



EPIDUROSCOPY USAGE FOR PAIN MANAGEMENT OF FAILED BACK SURGERY SYNDROME

BAŞARISIZ BEL CERRAHİSİ SENDROMUNUN AĞRI YÖNETİMİNDE EPIDUROSKOPİ KULLANIMI

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SUMMARY:

Purpose: The aim of this study is to evaluate the pain relief ratio of epiduroscopy on patients with failed back surgery syndrome.

Materials-Methods: We inspected 19 patients who are diagnosed as FBSS and 2 patients who were operated for disc herniation that had recurrent discopathy. Data was collected retrospectively from patient's files. Each patient underwent a standard physical examination and was asked to complete a 100-mm visual analogue scale (VAS) questionnaire before epiduroscopy and 1st, 3rd, 6th and 12th months after epiduroscopy.

Results: Mean pre- and post-procedure VAS scores at 1st, 3rd, 6th, and 12th months were 8.44±0.71 (7.24-9.64), 4.67±2.13 (2.45-9.50), 4.34±1.26 (2.12-6.87), 4.28±1.73 (2.65-7.12), 4.68±1.09 (2.53-6.15), respectively. The changes in pre-procedure and post-procedure VAS scores through follow-ups were statistically significant (p<0.001). Post-hoc tests (Wilcoxon signed-ranks test) revealed that the pre-procedure VAS levels were significantly higher than the post-procedure VAS scores. The changes in VAS scores at 1st, 3rd, 6th, and 12th months when compared to the pre-procedure VAS scores were 45.7%, 48.3%, 43.6%, and 44.2%, respectively.

Conclusion: Epiduroscopy could be an option as a final step of pain management for FBSS before palliative procedures, such as spinal cord stimulation or intrathecal drug delivery.

Key Words: Epiduroscopy, Failed back surgery syndrome, Epidural adhesiolysis

Level of Evidence: Retrospective clinical study, Level III

ÖZET:

Amaç: Bu çalışmanın amacı başarısız bel cerrahisi sendromlu hastalarda epiduroskopinin ağrıyı dindirme oranı bulmaya çalışmaktır.

Materyal ve Metod: 19 başarısız bel cerrahi sendromlu hasta ve 2 bel fıtığından ameliyat olmuş ve nüks etmiş hasta incelendi. Veriler hasta dosyalarından retrospektif olarak toplandı. Her hasta standart fizik muayeneden geçti ve 100mm'lik vizüel analog skala skorları prosedür öncesi ve prosedürden 1,3,6 ve 12 ay sonra hesaplandı.

Sonuçlar: İşlem öncesi ve sonrası 1,3,6 ve 12. aylardaki ortalama VAS değerleri 8.44±0.71 (7.24-9.64), 4.67±2.13 (2.45-9.50), 4.34±1.26 (2.12-6.87), 4.28±1.73 (2.65-7.12), 4.68±1.09 (2.53-6.15) olarak hesaplanmıştır. İşlem öncesi ve sonrası değerler arasında istatistiksel olarak anlamlı değişim bulunmuştur (p<0.001). Post-hoc testi (Wilcoxon signed-ranks test) işlem öncesi değerlerin işlem sonrasına göre anlamlı derecede yüksek olduğunu göstermiştir. İşlem sonrası 1,3,6 ve 12. aylardaki VAS skorlarının işlem öncesi değerler arasındaki değişim oranı ise 45.7 %, 48.3 %, 43.6 % ve 44.2 % olarak hesaplanmıştır.

Çıkarım: Epiduroskopi başarısız bel cerrahisi sendromlu hastalarda, spinal kord stimülasyonu ve intratekal ilaç kullanımı gibi palyatif prosedürler öncesi ağrı yönetiminde son basamak olarak önerilebilir.

Anahtar Kelimeler: Epiduroskopi, Başarısız bel cerrahisi sendromu, Epidural adezyonların açılması

Kanıt Düzeyi: Retrospektif klinik çalışma, düzey III

INTRODUCTION:

Epiduroscopic lysis of adhesions for epidural fibrosis is commonly performed procedure for treatment of failed back surgery syndrome (FBSS) and spinal stenosis (SS)¹³. FBSS is defined as persistent or recurrent back and/ or leg pain following an anatomically successful back surgery. SS is defined as anatomical narrowing of the central canal, lateral recesses, or foramina. Many studies have used <12 mm for relative stenosis and <10 mm for absolute stenosis to define lumbar SS in image-based modalities^{3,24}. Prevalence rates of FBSS from past studies of heterogeneous populations provide a wide range, varying 10% to over 40%⁵.

Regardless of whether the epidural scar tissue was created by surgery or a non-surgical reason, the common suggestion for treating FBSS with epiduroscopy is that the presence of epidural fibrosis can both cause pain and prevent delivery of medications for relief. Another proposed mechanism of action for epiduroscopic lysis of adhesions is the wash out of inflammatory cytokines from the affected area¹³. Mechanical dissection of scar tissue at the level of the affected nerve root with the tip of the endoscope and constant instillation of saline may allow restoration of blood supply and nerve root nutrition with possible pain relief and nerve root recovery⁶.

Endoscopic epidural adhesiolysis is a minimally invasive technique for the treatment of axial spine or radicular pain when conservative therapy has failed. We reported the results of 21 patients treated with endoscopic epidural adhesiolysis for FBSS.

MATERIALS AND METHOD:

We inspected 19 patients who are diagnosed as FBSS and 2 patients who were operated for disc herniation that had recurrent discopathy. All 21 patients have had conservative therapies such as medical and physiotherapy and had been operated at least once for lumbar spinal diseases. Data was collected retrospectively from patients files. Inclusion criteria were to be older than age of 40, to have all type of conservative treatments and fail, had been operated for lumbar vertebral level with instrumentation, had been diagnosed as recurrent discopathy, visual analogue scale score ≥ 7 and have not been treated with any epidural injection methods before. Exclusion criteria were pregnancy, coagulation disorders, glaucoma, malignancy, or allergy to radio-opaque contrast medium, local anesthetics, steroids, or hyaluronidase, progressive motor disorders, incontinence and postsurgical pseudomeningocele. All patients treated with epiduroscopic epidural adhesiolysis.

Technique of Epiduroscopy:

The patient was placed in the prone position on a horizontal operating table. A pillow was placed under the abdomen

to minimize lumbar lordosis. Cardiac and saturation monitorization is made and oxygen is given by nasal canule at 3lt/min. Sedation anesthesia was given with intravenous dosage of 0.02-0.05 mg/kg midazolam and 0.1-0.2 mg fentanyl. After sterile preparation of the surgical field, an 18-gauge Tuohy needle is introduced into the sacral hiatus, and its tip was confirmed to be in the caudal epidural space by lateral X-ray or by injection of a contrast medium (iotrolan 10 ml, Isovist 240; Schering, Osaka, Japan) through the needle. A 0.8-mm guide wire is then inserted through the needle under fluoroscopic guidance. Using the Seldinger technique, the 10F introducer (LMC pain treatment kit, EMOTEC®, Italy) with a 12F dilator was advanced over the guide wire into the sacral epidural space. After removal of the dilator and the guide wire, a 0.77mm endoscope (Polydiagnost®) (Figure-1) covered with a 8F video-guided catheter (PolyScope, Polydiagnost®) is introduced into the epidural space through the introducer. The endoscope is gently steered and advanced in a cephalic direction under direct vision in the epidural space. And also, fluoroscopy is used to determine the vertebral level of the endoscope tip(Figure-2).



Figure-1



Figure-2

The epidural space was irrigated and distended by infusion of saline during the procedure to obtain a good visual field. When adhesions or heavy connective tissues were detected in the epidural space, they were broken down by bolus injections of a small amount of saline through the catheter combined with careful and gentle movement of the catheter. When a sufficient field to steer the endoscope could not be obtained, or paraesthesia or resistance was noted, no attempt was made to steer the epiduroscope into such an area. Before and after lysis of adhesions, epidurography was performed to determine if the connective tissue strands interfered with the nerve root. The procedure was terminated when epidurography demonstrated that the contrast medium had reached the affected nerve root sheaths.

At the end of the procedure, lidocaine 1% 8 ml and triamcinolone acetate 40 mg were injected around the area through the catheter. The mean (range) total volume of saline used during the procedure was 298 (100–650) ml. that aspirated at the end of the procedure mostly.

Follow-up:

Each patient underwent a standard physical examination and was asked to complete a 100-mm visual analogue scale (VAS) questionnaire, in which 0 mm represented no pain and 100 mm the worst imaginable pain, for low back pain and leg symptoms on movement during activities of daily living, before epiduroscopy and 1, 3, 6 and 12 months after epiduroscopy. Two patients who had recurrent disc herniations and they did not benefit from the procedure. So on they have had surgery after 3 months of the procedure.

Statistical Analyses

Descriptive data of VAS scores were presented as mean, standard deviation, minimum and maximum. The categorical variable gender was presented as frequency and percent. The comparisons between independent two groups were conducted by Mann-Whitney U test. The changes during the follow-ups were compared by using Friedman test, and when a statistically significant difference was observed, post-hoc analyses were performed by Wilcoxon test. SPSS software version 21 (IBM Inc., USA) was used for the statistical analyses. Statistical significance level was considered as 0.05 in the analyses of this study.

RESULTS:

Mean age of the patients was 63.67 ± 10.28 (43-79) years. Eleven patients were female (52.4%), and 10 were male (47.6%). Mean age of the females and males were 67.73 ± 9.06 years and 59.20 ± 10.08 years, respectively. Females were significantly older than the males ($p=0.048$, Mann-Whitney U test).

Mean pre- and post-procedure VAS scores at 1st, 3rd, 6th, and 12th months were 8.44 ± 0.71 (7.24-9.64), 4.67 ± 2.13 (2.45-9.50), 4.34 ± 1.26 (2.12-6.87), 4.28 ± 1.73 (2.65-7.12), 4.68 ± 1.09 (2.53-6.15), respectively. The changes in pre-procedure and post-procedure VAS scores through follow-ups were statistically significant ($p<0.001$). Post-hoc tests (Wilcoxon signed-ranks test) revealed that the pre-procedure VAS levels were significantly higher than the post-procedure VAS scores.

The comparisons of pre- and post-procedure VAS scores according to gender are presented in Table 2. The analyses revealed that there were no significant differences between males and females regarding pre- and post-procedure VAS scores.

The changes in VAS scores at 1st, 3rd, 6th, and 12th months when compared to the pre-procedure VAS scores were 45.7%, 48.3%, 43.6%, and 44.2%, respectively.

Table-1. Pre-procedure and post-procedure VAS scores (*: Friedman test)

	Mean	Standard Deviation	Minimum	Maximum	p
	8,44	0,71	7,24	9,64	<0.001*
1.month VAS	4,67	2,13	2,45	9,50	
3.month VAS	4,34	1,26	2,12	6,87	
6.month VAS	4,28	1,73	2,65	7,12	
12.moth VAS	4,68	1,09	2,53	6,15	

Table-2. Pre-procedure and post-procedure VAS scores according to gender

	Female				Male				P
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Preprocedure VAS	8,34	0,73	7,24	9,64	8,55	0,70	7,54	9,56	0,573
1.month VAS	4,45	1,61	2,45	7,35	4,92	2,66	2,54	9,50	0,944
3.month VAS	4,39	1,43	2,12	6,87	4,29	1,06	3,13	6,54	0,934
6.month VAS	4,78	1,28	2,65	7,12	3,73	2,05	0,00	5,12	0,258
12.moth VAS	4,85	1,07	2,89	6,15	4,44	1,14	2,53	6,12	0,321

DISCUSSION:

Epiduroscopy also known as periduroscopy, epiduraloscopy, extraduroscopy, and spinal endoscopy is a minimally invasive technique that offers diagnostic and therapeutic advantages in cases of chronic low back pain and radiculopathy. It is especially interesting in patients with FBSS which can be difficult to treat. FBSS, postlumbar surgery syndrome and postlaminectomy syndrome are terms used to describe patients who have undergone lumbar spine surgery with unsatisfactory outcomes¹. Presumed causes of FBSS include facet joint pain, epidural fibrosis, arachnoiditis, discitis, foraminal stenosis, canal stenosis, retained disc fragment, recurrent disc herniation, spinal instability and sacroiliac joint pain⁷. The rate of FBSS can range from 10% to 50%, depending on the evaluation criteria used. Success of surgery rates may decrease to approximately 30% after the second surgery and 15% after the third⁹. In such cases, epiduroscopy can give us a better understanding of the cause of pain with visualization and improve the quality and efficacy of steroid injection or lysis of adhesions simultaneously².

All patients had low back and leg symptoms with positive postural factors, that were not cured by conservative therapy consisting of physiotherapy, bracing, non-steroidal anti-inflammatory drugs (NSAIDs) and sporadic epidural injection of local anesthetics with or without steroids⁶. Patients with FBSS and symptomatic lumbar spinal stenosis frequently have

large amounts of scar tissue surrounding nerve roots, which forms as a result of nerve root inflammation, chronic chemical radiculitis, extrusion of nucleus pulposus and following surgical bleeding from spinal surgery^{12,17,19}. Epidural scar tissue is thought to interfere with nerve root nutrition and blood supply and prevents the steroid solution from coming into contact with the nerve root²⁰.

Endoscopic epidural adhesiolysis not only include adhesiolysis and washout of inflammatory cytokines, but also lavage of the epidural space, suppression of ectopic discharge from injured nerves and enhancing blood flow to ischemic nerve roots¹³. Local anesthetics induce sympathetic nerve blockade and improve blood flow to the ischemic neural elements²⁸. Steroids reduce inflammatory edema of the injured nerve root and additionally improve intraneural blood flow²⁶. Fibrosis is thought to cause leg pain by interfering with the mobility of the dural sleeves of the spinal roots¹⁶. Suggestion is that mobility of the nerve roots may be restored after epiduroscopy and this may contribute to the long-term pain relief, exceeding the intrinsic effective duration of epidural injectates⁹.

As for any procedural intervention, bleeding, meningitis and nerve damage are some of the general complications associated with epiduroscopy²³. The added risks associated with entering the epidural space include cerebral spinal fluid leakage, subsequent post-dural puncture headache, neurological sequel resulting from a hematoma or compression from large

volume inject administration like acute monoplegia, a bent needle tip, torn catheters during withdrawal, sheared catheter remnant, intrathecal placement of catheter, epidural abscess and neurogenic bladder^{8,11,18,21,25}. We have no general or severe complication in our series.

At the present time, only a few prospective studies have been conducted to establish the benefits of epiduroscopy. Bosscher et al. showed with their 139 patient series with prospective study that lumbosacral epiduroscopy predicts outcome of treatment accurately in the majority of patients and they suggested that information obtained through epiduroscopy may carry significant diagnostic and prognostic value⁴. Geurts et al reported a prospective study included 20 patients with the relief of pain results 55% at third, 40% at sixth, 35% ninth and 35% at twelfth months⁷. Richardson et al. inspected 38 patients prospectively and at the end of 12-month period results showed statistically significant reductions in pain scores and disability¹⁹. Although many retrospective small series studies have described the clinical effectiveness and cost-effectiveness of epiduroscopy in patients with herniated disks or severe low back pain after back surgery^{9,14,22}. Although there are various reports as interlaminar approach with endoscopy, epiduroscopic laser neural decompression and ozone application by endoscopy^{2,10,15}. Our results are supporting the literature pain relief ratios on the treatment of FBSS with epiduroscopy.

Epiduroscopy has great value in the diagnosis of nerve root pathology and is more sensitive than gadolinium enhanced magnetic resonance imaging for visualizing scar tissue²⁷. The role of epiduroscopic adhesiolysis in patients with epidural scar tissue affecting nerve root nutrition warrants further investigation. The better outcome obtained in some patients with the epiduroscopy technique can be related to direct visualization of the pathological areas, better diagnosis, more accurate lysis of adhesions, and direct application of steroids and hyaluronidase at the site of the pathology.

Although definite evidence cannot be drawn from our study about the efficacy of the technique without having a control group, the decrease in median VAS evaluated in our study suggests that epiduroscopy could be an option as a final step of pain management for FBSS before palliative procedures, such as spinal cord stimulation or intrathecal drug delivery.

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