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The place of epiduroscopy in the management of low back pain after lumbar surgery

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ABSTRACT

Objective: The present study aims to evaluate the outcomes of epiduroscopy used in the diagnosis and treatment of low back pain in patients having previously undergone lumbar surgery. *Materials and Methods:* In the present study, patients who presented to Neurosurgery Clinic at Kahramanmaraş Sütçü İmam University due to chronic low back and leg pain between December 31, 2017 and August 1, 2022, were retrospectively reviewed. Patients with persistent pain after having undergone spinal surgery for spinal stenosis and lumbar discopathy were included in the study. According to the VAS (Visula Analague Scale) pain was evaluated before the procedure, immediately after the procedure 0th, 15th, 30th, 90th days after the procedure. Functionel status was examined according to Oswestry Disability Index (ODI). The satisfaction of the patients was evaluated according to the Odom's criteria on the 90th day after the procedure. *Results:* Hundred and twenty-seven patients were included in the study. The patients were evaluated into two groups as patients with spinal stenosis (Group SS) and patients with lumbar disc herniation (Group LDH). The difference between the groups in age, after procedure 30th day ODI scores and post procedure 30th VAS scores was significant. Considering all the patients according to the Odom's criteria, 87 patients (62.7%) rated their satisfaction as excellent or good. *Conclusion:* In the management of persistent low back pain after spinal surgery, epiduroscopy offers a strong alternative to repeat surgery due to the fact that it is a less invasive procedure and it provides good outcomes in terms of patient satisfaction.

Keywords: Epiduroscopy, previous lumbar surgery, Odom's criteria, Oswestry Disability Index, Visual Analogue Scale

1. INTRODUCTION

According to studies conducted in the world, low back pain ranks sixth among diseases seriously affecting people's lives and the ability to perform work tasks. It is the most important reason responsible for the years lived with disability in the world. It is also the most important cause of disability in the world (Buchbinder et al., 2013). Lifetime prevalence of low back pain is 38.9% (Hoy et al., 2012). The lifetime prevalence of lumbosacral radiculopathy in humans is 3-5% (Tarulli and Raynor, 2007).

The vast majority of patients with low back pain usually recover without any treatment. Some patient groups may still experience low back pain even after one year (Magalhaes et al., 2012). Treatment-independent improvement occurs within 6-8 weeks in 80% of patients with acute low back pain. Pain may recur within the first year in 38% of patients with acute low back pain, 41% of patients with subacute low back pain and 81% of patients with chronic (Magalhaes et al., 2012).

Chronic low back pain is usually observed in patients with post-traumatic and degenerative spinal problems. Lumbar discectomy and decompression surgery performed due to lumbar degenerative disc disease or narrow canal causing low back pain are currently the most frequently performed surgical procedures (Weinstein et al., 2006). The 'Failed Back Surgery Syndrome' is defined as the pain persisting after lumbar spinal surgery or appearing after the treatment performed to relieve pain. Failed Back Surgery Syndrome can be caused by many factors. Previous studies have evaluated the factors that cause Failed Back Surgery Syndrome and these factors were classified as preoperative, perioperative and postoperative (Hussain and Erdek, 2014). Various methods are used to relieve low back pain persisting after lumbar surgery. Among these methods, medical treatment and alternative treatment methods constitute the first-line therapies. Then, more advanced procedures ranging from noninvasive methods to surgery can be performed depending on the clinical condition of the patient (Pop et al., 2010; Unlu et al., 2008).

Epiduroscopy is a method that can be selected before proceeding with surgery. With the advances in imaging systems and the development of smaller endoscopes, epiduroscopy has now taken its place among the current treatment methods. Epidural adhesiolysis and epidural injections can be performed by visualizing the epidural region with epiduroscopy (Jo and Yang, 2013; Ruetten et al., 2003). The present study aims to show that persistent pain in patients having previously undergone lumbar spinal surgery can be relieved by epiduroscopy, which is a less invasive method and patients can return to normal life quickly. This approach can remove the burden of repeat surgery and the patients lead a pain-free life.

2. MATERIALS AND METHODS

After obtaining the approval of the local ethics committee (Kahramanmaraş Sütçü İmam University Medical Research Ethics Committee, Date: 29.03.2022 Session: 2022/11 Protocol: 05), patients presenting to the Neurosurgery Clinic at Kahramanmaraş Sütçü İmam University with leg pain and chronic low back pain between December 31, 2017 and August 1, 2022, were retrospectively reviewed. Patient data were obtained from the data recorded in the hospital automation system and the patient charts in the hospital archive.

The study included patients undergoing epiduroscopy due to persistent pain after having undergone spinal surgery for spinal stenosis and lumbar discopathy. Patients without a history of surgery, patients who have directly undergone repeat surgery and patients with missing data were excluded from the study (Figure 1). Pain was evaluated according to the VAS (Visual Analogue Scale) scores recorded on the patient charts before the procedure, immediately after the procedure and at days 15, 30 and 90 after the procedure and functional status was evaluated according to the Oswestry Disability Index (ODI). Post-procedural satisfaction was evaluated at day 90 after the procedure using the Odom's criteria.

Surgical Technique

Using a sterile technique, epiduroscopy is performed in supine position in the guidance of fluoroscopic under sedoanalgesia. Under fluoroscopic imaging, a guide needle is first inserted through the sacral hiatus. Then, a guide wire is passed through the needle, the needle is withdrawn and the introducer is placed over the wire. The endoscope is placed through the introducer and the target area is accessed with the help of a fiber optic endoscope. In the meantime, the target area is irrigated with isotonic solution, and available adhesions are removed for better visualization. If desired, injection can be made and the procedure is completed. Studies have shown that successful results are obtained with epiduroscopy (Lee et al., 2014).

Statistical analysis

IBM SPSS (Statistical Package for Social Sciences) version 20.0 was used for statistical analysis. Using the Gpower 3.1.1 software, it was calculated that at least 112 patients are required with for the study with an α of 0.05 and a power of 95%. The Shapiro-Wilk test and the homogeneity of variance test were used to check if the data used in the study was normally distributed. A chi-square test was used to examine categorical data, the student's t-test was used to compare numeric data between the groups and the repeated measures ANOVA was used to examine repeated measures within a group. Categorical data was expressed as number (n) and percentage (%), while numeric data was expressed as mean ± standard deviation (SD) (minimum – maximum values). A p value less than 0.05 was defined statistically significant.

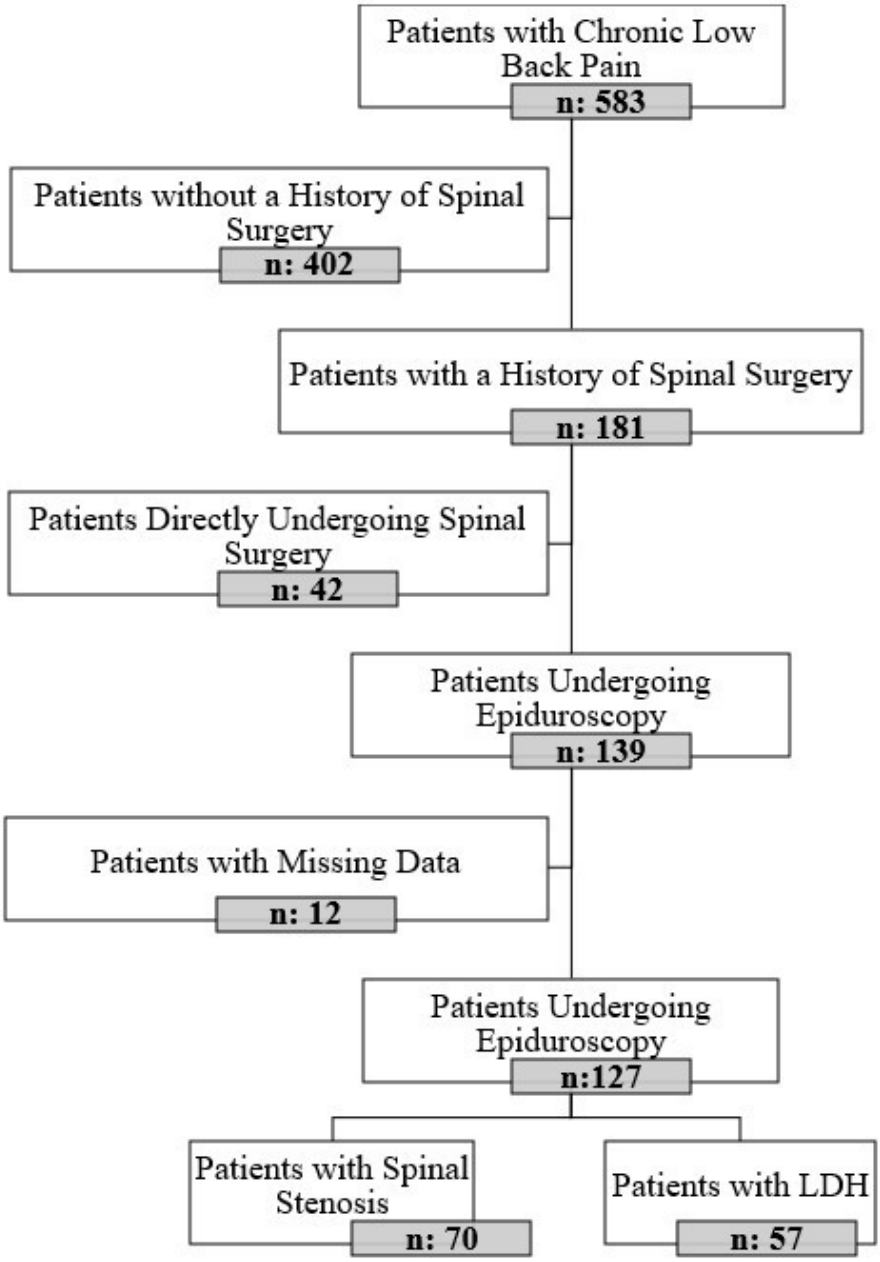

Figure 1 Flowchart of the study design

3. RESULTS

Hundred and twenty-seven eligible patients were evaluated. The mean age of the patients was 61.24 ± 13.43 (28 – 91) years. Of all the patients, 43 were male (33.9%) and 84 were female (66.1%). The patients were evaluated in two groups according to the pathologies detected by imaging methods: Patients with spinal stenosis (Group SS) and patients with lumbar disc herniation (Group LDH) (Table 1).

A comparison between the groups revealed a statistically significant difference in terms of age, and VAS scores and ODI scores at 30 days after surgery (p values are <0.001, 0.047 and 0.011, respectively), whereas no statistically significant difference was found between the groups in terms of other numeric parameters (age, VAS scores before and at 0, 15 and 90 days after surgery, ODI scores before and at 0, 15 and 90 days after surgery), gender and patient satisfaction (p >0.05) (Table 2). In terms of repeated measurements of VAS scores and ODI values within the group, all post-procedural values were found to be significantly lower than pre-procedural values (p<0.001 for preoperative VAS versus postoperative VAS at day 0; p<0.001 for preoperative VAS versus postoperative VAS at day 15; p<0.001 for preoperative VAS versus postoperative VAS at day 30; p<0.001 for preoperative VAS

versus postoperative VAS at day 90; p<0.001 for preoperative ODI versus postoperative ODI at day 0; p<0.001 for preoperative ODI versus postoperative ODI at day 15; p<0.001 for preoperative ODI versus postoperative ODI at day 30; and p<0.001 for preoperative ODI versus postoperative ODI at day 90 (Table 2).

Table 1 Demographic data of all patients included in the study

Age (years)		61.24 ± 13.43 (28 – 91)
Gender (n%)	Male	43 (33.9%)
	Female	84 (66.1%)
	Total	127 (100%)
Pathology	Spinal Stenosis	70 (55.1%)
	Lumbar Disc Herniation	57 (44.9%)
	Total	127 (100%)

Table 2 Satisfaction rates of patients in the groups according to age, VAS scores, ODI scores and the modified Odom's criteria

		Group SS	Group LDH	*p* value
Age (year)		71.12 ± 7.79 (52 – 91)	49.11 ± 7.68 (28 – 62)	<0.001[a]
Gender	Male	19 (15%)	24 (18.9%)	0.076
	Female	51 (40.2%)	33 (26%)	
	Total	57 (44.9%)	70 (55.1%)	
VAS	Preoperative	7.52 ± 1.36 (4 – 10)	7.19 ± 1.37 (5 – 9)	0.171
	Postoperative day 0	6.03 ± 1.19 (3 – 8)	5.75 ± 1.04 (4 – 8)	0.169
	Postoperative day 15	2.9 ± 0.93 (2 – 6)	2.74 ± 0.92 (2 – 6)	0.325
	Postoperative day 30	1.89 ± 0.75 (1 – 4)	1.63 ± 0.67 (1 – 3)	0.047[a]
	Postoperative day 90	3.04 ± 0.82 (2 – 5)	2.81 ± 0.85 (1 – 5)	0.119
p value		<0.001[b]	<0.001[b]	
ODI	Preoperative	60.11 ± 12.81 (30 – 88)	56.84 ± 12.07 (38 – 78)	0.142
	Postoperative day 0 Day	44.73 ± 10.62 (26 – 68)	42.18 ± 9.65 (24 – 68)	0.159
	Postoperative day 15 Day	22.49 ± 7.52 (10 – 47)	20.86 ± 7.57 (11 – 48)	0.229
	Postoperative day 30 Day	14.69 ± 6.37 (5 – 33)	12.02 ± 5.31 (5 – 26)	0.011[a]
	Postoperative day 90 Day	24.03 ± 7.05 (12 – 42)	21.89 ± 7.13 (7 – 42)	0.06
p value		<0.001[b]	<0.001[b]	
Patient Satisfaction According to the Modified Odom's Criteria	Excellent	10 (5.2%)	6 (3.1%)	0.576
	Good	44 (26.6%)	37 (19.8%)	
	Moderate	16 (8.3%)	13 (8.3%)	
	Poor	0 (0%)	1 (1%)	
	Total	70 (55.1%)	57 (44.9%)	
a: According to the student's t-test				

b: According to the paired samples t-test

Considering all patients, it was seen that patient satisfaction was excellent and good in 87 patients (62.7%) and moderate and poor (37.3%) in 40 patients according to the Odom's Criteria (Table 2 and Figure 2).

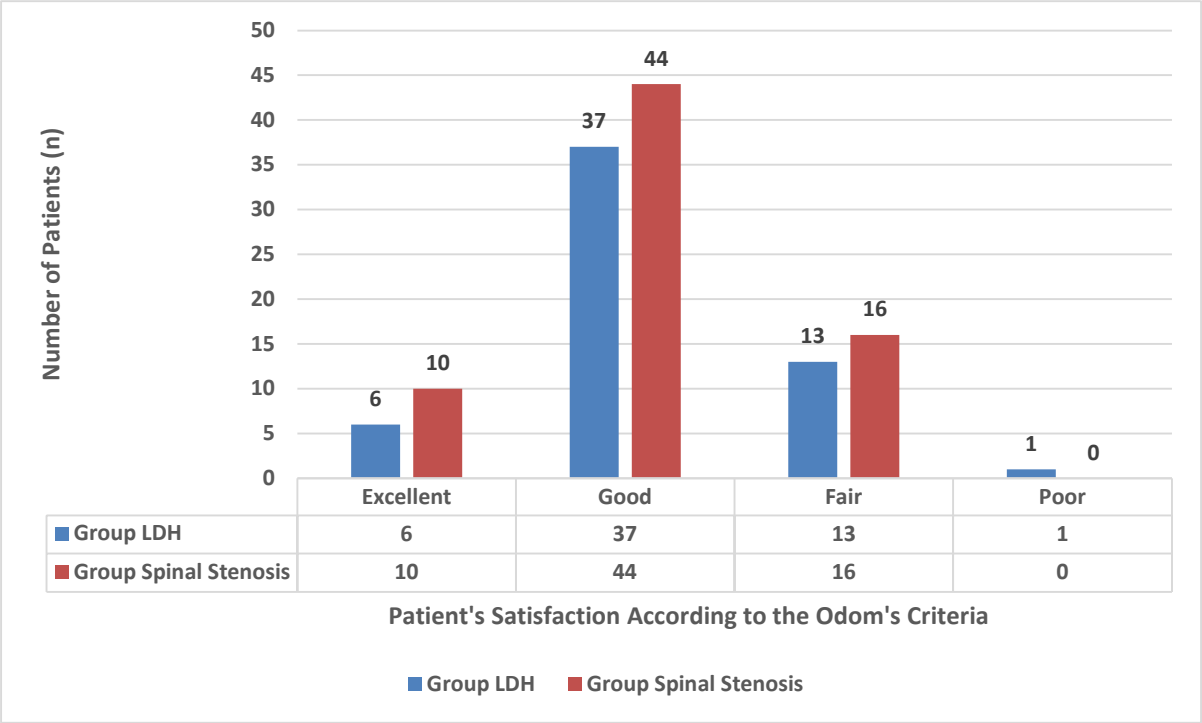

Figure 2 Odom's Criteria results of the study cases

4. DISCUSSION

The management of low back pain after spinal surgery is an important and challenging situation for spinal surgeons. The failed back surgery syndrome is defined as the persistence of pain and the inability to achieve satisfactory outcomes after surgery (Avellanal et al., 2014). The causes of failed back surgery syndrome include arachnoiditis, epidural fibrosis, discitis, foraminal stenosis, spinal stenosis, recurrent disc herniation and spinal instability (Geurtz et al., 2002). The probability of developing failed back surgery syndrome after spinal surgery can vary between 10% and 50%.

The success of the surgery may decrease after the second and third surgery (Igarashi et al., 2004). Treatment methods such as medical therapies and physical therapies are used to relieve pain in patients with persistent pain and impaired life quality after undergoing spinal surgery. Minimally invasive methods such as epiduroscopy can be attempted in patients with intractable complaints. The cause of pain can be better understood by visualizing the epidural space with epiduroscopy. Pathologies such as epidural fibrosis and adhesions can be visualized. At the same time, steroid injections can be delivered into the target area that can be further expanded by removing the existing epidural fibrosis (Avellanal and Diaz-Reganon, 2008).

All of our patients had lower back pain and leg pain that was aggravated by movement and standing. The patients did not benefit from post-surgical medical therapies, physical therapy methods and epidural injections (Dashfield et al., 2005). One of the main causes of failure or the persistence of complaints in patients having previously undergone spinal surgery is epidural fibrosis that occurs around the large nerve roots and within the canal (Kayama et al., 1996; La-Rocca and Macnab, 1974; Olmarker et al., 1993; Richardson et al., 2001). Epidural fibrosis causes procedural failure by preventing the infiltration of epidural steroid injection to the nerve root (Rydevik et al., 1984).

In our patients, epiduroscopy-guided adhesiolysis was performed in the areas with fibrosis and steroids and local anesthetics were injected thereafter. During epidural adhesiolysis, epidural space was also irrigated to wash off inflammatory cytokines and blood flow was maintained by removing pressure on nerve roots (Lee et al., 2014). Local anesthetic injections performed during the procedure prevent ischemia by increasing the blood flow to the neural tissue through sympathetic blockage (Parr et al., 2012; Yabuki and Kikuchi, 1995; Yun et al., 2012). Steroids, on the other hand, reduce the edema and relieve the pressure on the nerve root

(Bosscher et al., 2002; Parr et al., 2012; Winnie et al., 1972). In patients undergoing epiduroscopy, these changes in the nerve roots contribute to the reduction in pain. Complications may also occur during epiduroscopy procedure. These complications may include cerebrospinal fluid leakage, infection, bleeding, nerve damage and problems caused by the catheter itself, along with damage to the epidural space (Ho and Manghnani, 2008; Justiz et al., 2010; Perkins et al., 2003; Ryu et al., 2012; Wagner et al., 2006).

In the present study, two patients suffered from cerebrospinal leakage as a complication of the procedure. During the follow-up, the leakage has stopped and no infection or additional deficit occurred. In our patients, Visual Analogue Scale (VAS) was used to evaluate pain after epiduroscopy and the Oswestry Disability Index (ODI) was used to evaluate functional status (Lee et al., 2014; Mumcu and Erdoğan, 2019). As a result, a significant decrease was found. Similar studies have also reported significant decreases (Mumcu and Erdoğan, 2019). The Odoms criteria were used to evaluate satisfaction and the satisfaction rate was found to be significantly higher in the patients.

5. CONCLUSION

In conclusion, persistent low back pain after spinal surgery is an important problem for patients and the surgeons. Epiduroscopy is a strong alternative to repeat surgery in these patients. As we mentioned in our study, the procedure is minimally invasive and the results are quite satisfactory in terms of pain management and patient satisfaction. Thus, it increases the quality of life of patients and enables faster and more comfortable return to normal life.

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Author Contributions

ECK: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing-original draft.

ZY: Resources, Supervision, Writing-review & editing.

Ethical approval

The study was approved by the Medical Ethics Committee of Medical Faculty of Kahramanmaras Sutcu Imam University (29.03.2022 Session: 2022/11; Decision No: 05). (Ethical approval code: 2022/11:05).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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