Volume: 26, Issue:3, July 2015 pp: 207-212 ORIGINAL ARTICLE / ORJİNAL MAKALE

ALL LEVELS PEDICLE SCREW FOR DECOMPRESSION AND CORRECTION IN DEGENERATIVE LUMBAR SPINE SCOLIOSIS: SHORT-TERM RESULTS

DEJENERATİF LOMBER OMURGA SKOLYOZUNDA KORREKSİYON VE DEKOMPRESYONUNDA TÜM SEVİYELERE PEDİKÜLER VİDA KULLANIMI

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SUMMARY:

Introduction: Degenerative lumbar scoliosis is a slow progressed scoliosis most commonly seen in over 40 year adults. Degenerative or de novo lumbar scoliosis is defined as over 10 degrees of Cobb angle bent spine in adults with completed spine development sans having adolescent idiopathic scoliosis. Increased pain with movement is a common symptom along with walking irregularities and intermittent claudication like neurologic symptoms. Ideally spine should be fused in all segments contributing to the deformity.

Method: Our Study includes 20 patients operated between years 2012-2014 with lumbar degenerative scoliosis diagnosis. The patients are retrospectively studied. 15 women, 5 men with an age average of 57 (46-82). The average follow-up is 16.3 months (8-36). Pre and postoperative VAS and ODI scores are used for assessment. Radiologic control of the patients was done using calculated Cobb's angle from standing scoliosis images and L1-S1 lumbar lordosis angles.

Results: The calculated preoperative average Cobb's angles of the patients were 22.6 (15-40) with postoperative average has fallen to 4.8 (0-10). The preoperative average L1-S1 lumbar lordosis angle of the patients was 30.8 (15-45) and significant lordosis loss was noted. Postoperative average L1-S1 lordosis angle were calculated to be 40.3 (25-55). Preoperative average VAS was 7.8(7-9) with the postoperative average 2.4(0-4). Preoperative average ODI was 54 % (46-74 %) with the postoperative resulting average of 18% (12-30 %).

Conclusion: With the patients that are picked right, the correction of the scoliosis operation renders good results. We can say that with the correctly chosen patients the lumbar degenerative scoliosis correction operation with decompression and instrumentation is a correct treatment option.

Key Words: Degenerative lumbar scoliosis, coronal balance, correction.

Level of Evidence: Retrospective clinical study, Level III

ÖZET:

Giriş: 40 yaş üstü popülasyonda görülen, yavaş seyirli bir skolyoz tipidir. Dejeneratif veya de novo lomber skolyoz, adelösan idiopatik skolyoz olmaksızın iskelet maturasyonu tamamlandıktan sonra 10 derecenin üstünde Cobb açısı bulunan anormal omurga eğriliği olarak tanımlanır. Hareketle artan bel ağrısı tipik klinik bulgusu olup buna radikülopati, yürüme bozukluğu, intermittan kladikasyo gibi çeşitli nörolojik semptomlar da eşlik edebilir. İdeal yöntem, koronal planda deformiteye katılan tüm segmentlere füzyon uygulamaktır.

Materyal-Metot: Çalışmamızda 2012-2014 yılları arasında dejeneratif lomber skolyoz tanısı ile opere edilen 20 hasta retrospektif olarak değerlendirildi. Hastaların 15'i kadın, 5'i erkek, yaş ortalaması 57 (46-82) idi. Hastaların ortalama takip süresi 16.3 ay (8-36) olup klinik olarak pre ve postoperatif VAS ve ODI skalaları ile değerlendirildi. Hastaların radyolojik kontrolü preoperatif ve postoperatif olarak ayakta skolyoz grafilerinde ölçülen Cobb açıları ve L1-S1 lomber lordoz açısı ile yapıldı.

Sonuçlar: Hastaların ölçülen preoperatif ortalama Cobb açısı 22.6 (15-40) derece idi. Postoperatif ortalama Cobb açısı 4.8 (0-10) derece olarak ölçüldü. Hastaların preoperatif L1-S1 lomber lordoz açısı ortalama 30.8 (15-45) derece olup belirgin lordoz kaybı olduğu saptandı. Postoperatif L1-S1 lomber lordoz açısı ortalama 40.3 (25-55) derece olarak ölçüldü. Preoperatif ortalama VAS 7.8 (7-9) iken postoperatif 2.4 (0-4)'e geriledi. Preoperatif ortalama ODI % 54 (46-74) iken postoperatif % 18 (12-30)'e geriledi.

Çıkarım: Doğru seçilmiş hastalarda skolyoz korreksiyonu ile yaralı sonuçlara ulaşabiliriz. Lomber dejeneratif skoyoz cerrahisinde enstrümantasyon, dekompresyon ve koreksiyon uygun seçilmiş vakalarda başarılı bir cerrahi tedavi seçeneğidir.

Anahtar Kelimeler: Dejeneratif lomber skolyoz, koronal balans, dekompresyon, korreksiyon,

Kanıt düzeyi: Retrospektif klinik çalışma, Düzey III.

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Received: 4th April, 2015
Accepted: 18th June, 2015

INTRODUCTION:

Degenerative or de novo lumbar scoliosis is defined as over 10 degrees of Cobb angle bent spine in adults with completed spine development sans having adolescent idiopathic scoliosis. Asymmetrical disc degeneration, facet joint degeneration, lumbar stenosis and segmental instability are lumbar degenerative scoliosis' most common causes[1-4,28].

Degenerative lumbar scoliosis (DLS) is a slow progressed scoliosis most commonly seen in over 40 year adults. Incidence and prevalence are both increased with age. With today's advanced imaging techniques and increased awareness of the population results in an increase in rates[14,22,31].

DLS has a prevalence of 6 % above ages 50 and up[32]. Different surgical techniques are present for patients requiring surgical intervention. These differences arise from the differences of patients' radiological findings and expected outcome of living quality and function. Increased pain with movement is a common symptom along with walking irregularities and intermittent claudication like neurologic symptoms. Like other degenerative pathologies, conservative approach is also manageable for DLS[30]. Alas, patients requiring surgical intervention, conservative approach leads to further progress of the DLS. Furthermore, surgical decompression treatment to patients with only radicular pain leads to spine imbalance and worsen the symptoms in the long run[10,12]. Ideally, surgical fusion to all segments contributing to the deformity in coronal plane should be performed. For the proximal segment, the first neutral level above the deformity should be chosen[27]. The aim of this retrospective study is to see the results of the surgical decompression and correction of all the levels with pedicle screws with radiological imaging and functional satisfaction of the patient.

MATERIAL AND METHOD:

Our Study includes 20 patients operated between years 2012-2014 with lumbar degenerative scoliosis diagnosis. The patients are retrospectively studied. 15 women, 5 men with an age average of 57 (46-82). Most of the patients were found to be in 5th and 6th decades. The average length of the symptoms was 7.8 years[3-20]. The main symptom among all patients was back pain within 3 patients' pain in the apex of the scoliosis and 17 with diffuse pain through all the back. In all patients, radiculopathy with differing degrees and claudication in similar lengths were present. All patients received medical and physical treatment before surgical intervention. None of the patients had apparent motor deficit.

Radiological assessment was done with 2 way standing scoliosis images, dynamic lumbar images, MRI and CT scans. All patients received surgical treatment with posterior stabilization with pedicle screws on all levels, and posterior decompression and interbody lumbar fusion were done to necessary levels.

The average follow-up is 16.3 months (8-36). Pre and postoperative VAS and ODI scores are used for assessment. Radiologic control of the patients was done using calculated Cobb's angle from standing scoliosis images and L1-S1 lumbar lordosis angles.

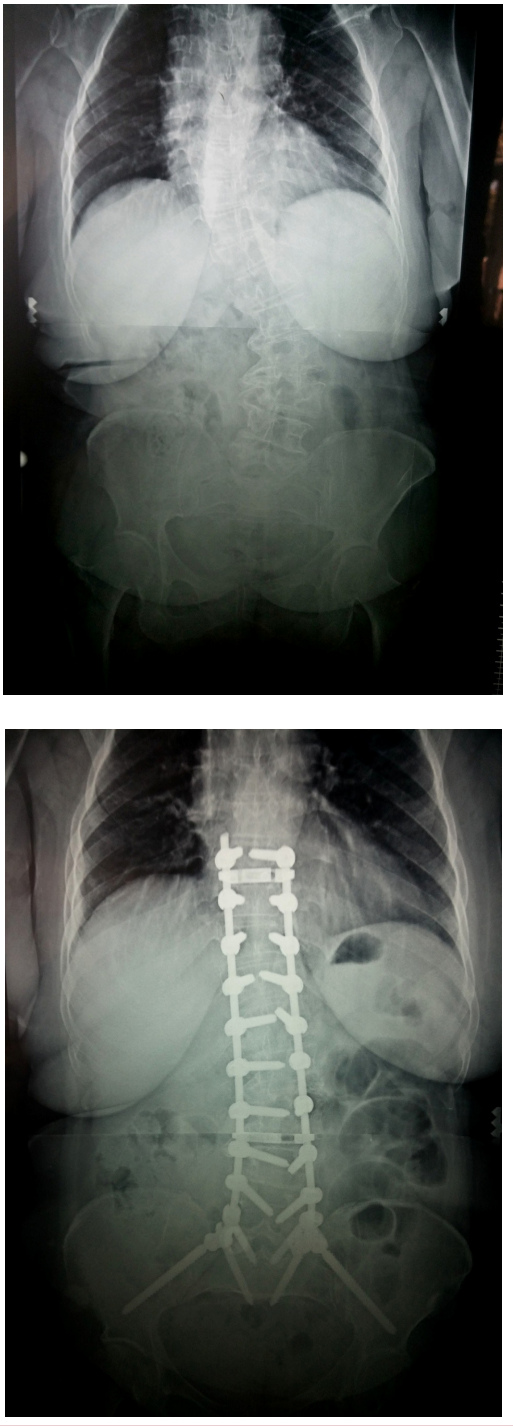

Figure-1. D8-Illiac wing instrumentation with decompression through L2-3-4 total laminectomy.

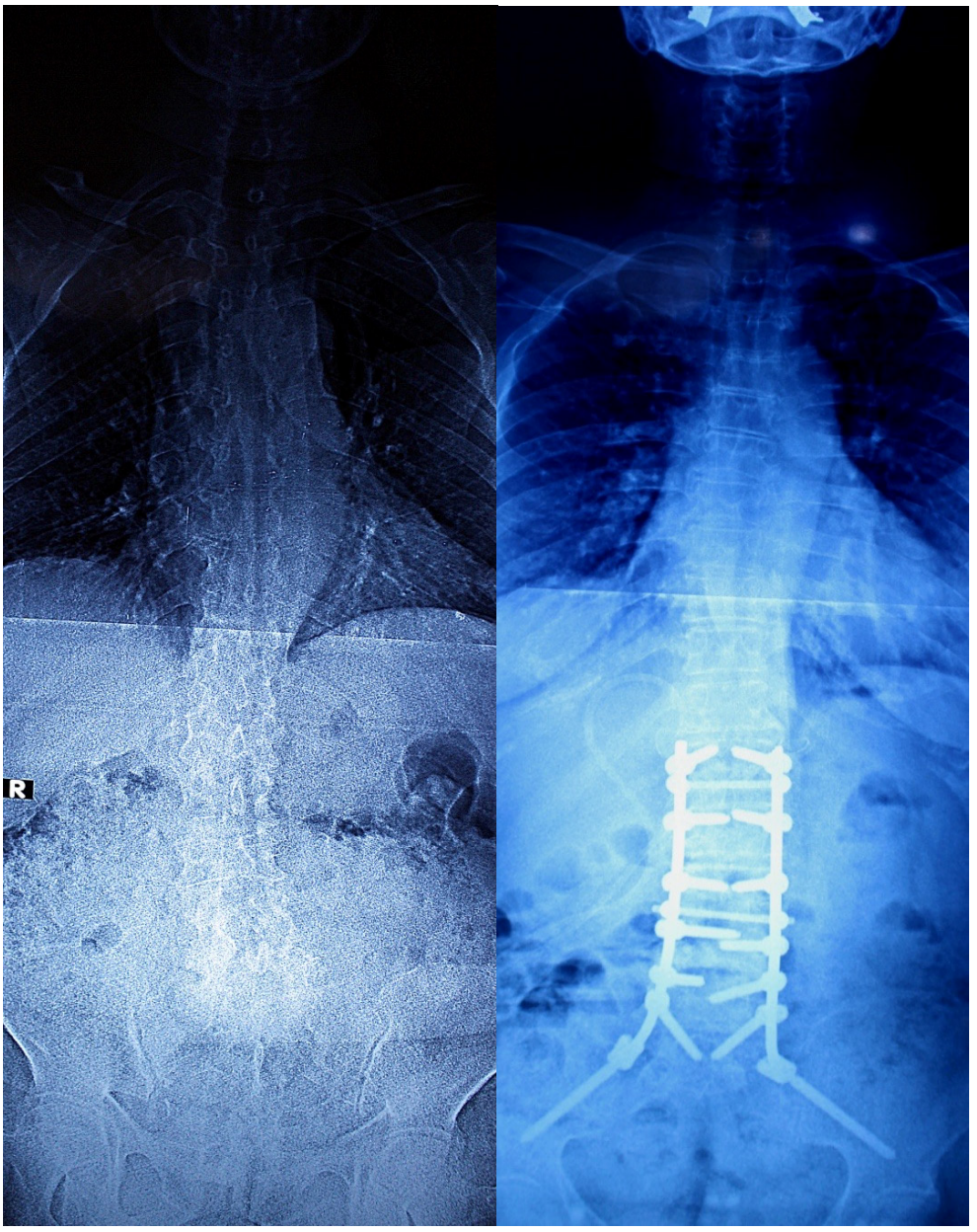

Figure-2. T12-Illiac wing instrumentation (excluding S1) with decompression L3-4-5 total laminectomy.

RESULTS:

The average hospitalization of the patients was 4.2 (3-10) days. The calculated preoperative average Cobb's angles of the patients were 22.6 (15-40) with postoperative average has fallen to 4.8 (0-10) (Figure-1,2).

The preoperative average L1-S1 lumbar lordosis angle of the patients was 30.8 (15-45) and significant lordosis loss was noted. Postoperative average L1-S1 lordosis angle were calculated to be 40.3 (25-55) (Figure-3).

Preoperative average VAS was 7.8 (7-9) with the postoperative average 2.4 (0-4). Preoperative average ODI was 54 % (46-74 %) with the postoperative resulting average of 18 % (12-30 %). Postoperative complications were seen on 4 of the patients. 2 patients developed postoperative radiculopathy and frusta paralysis and had to undergo another decompression operation. 1 patient had wound infection and antibiotics were administered with the supervision of the present infectious diseases resident and the patient was discharged on 10th day with oral antibiotheraphy. Deep vein thrombosis was diagnosed on the 10th postoperative day in 1 patient and necessary treatment was administered in junction with cardiovascular surgery department.

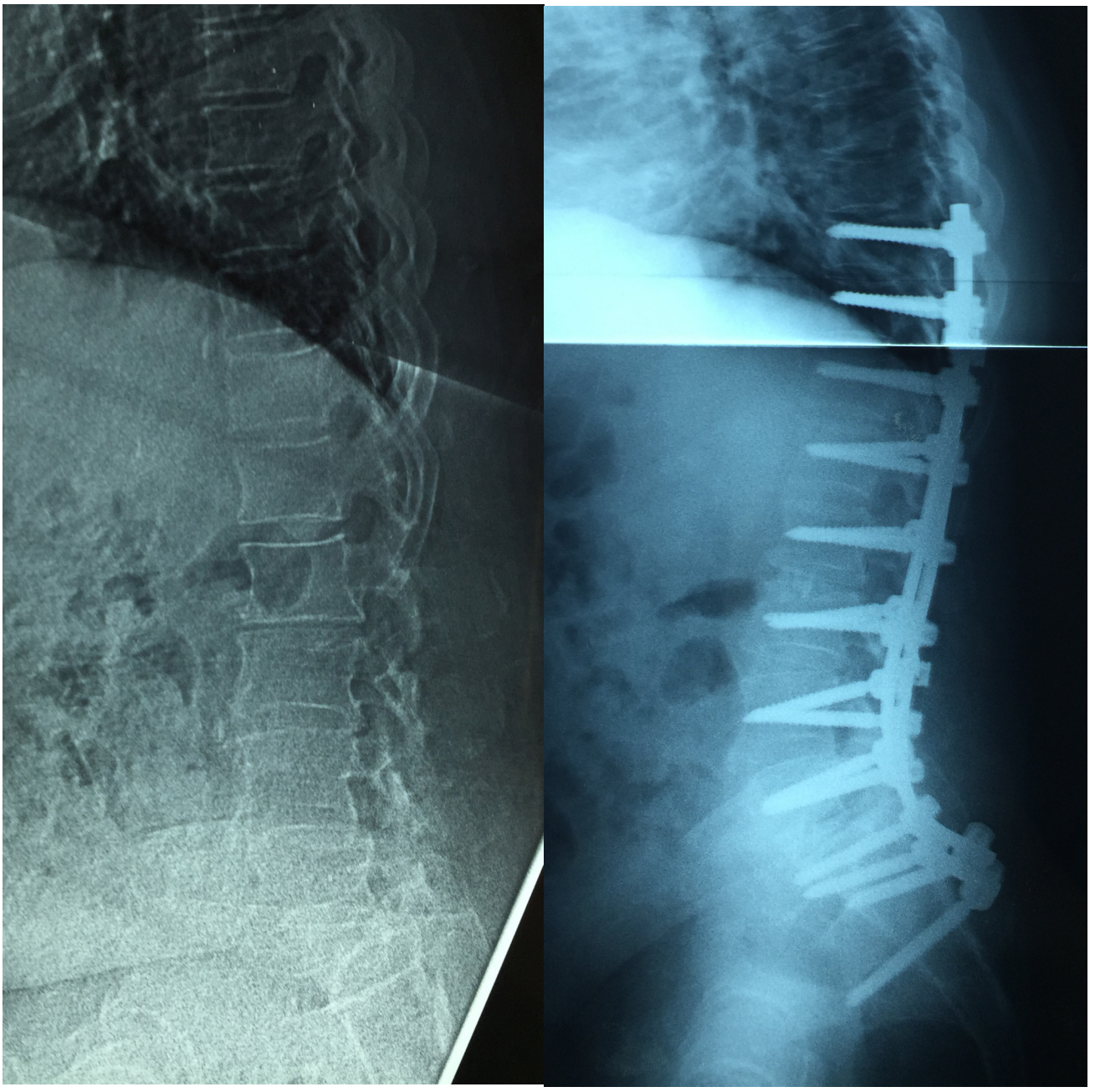

Figure-3. Sagittal preoperative and postoperative views of T10-Illiac wing instrumentation.

DISCUSSION:

Surgical correction of DLS is a harder operation among the spinal deformity interventions. Because of the fact that lumbar degeneration is seen in a comparatively older part of the population, comorbidities are common. The careful analysis of the deformity is vital in operation of the DLS. Apical vertebra and the top and bottom level of the deformity should be studied. Knowing the principals of the scoliosis disease is very important for choosing the right method for the operation[9,18].

Transpedicle screw fixation is first used by Roy-Camile in the 70ies. Roy-Camile used screw fixation commonly in the treatment of fractures[20]. Pedicle screw fixation is commonly used today in many spinal cases need of strong stabilization of the posterior bodies[21]. Also using pedicle fixation enables the correction of scoliosis in multiple planes.

Hurry et al. performed solo posterior or combined anterior and posterior operations for correction of the rigid lumbar scoliosis. They've come to find that posterior pedicle screw stabilization with wide posterior relaxation is as successful as

correction with combined anterior and posterior approach[11]. In our series, correction through posterior approach rendered successful results.

Glassman et al. find a distinctive correlation of successful treatment and correction of the balance in coronal and sagittal planes[11]. In our series, we also found an agreeing correlation.

Lang et al. insisted on that Multi-segment decompression, internal fixation and fusion helps relieve the symptoms resulting from root compression and improves the life standard by helping remaintain the spinal balance. They come to the conclusion that this procedure is a viable treatment for DLS[17]. We also come to the conclusion that decompression, stabilization, and deformity correction resulted in an increase of life standard and quality in out patients.

Schwab et al. reported that the bent top end plates of L3-4 vertebrae correlate with lateral malposition of the lumbar vertebrae, loss of lumbar lordosis, pain of the thoracolumbar kyphosis and general unpleasant clinical features. They agree on the fact that posterior correction is as successful as combined approach of anterior and posterior techniques[24]

Decompression of the neural components results in clinical recovery. Decompressive surgery is very effective in relief of the radicular pain but remains ineffective in mechanic back pain. Postoperative residual back pain could have been cause by mechanic origins and mostly results from spinal instability[12].

Kleinsteuck et al. comes to find that decompression and fusion approach results in better clinical recovery in patients with segmental instability compared to single decompressive surgery. In our series, our patients all had DLS with correlated segmental instability and radiological findings. Combined decompression and fusion resulted to the recovery from the symptoms[14].

DLS surgery is reported to have high complications in the literature[3,5-8,12,19,24-26,29]. Kostuik and Hall[16] reported that in patients whom the sacrum was included in the fusion had 78 % complications. Simmons et al.[26] reported 41 % complications in their series of 49 patients. Swank et al.[29] reported a complication rate of 53 % in their 222 patient-series. Daubs et al.[8] reported 37 % complication rate in their 46 patient adult scoliosis series. In our series of 20 patients we had a total of 20 % complications. 2 patients developed postoperative radiculopathy and frusta paralysis and had to undergo another decompression operation. 1 patient had wound infection and antibiotics were administered with the supervision of the present infectious diseases resident and the patient was discharged on 10th day with oral antibiotheraphy. Deep vein thrombosis was diagnosed on the 10th postoperative day in 1 patient and necessary treatment was administered in junction with cardiovascular surgery department. There was no mortality or mechanical complication.

Surgical approach road can be taken when the clinical and radiological findings correlate. These findings include but not limited to the angulation of the L3 and L4 endplate angulation, loss of lumbar lordosis, thoracolumbar kyphosis and lateral listhesis[5,7,12].

Patients with adult degenerative scoliosis have symptoms consisting of back pain, neurological claudication, and imbalance in the coronal and sagittal plane. Different approaches can be taken in the treatment. 3 operative approaches can be defined in adult degenerative scoliosis. These are; only decompression, decompression and limited short fusion, and deformity correction through long segment fusion.

Only decompression is not advised since it will add to the imbalance. Limited short fusion and segmental decompression is advisable for patients with low Cobb's angle, minimal rotational deformity and correct sagittal and coronal balance. Short fusion does not have satisfactory effect on restoration of the lumbar lordosis.

The long fusion approach is especially satisfactory for patients with high Cobb's angle and coronal and sagittal imbalance. Long fusion approach is needed for correction of the deformity.

Instrumentation, decompression and correction in LDS surgery is very successful in carefully picked patients, especially renders comparatively better results in older, osteoporotic patients whom further correction manoeuvers are planned as it will contribute to the strengthening of the spine.

Patients with adult lumbar scoliosis will have a higher risk for additional problems with the increasing age. Operations on these patients have very different hardships compared to adolescent scoliosis operations. The surgical intervention has a higher complication rating. We can achieve successful results in carefully picked patients.

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