



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

LOMBER SPİNAL STENOZ CERRAHİSİNDE ANTEROLATERAL RETROPERİTONEAL YAKLAŞIM İLE PARAMEDİAN YAKLAŞIMIN KOZMETİK VE FONKSİYONEL SONUÇLARININ KARŞILAŞTIRILMASI

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SUMMARY:

Study Design: Retrospective clinical study.

Objective: 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.

Summary of Background Data: Exposure of the anterior portion of the lumbar disks can be obtained through either a transperitoneal or extraperitoneal approach, utilizing a variety of skin incisions. The retroperitoneal approach is the preferred procedure because it can be performed through small skin incisions and obviates the need for bowel retraction.

Methods: The study reviewed 41 patients with lumbar spinal stenosis surgically treated by combined anterior and posterior routes. 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.

Results: The mean postoperative 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.

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.

Key Words: Anterior interbody fusion, Anterior paramedian retroperitoneal approach, Anterolateral retroperitoneal approach, Cosmesis.

Level of Evidence: Retrospective clinical study, Level III

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ÖZET:

Amaç: Bu çalışmada anterior-posterior kombine cerrahi uygulanan hastalarda anteromedian yaklaşım ile anterolateral retroperitoneal yaklaşımın fonksiyonel ve kozmetik sonuçlarının karşılaştırılması amaçlanmıştır.

Geçmiş bilgiler: Vertebtal diskin ön kısmına, değişik insizyonlar kullanılarak önden transperitoneal veya ekstraperitoneal yaklaşımla ulaşılabilmektedir. Retroperitoneal yaklaşım daha küçük kesi ve barsak retraksiyonu gerekmediğinden daha çok tercih edilmektedir.

Mateyal-Metot: Bu çalışmada anterior ve posterior yollarla kombine cerrahi tedavi uygulanan 41 spinal stenozlu hasta gözden geçirilmiştir. Posterior dekompresyon, posterior füzyon ve enstrümantasyona ilaveten anterior cisimler arası füzyon için 14 hastada anterolateral yaklaşımla retroperitoneal girişim (Grup-I), 27 hastada anterior paramedian retroperitoneal yaklaşım uygulanmıştır. Ameliyat, aynı cerrah tarafından yapılmıştır.

Sonuçlar: Ortalama postoperatif SRS skoru, anterolateral girişim grubunda 22.4 ve anterior

paramedian girişim grubunda 24.2 olarak bulunmuştur ($p < 0.05$). SRS anketindeki en büyük fark kişisel görünüm,ve ağrı domainleride olduğu görülmüş, fonksiyon ve günlük aktivite açısından bir fark olmadığı belirlenmiştir. İkinci gruptan 2 vakada yara yeri problemi olurken, 1. gruptan 1 hastada olduğu belirlenmiştir. Tüm bu hastalar yara debridmanı ve primer kapama ile iyileşmişlerdir. Anterolateral girişim yapılan 5 hastada abdominal herniyonu düşündüren karın şişliği görülmüştür.

Çıkarımlar: Anterior ve anterolateral cerrahi yaklaşımlar potansiyel komplikasyonları ve anatomiye aşına cerrahlarca lomber spinal girişimlerde güvenle kullanılabilir. Anterior paramedian yaklaşım yapılan hastalar anterolateral yaklaşıma nazaran daha konforlu bir yaşama ve kozmetik olarak daha iyi sonuçlara sahiptirler.

Anahtar kelimeler: Anterior cisimler arası füzyon, anterior paramedian retroperitoneal yaklaşım, anterolateral retroperitoneal yaklaşım, kozmetik.

Kanıt düzeyi: Retrospektif klinik çalışma, Düzey III

INTRODUCTION:

The anterior approach to the spine provides direct vision and access to the vertebral column. In 1933, Burns ⁽⁴⁾ first reported the anterior lumbar interbody fusion as a technique to stabilize spondylolisthesis. In 1934, Ito et al. ⁽²¹⁾ described interbody debridement for Pott disease through an anterior approach. In 1945, Capener ⁽⁵⁾ described a transperitoneal approach using a tibial graft. In Hong Kong in 1956 and later in 1960, Hodgson and Stock ^(15, 16) extended the anterior approach to the thoracic and lumbar spine for debridement of tuberculosis abscesses with subsequent interbody fusion. In 1944, Iwahara ⁽²²⁾ demonstrated the extraperitoneal approach that had none of the disadvantages of opening the peritoneum.

Anterior lumbar interbody fusion and disc replacement are becoming increasingly common procedures for the management of a number of spinal problems, such as pseudarthrosis, degenerative joint disease, and internal disk disruption from malignancy, infection, or trauma. Anterior exposure for lumbar spinal fusion allows the removal of diseased intervertebral discs and implantation of bone grafts to promote healing of the spinal fusion ⁽²⁰⁾.

Exposure of the anterior portion of the lumbar disks can be obtained through either a transperitoneal or extraperitoneal approach, utilizing a variety of skin incisions. The retroperitoneal approach is the preferred procedure because it can be performed through small skin incisions and obviates the need for bowel retraction. Since mobilization of vascular structures and the ureters are generally necessary, it is common for vascular, urologic, or general surgeons to assist the spine surgeon with the exposure of the lumbar disks ⁽³⁴⁾.

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.

MATERIALS AND METHODS:

The medical records of all patients with the diagnosis of lumbar spinal stenosis who underwent anterior and posterior fusion from the spinal level of L2 to S1 between January 2002 and December 2006 were retrospectively reviewed. The type of operation, the indication, and the outcomes based on postoperative outpatient evaluation were determined. Postoperative evaluation of the patients consisted of modified SRS-30 questionnaire (maximum score of 25) and specific questions related with patient satisfaction.

The study reviewed 41 patients with lumbar spinal stenosis surgically treated by combined anterior and posterior routes. 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 (figures I and II). An access surgeon was used in all cases.

After placement of anti-embolism stockings, sequential compression devices, and a Foley catheter, general anesthesia was administered, and the abdomen was prepped and draped in the sterile fashion. In the surgical technique of paramedian approach, a left paramedian incision with extraperitoneal approach and exposure of the lumbar spine via the patients' left side was attempted. The fascia lata was identified and incised. The left rectus abdominis muscle was identified and elevated superiorly. Inferior epigastric vessels

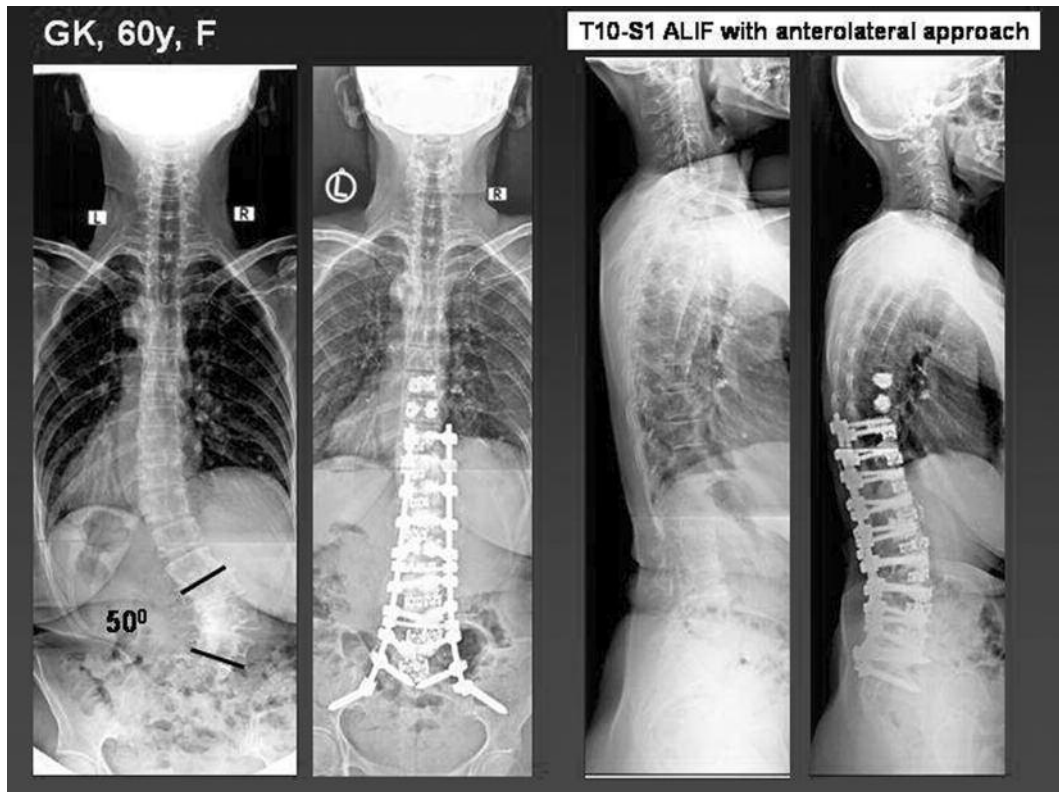


Figure-1 In addition to posterior instrumentation, decompression and fusion; anterolateral retroperitoneal approach from T10 to S1 in a 60-year-old woman with lumbar spinal stenosis associated with denovo scoliosis.

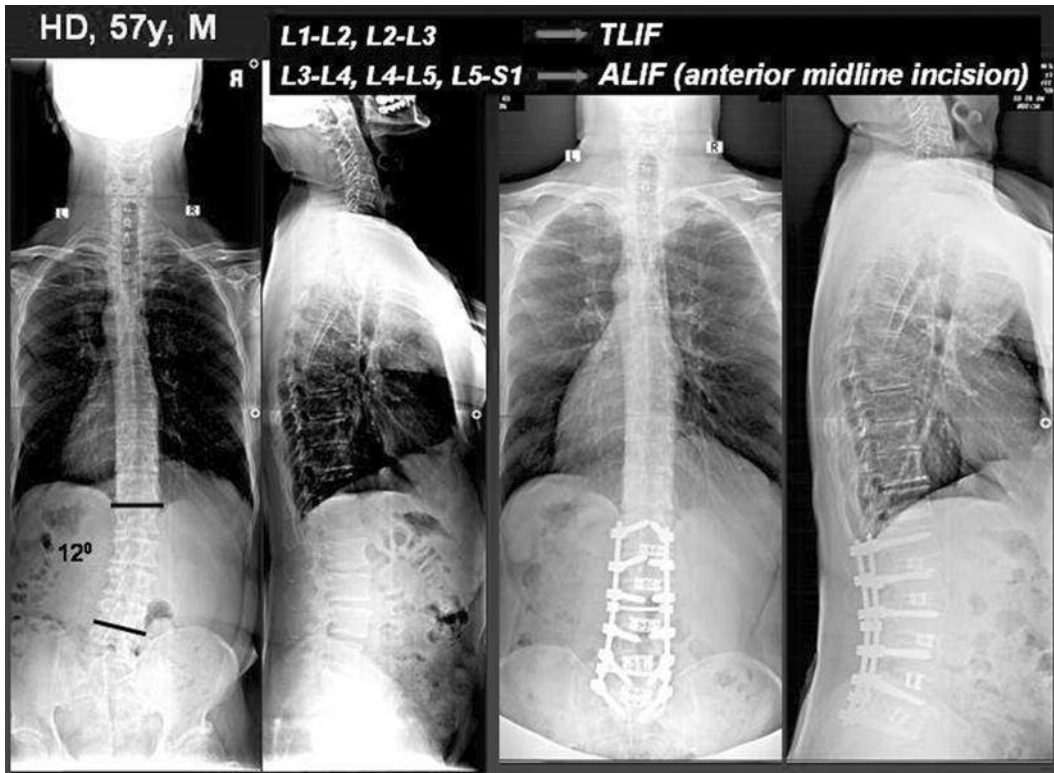


Figure-2 57-year-old male patient with lumbar spinal stenosis. Together with posterior instrumentation and decompression; TLIF was done at L1-L2 and L2-L3 levels and ALIF with anterior paramedian retroperitoneal approach at L3-L4, L4-L5 and L5-S1 levels.

were not dissected free but were left attached to the posterior of the rectus abdominis muscle whenever possible. The preperitoneal and retroperitoneal fat was then bluntly dissected from lateral to medial. For L5-S1 exposure, the ureter was identified and retracted medially and the left iliac artery and vein were identified and retracted laterally. For exposure of L4-L5/ S1, the left iliac artery was traced up to its take-off from the aorta and the space between the left iliac artery, and the psoas muscle was bluntly dissected. The left iliac artery was then retracted medially. After identification of the left iliac and iliolumbar veins, the iliolumbar vein was ligated and divided. Any lymphatic vessels were ligated with small vascular clips, and any vessel injuries were repaired or ligated at time of identification. The appropriate disc space(s) was identified, confirmed by fluoroscopy, and a self-retaining retractor was placed.

The anterior spinal fusion was performed by the senior surgeon with commercially available bioprosthetic. Once this was completed, the iliac artery, iliac vein, and iliolumbar vein were inspected for bleeding, and the ureter was inspected for injury. Running absorbable suture was used to close the anterior rectus sheath. The subcutaneous tissue was irrigated, and hemostasis was controlled with electrocautery. Scarpa's fascia was closed with interrupted absorbable suture, and the skin was closed with a running absorbable subcuticular stitch. The incision site was covered with antibiotic-soaked gauze overlay and skin tape. We routinely used a postoperative nasogastric tube (NGT). We did continue mechanical DVT prophylaxis throughout the perioperative period.

In the surgical technique of anterolateral retroperitoneal approach, the patient is placed in the lateral decubitus position and secured

using either a bean-bag or sand bags. Typically, the approach is via the left side. The incision is oriented in an oblique fashion and is carried down onto the abdominal wall. The external and internal obliques are split for a variable distance. It is best to limit this to the bare minimum to prevent postoperative muscular dysfunction. Once this is complete, the peritoneum is dissected off of the overlying diaphragm and the psoas muscle, which opens the retroperitoneal space. The segmental vessels to the vertebral bodies are dissected and divided to gain anterior access to the disk spaces. Specific care must be paid to the segmental arteries because of the potential for serious hemorrhage. These arteries are paired at each vertebral level and supply extra-spinal and intra-spinal structures. These vessels need to be controlled and ligated on the side, which the exposure is undertaken. This should be done close to the aorta to ensure that the collateral blood supply to the spinal cord is preserved to protect against cord ischemia. After classical discectomy and fusion, the anterior abdominal wall is reconstructed layer by layer.

Data were analyzed with chi square test. A p value of < 0.05 was considered as statistically significant.

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 postoperative 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 group 1 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.

DISCUSSION:

Anterior exposure of lumbar disks has become an increasingly popular approach to the treatment of disk disease. This strategy has several advantages over the posterior approach, including the reduced incidence of nerve damage, the avoidance of paraspinal muscle trauma, the ability to get a more complete disk excision and therefore placement of a larger interbody fusion device, and decreased hospital course⁽³⁴⁾. Potential complications of the anterior approach are numerous because of the anatomic structures. These include retrograde ejaculation, impotence, retroperitoneal fibrosis, rectus muscle hematoma, pancreatitis, femoral nerve palsy, pseudomeningocele, and latissimus dorsi rupture^(3, 6, 11, 13, 14, 19, 20, 23-29, 31). One study⁽¹⁾ reviewing 1310 consecutive cases for anterior exposures of L2-S1 revealed a 0.45% incidence of left iliac artery thrombosis. It also reported a 1.4% incidence of major vein lacerations, which is not seen in our patients.

The retroperitoneal approach limits the risk to abdominal organs and ileus^(2, 7, 9), and it also

has been reported to cause less third-space sequestration and decreased risk of retrograde ejaculation^(8, 10, 30, 32, 33). A anterolateral approach is often used to achieve exposure of all segments of the lumbar spine. However, a disadvantage of this approach is that one does not access the L5-S1 disc as directly anteriorly as through a paramedian approach. A paramedian approach carries less morbidity than a thoracoabdominal approach, although there is still some potential for abdominal muscle denervation with the approach. Horton et al.⁽¹⁸⁾ describe the morbidity of thoracoabdominal versus lumbar oblique versus paramedian-type approach. There was some morbidity to all three approaches but far less through the paramedian approach.

In all our cases, we used an access surgeon for the retroperitoneal exposure. Open retroperitoneal exposure to the lumbar and lumbosacral vertebral bodies can be performed safely and should be in the repertoire of the orthopedic and vascular or general surgeon. Although some reports indicate that experienced orthopedic spine surgeons can have comparable complication rates, we believe a combined approach maximizes the various surgical skills of the orthopedic and vascular or general surgeon, reducing complication rates in anterior spinal surgery^(12, 17, 26). The exposing surgeon must know generally what operation is to be done, and the spine surgeon must understand the limitations of exposures available to do it. Both surgeons should participate in perioperative care. Just as the spine surgeon teaches the patient about the operation, the exposing surgeon counsels the patient regarding the incision and the possible complications attendant to that. Exposing surgeons can abet protection of

critical structures by assisting during the corrective portion of the operation.

The open retroperitoneal exposure for anterior spine surgery is a technically challenging and rewarding technique. 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.

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