. Hastaların tedavi başlangıcında ölçülen ortalama torakal kifoz açıları 34.3° ((-16) - 90°) iken son takiplerinde bu değer 32.3° ((-4°) - 77°), ortalama lomber lordoz açıları tedavi başlangıcında -40.1° (2° - (-80°)) derece iken son takiplerinde -30.8° ((-2°) - (-60°)) olarak saptandı. Rodlar ortalama 13.6 (10-16) omur bölgesini kapsayacak şekilde yerleştirildi. Toplam 14 adet komplikasyonla karşılaşıldı. Bunlardan 7 tanesi rod kırılmasıydı. Diğer komplikasyonlar 3 adet dura zedelenmesi, 2 adet yüzeysel yara enfeksiyonu, 1 adet derin enfeksiyon, 1 adet pedikül vidasının yerinden çıkması olarak saptandı. Rod kırılması sonucu ortalama % 19 oranında korreksiyon kaybı görüldü. Çift major eğriliklerde lomber omurlarda eğrilik kontrolü sağlanamadı ve omurga rotasyonunda ilerleme olduğu saptandı. Hastalara toplam 33 operasyon yapıldı. Uzatmaları tamamlanan iki hastaya füzyon ameliyatı yapıldı. Hastaların hiçbirinde nörolojik sorunla karşılaşılmadı.

Sonuçlar:

Pedikül vidası ve tek rod ile subkutan rod uygulanan vakalarımızda komplikasyon oranları daha önce yayınlanan çalışmalarla benzer oranlardadır. Bizim serimizde vida sıyırması daha az oranlarda görülmüştür. Torakal ve torakolomber eğriliklerde tek rod uygulaması eğriliği kontrol altında tutarken çift major eğriliklerde eğriliğin kontrolünde başarısız kalmıştır. Tek rod uygulamasında sıkça gördüğümüz rod kırılmalarından sonra özellikle çift major eğriliklerin kontrolünü de sağlamak amacıyla çift rod uygulamanın daha başarılı olacağı kanısındayız.

SS-39. SERVİKAL SPONDİLOZDA EKLEM POZİSYON HISSİNİN DEĞERLENDİRİLMESİ

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Amaç:

Eklem pozisyon hissi (EPH), son yıllarda araştırmacıların ilgisini çeken bir konu haline gelmiş ve üzerinde bazı çalışmalar yapılmaya başlanmıştır. Literatürdeki çalışmalara bakıldığında EPH ve propriyosepsiyonun, diz, dirsek, omuz ve ayak bileği gibi periferik eklemleri ve bu eklemlerin patolojilerindeki durumu ortaya koyduğu görülmüştür. Omurgada ve özellikle servikal bölgede EPH'ni inceleyen çalışmalar ise oldukça azdır ve sonuçları diğer eklemler kadar netlik kazanmamıştır. Bu konuda yapılan az sayıdaki çalışmalarda da EPH'nin ölçümü, eklem hareket sınırının sadece bir noktasında yapılmış ve gözlerin açık ve kapalı olmasına yönelik bir karşılaştırmaya da gidilmemiştir. Bu çalışma servikal spondilozu olan hastalardaki dejenerasyonun, EPH'ne olan etkisini incelemek, eklem pozisyonundaki büyük ve küçük açılarının ve gözlerin açık ve kapalı olmasının bu etkideki rolünü belirlemek amacı ile yapılmıştır.

Yöntem:

Eylül 2006-Haziran 2007 tarihleri arasında servikal spondiloz tanısı konmuş olan ve yaş ortalaması 51.50 ± 10.01 olan 20 hasta ve yaşları 24 ± 3.37 olan 20 sağlıklı birey çalışmaya alınmıştır. Önceden herhangi bir servikal ve üst ekstremitte cerrahisi geçirmiş olanlar ile akut servikal disk herniasyonu, servikal nöropati, myelopati, torasik outlet sendromu, rotator cuff patolojisi veya diğer yumuşak doku problemi olan hastalar çalışma dışı bırakılmıştır. Çalışma ve kontrol grubundaki tüm bireylerin EPH, orijinal olarak geliştirdiğimiz bir sistem ile büyük ve küçük iki açıda, gözler hem açık hem de kapalı olarak ölçülmüştür. Geliştirdiğimiz ölçüm sistemi bir baş aparatı

ve buna bağılı laser marker ile goniometrik platformlardan oluşmuştur. EPH'ni değerlendiren testlerin herbiri 3 kez tekrar edilmiş ve ortalama değerleri alınmıştır. Hasta ve kontrol grubundan alınan ölçümlerin sonuçlarını karşılaştırmak için "Bağımsız Gruplar için t Testi" kullanılmıştır. Hasta ve kontrol grubunda EPH'nin gözler açık ve kapalı iken, ve büyük ve küçük açılardaki grup içi farkları "Bağımlı Gruplardaki t Testi" ile analiz edilmiştir.

Bulgular:

Gözler açık iken fleksiyon, ekstansiyon, lateral fleksiyon ve rotasyonların özellikle büyük açılardaki EPH'nde hasta ve kontrol grubu arasında, istatistiksel olarak anlamlı farklar görülmüş ve hasta grupta EPH'nin önemli düzeyde azaldığı sonucuna varılmıştır ($p < 0.05$). Gözler kapalı iken hasta ve kontrol grubu arasında özellikle ekstansiyon ($t_1:0.038$, $t_2:0.012$) ve rotasyonun ($t_1:0.0012$, $t_2:0.001$) büyük ve küçük açılarında anlamlı farklar bulunmuş, ancak diğer hareketlerde anlamlı bir farka rastlanmamıştır ($p > 0.05$). Hasta grubun gözler açık ve kapalı olarak yapılan EPH ölçümleri grup içi karşılaştırıldığında, fleksiyondaki EPH'de hiçbir değişiklik olmadığı halde ($p > 0.05$), özellikle ekstansiyon ve rotasyonun büyük açılarında EPH hatasının arttığı görülmüştür ($p < 0.05$). Aynı şekilde kontrol grubunda da gözlerin kapatılması ile ekstansiyon, rotasyon ve lateral fleksiyon hareketlerindeki EPH hatası artmıştır ($p < 0.05$). Hem hasta, hem de kontrol grubunda büyük ve küçük açılardaki hata ortalamalarının grup içi farklarına bakıldığında, bütün hareketlerde istatistiksel olarak anlamlı ve ileri düzeyde farklılıklar bulunmuştur ($p < 0.05$).

Sonuçlar:

Servikal spondilozlu hastalarda özellikle büyük açılarda EPH azalmakta ve pozisyon hissindeki hata artmaktadır. EPH'ndeki hata oranı, hem hasta hem de sağlıklı bireyler için gözlerin kapalı olması ile artış göstermektedir. Bu da görsel uyarının, baş ve servikal propriyosepsiyon ve EPH'ndeki önemini gösteren bir sonuçtur. Büyük açılardaki EPH, küçük açılara göre daha fazla bozulmaktadır. Büyük açılarda hata oranının artması, eklem hareket komponentinin aldığı yolun uzaması ile açıklanabilir. Bu konu ile ilgili geniş serili ileriki çalışmalarla sonuçların yorumu daha iyi yapılabilecektir.

SS-40. CİDDİ KORONAL VE SAGİTAL DEFORMİTELERİN DÜZELTİLMESİNDE POSTERİOR TOTAL VERTEBRAL KAMA REZEKSİYONU (DOMANIÇ OSTEOTOMİSİ)

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Amaç:

Çalışmada torakal, torakolomber ve lomber bölgede sadece posterior yolla total vertebral kama rezeksiyonu (TVKR) yapılan 14 vakanın koronal ve sagittal dengelerinin ameliyat öncesi ve sonrası değerlendirilmesi amaçlanmıştır.

Yöntem:

Yaş, cinsiyet, deformitenin etiyojisi, deformitenin lokalizasyonu, preop ve postop lokal kifoz açısı, sagittal planda düzeltme miktarı, sagittal şakül çizgisi, preop ve postop Cobb açısı, kanama miktarı, ameliyat süresi ve hastaların nörolojik durumu değerlendirildi.

Bulgular:

Ortalama yaşları 24.8 (12-77) olan 14 hasta (9 kadın, 5 erkek) çalışmaya alındı. Hastaların ortalama takip süresi 25.3 ay (6-104) olarak bulundu. 4 hastada

posttravmatik kifoz, 4 hastada konjenital kifoskolyoz, 2 hastada metastaza bađlı (1 hasta meme ca ve diđer hasta mide ca) kifoz, 1 hastada konjenital hemivertebral, 1 hastada tümör rezeksiyonu sonrası kifoz, 1 hastada konjenital kifoz ve 1 hastada lokalize plazmasitom mevcuttu. Deformite 7 hastada torakal bölgede, 1 hastada lomber bölgede ve 6 hastada torakolomber bölgede mevcuttu. 9 hastada kifoz ve 5 hastada ise kifoskolyoz vardı. Ortalama ameliyat süresi 5,5 saat (4-7 saat). Ortalama kan kaybı 2684cc (1800-3600cc) olarak bulundu. Hastaların ameliyat öncesi kifoz açıları 12° - 75° arasında iken, postop dönemde -20° ile 44° arasında bulundu. Ortalama düzeltme miktarı 26.3° (8° - 46°) idi. Kifoskolyoz mevcut olan hastaların ameliyat öncesi Cobb açıları 25° - 97° iken, postop dönemde 10° - 52° derece olarak bulundu. Koronal düzlemdeki düzeltme miktarı ortalama 28.8° (9° - 45°) olarak bulundu. Ameliyat öncesi 13 hastada deđerlendirilen sagittal řakül çizgisi +110 ile -33 mm arasında deđişmekteydi. Ameliyat sonrası dönemde ise +12 ile -7 mm arasındaydı. 4 hastada ameliyat öncesi dönemde nörolojik problem vardı. Sadece 1 hasta dışında hastaların tümünde nörolojik durumunda iyileřme tespit edildi.

Sonuçlar :

Omurganın dengesini sađlamak ve deformitelerin düzeltilmesinde çeřitli osteotomiler literatürde tanımlanmıřtır. Total vertebral kama rezeksiyonu ile sagittal ve koronal düzlemdeki ciddi deformiteler ile bunların kombinasyonlarında yeterli düzeltme elde etmek mümkündür. Bizim alıřmamızda literatür ile uyumlu olarak ortalama 26° 'lik düzeltme elde edildi. Anterior-posterior girişime göre daha az morbid bir girişim olan sadece posterior yolla TVKR ile ciddi sagittal düzlem deformitelerinin düzeltilmesi mümkündür.

SS-41. COMPARISON OF PAIN INTENSITY AND KYPHOSIS BETWEEN TWO-SEGMENT COMBINED INSTRUMENTATION AND FUSION VS. THREE-SEGMENT POSTERIOR INSTRUMENTATION AND FUSION IN THORACOLUMBAR BURST FRACTURES

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Aim:

The purpose of this randomized clinical trial is comparing the severity of residual kyphotic deformity and back pain between groups treated by anterior and posterior combined instrumentation and fusion of two motion-segments and posterior only instrumentation and fusion of three motion-segments in thoracolumbar burst fractures.

Methods:

Neurologically intact thoracolumbar burst fractures (T12-L2) that carries the risk of kyphotic deformity ($>20^\circ$ / $>50\%$ anterior wedging) were included regardless the degree of canal narrowing. Groups were randomized as two-segment posterior and anterior combined instrumentation and fusion (n=13) vs. three-segment posterior instrumentation and fusion (n=8), via adding one upper level to the fusion site posteriorly. Posterior pedicle screws were used for all cases. Anterior cages and anterior screws were applied to the combined group for anterior stabilization. After nineteen-month follow-up (12–29 months) duration of surgery, intraoperative blood loss, kyphosis angle, VAS, Oswestry and Roland-Morris questionnaire were studied.

Results:

Duration of surgery was significantly higher in combined fusion group (373 min) compared to posterior fusion group (288 min) ($p < 0.05$). No difference was observed in intraoperative bloodloss, kyphotic deformity, VAS, Oswestry, and Roland Morris Scores between treatment groups. VAS (2.1) and Oswestry (6.7) scores of politrauma patients ($n=9$) were significantly lower ($p < 0.05$ and $p < 0.05$) than isolated spine fracture ($n=12$) patients (3.5 and 11.6) regardless treatment groups.

Conclusion:

In thoracolumbar burst fractures, stability and integrity of spinal column could be restored and maintained by posterior instrumentation and fusion of three-motion segment or combined instrumentation and fusion of two-motion segment. Perception of back pain in politraumatized patients with thoracolumbar burst fractures could be lower when compared to isolated thoracolumbar burst fractures which might become a confounder in research studies.

SS-42. HORIZONTAL GAZE PALSY AND SCOLIOSIS

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Aim:

The aim of this study is to underline the association of scoliosis and horizontal gaze palsy. Horizontal gaze palsy (HGP) in association with scoliosis has been reported both in orthopaedic and ophthalmologic literature. Juvenile progressive scoliosis in combination with congenital horizontal gaze palsy apparently is caused by a malfunction of the normal control mechanism for equilibrium related to the lower brain stem.

Materials and Methods:

Thirteen cases (four families and 3 sporadic cases) having horizontal gaze palsy with scoliosis were documented, other systemic and ocular associated findings were identified briefly and genetic counselling was performed. A thorough orthopaedic examination was performed. All patients underwent X-Ray of the spine, pelvic ultrasound, Cranial and spinal cord MRI, caloric tests, chromosome analysis, gene analysis and full ophthalmologic examination.

Results:

Mean age was 14.8 (1-56) Consanguinity was common in all but last two cases. In Family I two generations and in Family II three sisters in the same generation were affected. In two families and three sporadic cases consanguinity was found. Scoliosis of varying degree (10°-65°, av. 38.4°), horizontal pendular nystagmus of low amplitude and loss of conjugate horizontal eye movements were common in all patients. Bilateral iris and choroid coloboma were observed in the male case of family

I. Female patients of this family had also genital dysgenesis which the relationship of Horizontal gaze palsy and progressive scoliosis and Rokitansky-Kustner-Hauser syndrome was not previously reported. Scoliosis was early onset and progressive in nature in all patients. 6 out of 11 patients underwent surgery due to scoliosis (Range 45°-70°, av. 50.3°). There were 4 Right Thoracic, 2 Left thoracic, 3 Right Thoracolumbar, 2 left thoracolumbar curves. Two patients of the third family (Cases 10 and 11, 6 years old female and 3 years old male had mirror image thoracolumbar curves) Cranial and spinal magnetic resonance imaging revealed cleft in Medulla Oblongata in all patients (9 patients) that underwent MRI. 2 adult patients refused MRI and two infant MRI were suboptimal. Neurological examination was otherwise normal.

Conclusion:

Every child with congenital HGP should be evaluated for a possibly associated scoliosis which is a progressive condition. If present, a diagnosis of this presumably autosomal recessive syndrome can be made with appropriate treatment and genetic counselling. Our cases and the literature clearly indicate that even if scoliosis is not present at first evaluation, longitudinal follow-up will show the evolution and progression of scoliosis.

SS-43. TORAKAL SKOLYOZ CERRAHİSİNDE PERİPEDİKÜLER BANT FİKSASYONU

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Amaç :

Skolyoz enstrumantasyonunda laminar-transvers proses çengelleri, laminar-transvers/posterior spinoz proses telleri ve pedikül vidaları günümüze kadar gelen fiksasyon yöntemleridir. Bu çalışmada 2004 yılından itibaren 23 vakada torakal eğriliklerde apikal bölge vertebraların konkav taraf pediküllerine uyguladığımız peripediküler bant tekniğini tartışmaya sunmak istiyoruz.

Yöntem:

Vakanın rijiditesine, apexin pozisyonuna göre minimum 3 maksimum 5 torakal apikal bölge vertebrasının konkav pedikülüne uygulanır. Eğriliğin diğer bölgelerindeki tespitlerde (konveks taraf, alt son, üst son vertebralar) klasik bilinen yöntemler kullanılır. Bant ilk önce vertebranın transvers prosesinin altından geçirilir. Kaudalde kalan uç kaudalden kraniale doğru aynı vertebranın sublaminarından geçirilir. Bu aşamada bandın her iki ucuda vertebranın kranialinde kalmıştır. Bu iki uçtan kraniale doğru çekerken bandın gövdesinin inferior pedikülün altından geçmesi sağlanır. Sonuçta bant pedikülün etrafını dolanarak onu çepeçevre kavramış olur. Bu şekilde hazırlanan minimum 3 maksimum 5 bant rot üzerine yerleştirilen gerdiriciler ile eş zamanlı gerdirilir. Bant tekniği ile iki ayrı yöntemle korreksiyon sağlanabilir. Birincisi

rota derotasyon yaptırarak. Biz bunu fleksibil ve hafif düzeyde olan idiopatik ve nörofibromatozis skolyozlarında kullanıyoruz. İkincisi gerdirme ile direkt lateral-posterior translasyon yöntemi. Bunu da konjenital skolyozda ve rijit, ileri düzeyde idiopatik ve nörofibromatozis skolyozlarında kullanıyoruz.

Bulgular :

2004-2008 yılları arasında 23 vakada uygulandı. Vakaların 20 si idiopatik, 2 si konjenital, 1 i nörofibromatozis skolyozu idi. Korreksiyon oranı idiopatikskolyozda %67 olarak saptandı. Enfeksiyon ve major nörolojik hasar görülmedi. Üç vakada interkostal innervasyon bölgesinde geçici pareztesi saptandı. Bunun transvers proses civarında aşırı koter kullanımına bağlı olduğunu gözlemledik ve bunda titiz davrandıktan sonra birdaha görmedik.

Tartışma :

Skolyotik eğriliğin korreksiyonunda pediküler vida uygulamasının en etkili yöntem olduğu kabul edilmekle birlikte, pedikül vidasının torakal eğriliğin apikal deforme vertebrada özellikle konkav taraf pedikülüne yerleştirmesinin teknik-anatomik zorlukları ve riskleri mevcuttur. Tartışılan bir diğer konu ise pediküler vida uygulamasının torakal lordoskolyotik eğriliklerde normal kifoz oluşturmada yetersiz kaldığıdır. Torakal eğriliklerde apex cevresi vertebraların konkav pediküllerine uyguladığımız peripediküler bant fiksasyonunun her üç düzlemde de korreksiyonu sağlarken riskleri de minimize eden etkili, öğrenme süreci kısa, kolay uygulanabilen yeni bir yöntem olduğu kanaatindeyiz.

SS-44. SPONDYLOLISTHESİS CERRAHİ TEDAVİSİNDE TRANSDİSKAL VİDALAMA TEKNİĞİ

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Amaç:

Spondylolistesiz cerrahisinde cerrahi alanı küçültmek (minimal invaziv girişim), implant kütesini azaltmak, füzyon sahasını genişletmek amacıyla transdiskal vidalama tekniğini geliştirdik. 12 vakada uyguladığımız tekniği tartışmaya sunuyoruz.

Yöntem:

Transdiskal vidalama tekniği isthmic tip spondylolisthesizin L5-S1 seviyesinde Grade 2 ye kadar olanlarında uygulandı. Bu seviyede posterior paramedian 5 cm lik çift insizyonla vertebranın her iki yanından girişim yapılır. Kas klavajını takiple L5-S1 foramen bölgesine ulaşılır. L5 pars interartiküleristeki lizis hattı bulunduktan sora bu bölgedeki fibrokartilajinöz hipertrofiye doku temizlenir. Kerrison ile yapılan temizlik işlemine L5 radiksinin tamamen rahatladığı görülene kadar devam edilir (foraminal dekompresyon). Birinci posterior sacral foramenin hemen lateralinden kortikal kemikte delik açılır. Künt uçlu delici ile yönü 10⁰-15⁰ mediale vakaya göre uygun açıda kraniale yönlendirilerek S1 son plağı hissedilene kadar delinir. Lateral scopi kontrolü yapılır. Delicinin ucunun S1 son plağının ortalarına denk gelmiş olması gereklidir. Pozisyon uygunsa künt uçlu delici çıkartılır yerine keskin uçlu yerleştirilir.

S1 son plağı, L5-S1 diski geilip L5 alt son plağı hissedildiđinde tekrar lateral scopi kontrolü yapılır. Delicinin ucunun L5 alt son plağının ortasına yakın yerden temas etmiş olması gerekir. Delme işlemine devam edilir ve L5 vertebra ön korteksinin 5mm kadar gerisinde durulur. Bu aşamada hem lateral hemde A/P scopi görüntüleri ile delicinin pozisyonu kontrol edilir. A/P görüntüde uç pedikül hizasından aşağıda ve korpusun içinde olmalıdır, lateral görüntüde ise gene pedikül hizasından aşağıda ön korteksten yaklaşık 5mm geride olmalıdır. Delici çıkartılır deliđe klavuz tel yerleştirilir. Kanüllü tep ile klavuz tel üzerinden tepleme işlemi yapılır. Tep ve tel çıkartılıp 7mm apında transdiskal vidası yerleştirilir. Dikkat edilmesi gereken her iki yandan yerleştirilen vidaların son sıkıştırma işlemlerinin aynı anda senkronize yapılmasıdır. Son defa scopi ele kontrol yapılır. L5 lateral proses ve pedikülün lateral duvarı dekortike edilir. S1 sacral ala üzeri dekortike edilir. aynı insizyondan alınan iliak kanat greftleri ile postero lateral füzyon yapılır.

Bulgular :

Oniki vakaya bu teknik uygulandı. Vakaları 10 adedi bayan 2 adedi erkek idi.En küçük yaş 19 en büyüğü 59 olarak saptandı. Nörolojik komplikasyon, enfeksiyon saptanmadı. Bir adet vida korpus dışında diđer bir adedi de kanal içinde saptandı. Bu vakalara revizyon gerekmedi. Postop dönemde hastalara korse önerilmedi.

Sonuçlar:

Kısa sürede öğrenilebilen, kolayuygulanabilen,düşük maliyetli minimal girişim ve metal yığılımlı olan tekniğimizin etkiliolduđu inancındayız.

SS-45. VEREM SPONDİLİTİNDE GERÇEKLEŞTİRİLEN REKONSTRUKTİV AMELİYATLARIN SONUCU:

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Rekonstruktiv ameliyatlarda verem spondilitinin ilerlemiş safhasında gerçektirilmişdir. Verem spondilitinde cerrahi müdahilə omurganın patoloji hissənin və paravertebral abseslərin təmizlənməsi, rekonstruktiv ameliyattan ibarətdir. Araştırmanın amacı verem spondilitində xəstəliyin ilerlemiş safhasında gerçektirilən rekonstruktiv ameliyatlarda önəmini göstərməkdir. Araştırmada ameliyat edilən 127 xəstə arasında gerçektirilmişdir. Xəstələrin yaşı 17-48 yaş aralığında olub xəstəliyin müddəti 1-5 il arasında dır. 56 (44.1 %) xəstədə göğüs omurgası, 71 (55.9 %) xəstədə omurganın bel kısmı zədələnməmişdir. 95 (74.8 %) xəstədə isə omurga beyni rahatsızlığı olduğu saptanmışdır. Tədaril xəstənin ameliyattan sonra 2-3 ay yataq istirahətini etdirilərk gerçektirilmişdir. Xəstələr ameliyattan 2-3 ay sonra korse geydirilərk ayağa kaldırılıp yürütülmüşdür. Klinikdən Fiziatir və ortopedistlərin nəzarətində taburcu edilmişlərdir. Antibakterial və patogenetik terapi davam etdirilərk omurga sütunu röntgenlə kontrol edilip, kan təhlilləri yapılıp və tədarilə uyğun jimnastik hərəkətləri təvsiyə edilmişdir. Araştırmalar nəticəsində 3-5 il içində xəstəliyin ilerlemiş safhalarını öyrənmək mümkün olmuşdur. Fegere sütununda ön elementlərində gerçektirilən rekonstruktiv ameliyatlarda nəticələri 1 xəstədə (0.79 %) autotrans plantatin kırığı, 2 xəstədə (1.6 %) autotrans plantatinin yer dəğiştigi görülmüşdür. 127 Xəstədən 121 i (95.2 %) iyi sonuç, 5 xəstədə (3.9 %) kafi sonuç 1 xəstədə gəyri kafi sonuç əldə edilmişdir. 119 Xəstədə (93.7 %) ameliyat zamanı omurganın deformasiyasını tədaril etmək mümkün olmuşdur və tədaril olduğu gibi vəziyyəti sabitlənməmişdir. Nevroloji rahatsızlığı olan 95 (74.8 %) xəstədən 2 tanesini kısmən, yalnız 1 tanesini tədaril etmək mümkün olmamışdır. Bəyləliklə verem

spondilitinde gerekleřtirilen autotrans plantlarla rekonstriktif ameliyatlar ilerlemiř safhalarda ulařılan sonular omurga stununun deformasyonu tedavi edilmiř ve elde edilen sonu sabit vaziyetde kalmıřtır.