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Research Article

Treatment of Temporary Erectile Dysfunction (ED) and Overactive Bladder (OAB) Due to Spinal Lesions by Epidural Catheter Therapy as A Spinal Intervention: Retrospective Data Analyses of the Clinical Outcomes

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Abstract

Background: Chronic spinal pain resulting from central disc herniation and degenerative spinal disorders could be the cause of temporary Erectile Dysfunction (ED) and/or Overactive Bladder (OAB) and increased healthcare utilization worldwide. Although conservative management remains the first-line treatment, a considerable proportion of patients develop persistent symptoms that are refractory to standard therapeutic approaches.

Objective: To assess the clinical effectiveness, safety, and long-term outcomes of percutaneous Epidural Catheter Treatment (ECT) in patients with central disc herniation, nerve root compression, spinal canal stenosis, postoperative syndrome assessment (failed back surgery syndrome), and epidural adhesion formation, and to identify factors associated with favorable clinical outcomes. The purpose of this descriptive research is to provide a systematic framework for the application of epidural interventions in the management of these two temporary accompanying phenomena. These recommendations are based on the best available evidence regarding the effectiveness and safety of epidural and related interventional procedures for spinal pain and lesions, including symptoms arising from central disc herniation, spinal stenosis, and post-surgical pain syndromes. The aim of this study was to evaluate the clinical effectiveness, safety, and long-term outcomes of percutaneous ECT in patients with central disc herniation and related spinal disorders. We hypothesized that this intervention would result in significant and sustained symptoms reduction with a very low complication rate and reduced need for surgical intervention.

Methods: This retrospective statistical analysis included 200 patients with ED/OAB out of total 1,850 patients with radiologically confirmed lumbar central disc herniation who were treated with a percutaneous Epidural Catheter (ECT) at Hamburg's Spine [27], Neurosurgery & Pain Management Center, in Hamburg/Germany, between 2014 and 2024. Demographic characteristics, clinical presentation, imaging findings, and treatment-related variables were systematically collected. Erectile Dysfunction, Overactive

Bladder (OAB) along with Pain intensity was evaluated using the International Index of Erectile Dysfunction (IIEF) 1-5 plus 15 (SHIM scala) and International Prostate Symptoms Score (AUA-IPSS), and Visual Analog Scale (VAS), while functional status was assessed using the Oswestry Disability Index (ODI). Assessments were performed at baseline and during follow-up at 1 week, 2 weeks, 6 weeks, 3 months, 6 months, 1 year, 3 years, and 5 years after the intervention. Statistical analyses were conducted using SPSS software, with statistical significance defined as $p < 0.05$. All procedures were performed on an outpatient basis without the need for hospital admission or overnight observation. As a preventive measure against infection, patients received standardized antibiotic prophylaxis administered twice daily for five days, starting on the evening before the procedure according to the institutional protocol. Clinical follow-up was supplemented by serial laboratory evaluations, including pre- and post-procedural measurement of C-Reactive Protein (CRP), to assess for potential infectious complications.

Results: A total of 200 patients were included in the study (mean age 54 years). Significant improvement was observed following treatment. VAS pain scores decreased from 8.29 ± 1.24 to 2.62 ± 1.63, with a mean reduction of 5.67 ± 1.58 points ($t(199) = 50.88$, $p < 0.001$; Cohen's $d = 3.60$). ODI scores also improved markedly, decreasing from 73.89 ± 12.19 to 20.10 ± 12.44, with a mean reduction of 53.79 ± 13.25 points ($t(199) = 57.41$, $p < 0.001$; Cohen's $d = 4.06$). Only 25% of patients required surgery during follow-up. Younger age and absence of motor deficit were identified as independent predictors of successful conservative treatment. With relation to ED showed improvement of SHIM from 7±2.2 to 23±3.3 and IPSS from 19±1.4 to 8±2.8 with $p < 0.005$ and $p < 0.001$ respectively. ECT resulted in a statistically significant reduction in described symptoms and a marked improvement in functional outcomes. Overall clinical improvement was observed in approximately 75-85% of patients ($p < 0.001$). Younger age and the absence of significant neurological deficits were independently associated with superior clinical outcomes. No clinically relevant infections or major procedure-related complications were identified during long-term follow-up

Conclusion: Percutaneous ECT represents a safe and effective minimally invasive therapeutic option for patients with lumbar central disc herniation and chronic spinal pain syndromes. The intervention provides substantial and sustained pain relief, voiding and erection improvement with reported pain reduction of up to 75-80%, and may significantly decrease the need for surgical intervention in appropriately selected patients.

Keywords: Central Disc Prolapse; Epidural Catheter Treatment; nerve root compression, Spinal canal Stenosis, Temporary ED and OAB, Pain Management

List of Abbreviations: CRP: C-reactive protein; CT-Computed tomography; ECT-Epidural Catheter Therapy; VAS-Visual Analog Scale; ODI-Oswestry Disability Index; ED- Erectile Dysfunction; OAB-Overactive Bladder; WHO-World Health Organization; IPSS- International Prostate Symptoms score; IIEF-International Index of Erectile Function; SHIM- Sexual Inventory In Men

Introduction

Chronic spinal pain is one of the most prevalent chronic conditions worldwide and constitutes a major source of disability, reduced quality of life, and economic burden. Central disc herniation and degenerative spinal disorders commonly lead to pain in the spine and neuroforaminal stenosis and recessed stenosis due to mechanical compression and inflammatory irritation of neural structures. Multiple anatomical components have been identified as potential pain generators, including intervertebral discs, nerve roots, facet joints, sacroiliac joints, ligaments, epidural tissues, and paraspinal musculature. In a subset of patients indicated here, complaints accompanied as erectile dysfunction and overactive bladder with urgency voiding. However, a subset of patients fails to achieve sustained symptom relief despite optimized conservative and surgical therapy. Epidural catheter was developed in the late 1980s by Dr. Gabor B. Racz at the Texas Tech University Health Sciences Center. This technique has since been recognized as a pioneering advancement in the field of interventional pain management. Initially, the procedure involved the injection of normal saline alone through the ECT to achieve mechanical lysis of adhesions. A minimally invasive interventional technique aims to mechanically break up epidural adhesions that may trap nerve roots or impede drug delivery. Professor. Dr. Arous at this center developed this technique to include the administration of saline solutions, enzyme agents such as hyaluronidase, and low doses of corticosteroids via catheter to enhance therapeutic efficacy and minimize side effects. This clinical evidence aim to support logical and systematic framework for the application of epidural interventions in the treatment of spinal pain. These recommendations are based on the best available evidence regarding the efficacy and safety of epidural interventions and related interventional procedures for the treatment of spinal pain, including pain caused by herniated central discs, spinal stenosis, and post-operative pain syndromes. We hypothesized that percutaneous ECT would result in significant and sustained pain and other functional problems reduction and functional improvement in patients with central disc herniation, intervertebral disc protrusion, nerve root compression, spinal canal stenosis, and postoperative pain syndrome with a low rate of complications and reduced need for surgical intervention.

Review of Evidence

Observational and controlled studies have demonstrated clinically meaningful pain relief in a substantial proportion of patients undergoing percutaneous epidural adhesiolysis, with reported improvement rates approaching 80%. We hypothesized that percutaneous ECT would result in significant and sustained pain reduction and functional improvement in patients with central disc herniation, intervertebral disc protrusion, nerve root compression, spinal canal stenosis, with a low rate of complications and reduced need for surgical intervention.

Methods

Study Design

This retrospective observational study was conducted at our center. Data analyses contain retrospective review and statistics.

Study Population

Patients mean age was 54 years with MRI-confirmed Central lumbar disc herniation, neuroforaminal stenosis and recessal stenosis, nerve root compression or spinal canal stenosis were included. Patients with progressive neurological deficits or cauda equina syndrome were excluded. The present statistical analysis was conducted using random sampling of patients treated over the last four years, in accordance with accepted standards for observational clinical research.

Inclusion Criteria

Adult patients were eligible for inclusion if they met the following criteria: radiologically confirmed disc herniation, disc protrusion, nerve root compression, spinal canal stenosis, epidural adhesion formation, or failed back surgery syndrome; presence of persistent radicular and/or axial spinal pain refractory to conservative therapy; and clinical stability without progressive neurological deterioration. Patients' mean age was 54 years with MRI-confirmed central lumbar disc herniation, neuroforaminal stenosis and recessed stenosis, nerve root compression or spinal canal stenosis were included. Patients with progressive neurological deficits or cauda equina syndrome were excluded. The present statistical analysis was conducted using random sampling of patients treated over the last four years, in accordance with accepted standards for observational clinical research.

Inclusion Criteria

Adult patients were eligible for inclusion if they met the following criteria: radiologically confirmed central disc herniation, nerve root compression, spinal canal stenosis, epidural adhesion formation; presence of persistent radicular and/or axial spinal pain refractory to conservative therapy; and clinical stability without progressive neurological deterioration. In this group we considered subjects with erectile dysfunction and/or overactive bladder or Lowe Urinary Tract Symptoms.

All participants underwent a comprehensive urological evaluation performed by board-certified urologists. The assessment excluded the presence of any primary urological pathology. Therefore, all lower urinary tract symptoms (LUTS) observed in the study cohort were considered to be secondary to neurological dysfunction rather than attributable to primary urological disease. The standardized urological assessment included urinalysis to exclude urinary tract infection (UTI), measurement of post-void residual (PVR) urine volume, ultrasonographic evaluation of the kidneys and urinary bladder when clinically indicated, and comprehensive urodynamic studies to objectively assess lower urinary tract function. All diagnostic evaluations were performed in accordance with the latest European Association of Urology (EAU) Guidelines on Neuro-Urology (2026) and the American Urological Association/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction (AUA/SUFU) Guideline on Adult Neurogenic Lower Urinary Tract Dysfunction (Diagnosis and Evaluation; Treatment and Follow-up), which represent the current international standards for the evaluation and management of neurogenic lower urinary tract dysfunction. [21,22,23]

Exclusion Criteria

Patients were excluded if they had known coagulation disorders (including hemophilia or other bleeding diatheses), active local or systemic infection, inflammatory or autoimmune disease affecting the spine, significant vascular pathology, and pregnancy, known hypersensitivity to any component of the treatment protocol, progressive neurological deficits, or cauda equina syndrome. Epidural catheterization was deliberately avoided in patients with increased risk of bleeding or infection to ensure procedural safety.

Diagnoses

This procedure was applied to patients diagnosed with a range of spinal pathologies, including intervertebral disc protrusion, nerve root compression, spinal canal stenosis, postoperative pain syndrome (failed back surgery syndrome), lumbar disc herniation, and epidural adhesion formation. In this group we considered subjects with erectile dysfunction and/or overactive bladder or Lowe Urinary Tract Symptoms.

Treatment Protocol

At our center, the protocol includes the administration of normal saline combined with hyaluronidase and very low-dose corticosteroids [1,12,2,8,4], in addition to Osmofundin 15% N (Mannitol) and Ropivacaine 2mg/ml for analgesia. This multimodal approach aims to reduction of pressure, edema, and inflammation on nerve roots, in addition to the fact that enzymes aid in making the herniated nucleus pulposus smaller and softer over time. The procedure is performed under CT guidance [14] during the first session to ensure highly accurate access to the

targeted anatomical region. Subsequently, over the following four days, the same medications are administered twice daily with a three-hour interval between injections. Although the foundational protocol was designed to mechanically break down adhesions using catheter-directed fluid and medication [12,8,4], in our practice the procedure has been further refined by the addition of agents such as hyaluronidase, very low-dose corticosteroids, normal saline, and adjunctive analgesics prior to consideration of surgical intervention in patients with pain related to disc herniation, spinal stenosis, or nerve root compression. Observational and controlled studies have demonstrated clinically meaningful pain relief in a substantial proportion of patients undergoing percutaneous epidural adhesiolysis, with reported improvement rates approaching 80% in selected cohorts [2,12,8,4]. In addition, patients with secondary conditions resulting from spinal stenosis, including chronic radicular pain and functional impairment, were also included in the treatment protocol [25]. .

Post-Treatment Rehabilitation

Following completion of ECT, all patients were advised to participate in physical therapy [26], swimming, and regular exercise as part of a comprehensive rehabilitation program. Following ECT, patients who demonstrated insufficient clinical improvement and declined surgical intervention received additional supportive pain management in conjunction with structured physical therapy and supervised exercise programs. In patients who demonstrated clinical improvement following ECT, the supportive pharmacological treatment plan was implemented for a duration ranging from one week to one month, depending on individual pain severity and clinical response. Analgesic therapy in this subgroup was administered in a stepwise manner based on the principles of the World Health Organization (WHO) analgesic ladder. Patients with mild residual pain were treated with non-opioid analgesics (step 1). In cases of moderate pain, medium potency opioids such as Tilidine Hydrochloride were prescribed (step 2). Patients with severe pain received high potency opioids, including oxycodone (step 3). In refractory or persistent cases, advanced pain management strategies were employed, including transdermal opioid patches and, in selected patients, implantation of a subcutaneous pain pump for continuous analgesic delivery. In addition, muscle relaxants were prescribed in selected patients presenting with paraspinal muscle spasm in order to reduce muscle-related pain, improve mobility, and support functional rehabilitation. This selective multimodal post-interventional approach aimed to optimize pain control, facilitate functional recovery, and support rehabilitation in patients who did not achieve sufficient symptom relief following ECT alone.

Intervention Description

Epidural Catheter involves the placement of a catheter into the epidural space with the active aim of relieving nerve root compression and improving nerve root mobility, particularly in cases involving extruded components of the intervertebral disc. Catheter insertion was performed using either the sacral canal or the interlaminar to reach the targeted anatomical region. The procedure lasted approximately 10-20 minutes and was performed under light sedation with CT guidance [2,6]. The catheter remained in the epidural space for a duration of five days. This is followed by a standardized injection protocol designed to mechanically decompress the affected structures, expand the involved epidural tissue layers, and facilitate optimized targeted drug delivery. Following medication injection, the catheter was secured and covered with a sterile dressing to maintain aseptic conditions. This technique has been extensively described in the literature and is commonly employed in patients with chronic spinal pain who are refractory to conventional conservative treatment modalities[12,14].

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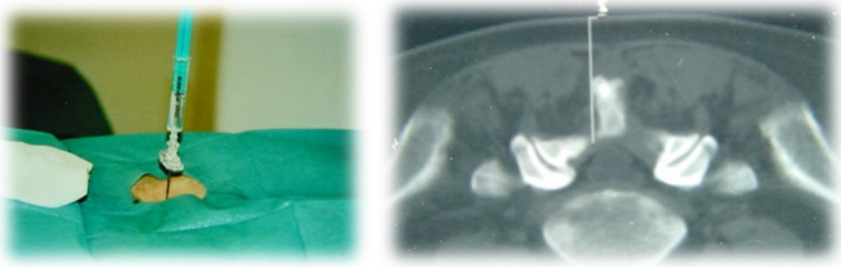

Figure 0

This is MRI Picture From X Patient Pre and Post Tratment who Pre is (Figure 1) and Post is (Figure 2).

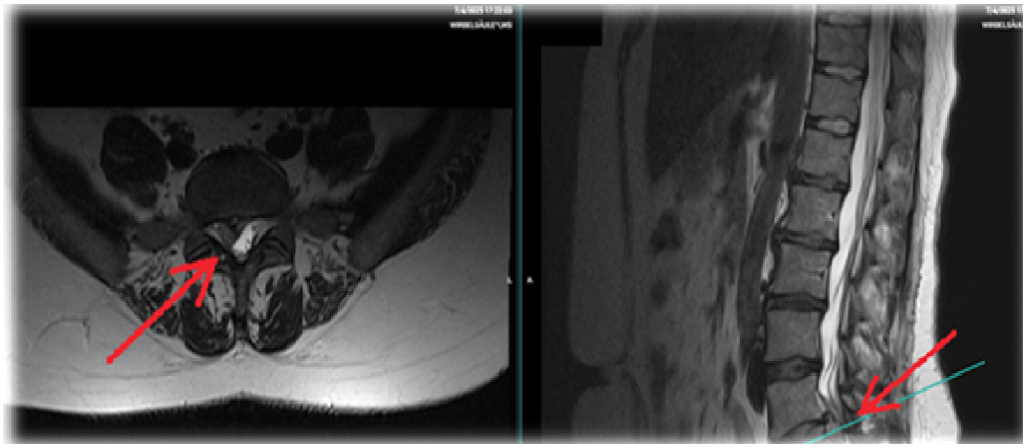

Figure 1 Pre

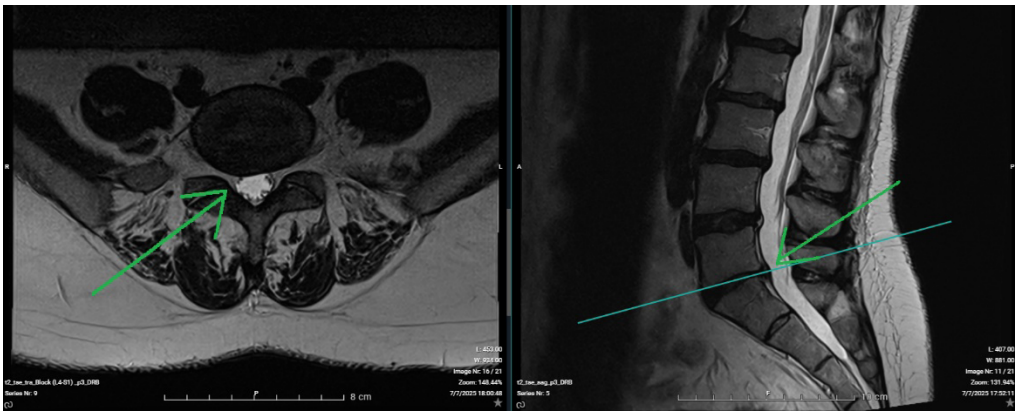

Figure 2 Post

Outcome Measures

Primary outcomes included pain reduction assessed by VAS and ODI. Secondary outcomes included the need for subsequent surgical intervention. Follow-up was conducted using standardized outcome assessment principles in line with WHO recommendations for the evaluation of acute and chronic pain and clinical outcome reporting [3,13]. Patients were assessed at predefined time points, including baseline (pre-treatment), 1 week, 2 weeks, 6 weeks, 3 months, 6 months, 1 year, and during long-term follow-up when available Pain intensity was evaluated using the VAS, which is an internationally validated instrument recommended for pain-related outcome measurement. Clinical improvement, adverse events, and the need for additional interventions were systematically documented at each follow-up visit. This structured follow-up protocol allowed consistent monitoring of treatment effectiveness, functional recovery, and safety over time. All patients underwent pre- and post-treatment evaluation and follow-up by consultant urologists, with follow-up assessment including Magnetic Resonance Imaging (MRI). Post-treatment clinical evaluation demonstrated significant improvement in the patients' clinical condition following the intervention.. With regards to SHIM and IPSS records had been documented prior and after treatment we registered SHIM improvement from 11 at baseline to 21 after Tx. IPSS from 19 to 9 score.

Statistical Analysis

Paired-samples t-tests were used to compare pre- and post-treatment outcomes for pain intensity VAS and functional disability ODI. Effect sizes were calculated using Cohen's dz, which is recommended for within-subject (paired) designs. Ninety-five percent confidence intervals (95% CI) were computed to assess the precision of effect size estimates. Statistical significance was set at p-value < 0.05 was considered statistically significant. All analyses were performed using SPSS (31.1.0(49)).

Treated Level					
		Frequency	Percent	Valid Percentages	Cumulative Percentages
Valid	L4-L5	150	75	75	75
	L5-S1	50	25	25	25
	In total	200	100.0	100.0	
Diagnosis					
		Frequency	Percent	Valid Percentages	Cumulative Percentages
Valid	Central disc herniation	110	55.0	55.0	55.0
	Nerve root compression	56	28.0	28.0	83.0
	spin canal compression	34	17.0	17.0	100.0
	In total	200	100.0	100.0	

Ethical Approval

This descriptive research is anonymous and retrospective in nature. General ethical approval is granted by German Medical Association to these studies as per professional law of physician.

Results

A total of 200 patients were included in the analysis. The mean age was 54 years, and 73% were male. The most frequently involved spinal level was L4-L5, followed by L5-S1. The mean baseline VAS score was 8.29 ± 1.24, which decreased to 2.62 ± 1.63 following treatment. Paired-samples analysis demonstrated a significant reduction in pain intensity, with a mean difference of 5.67 ± 1.58 (95% CI: 5.45-5.89; $t(199) = 50.88$, $p < 0.001$). A moderate correlation between pre- and post-treatment VAS scores was observed ($r = 0.426$, $p < 0.001$), indicating consistent within-subject improvement. The magnitude of treatment effect was large, with Cohen's $d = 3.60$ (95% CI: 3.22-3.98) and Hedges' $g = 3.58$ (95% CI: 3.21-3.96). Similarly, ODI scores improved substantially from 73.89 ± 12.19 at baseline to 20.10 ± 12.44 post-treatment. The mean difference was 53.79 ± 13.25 (95% CI: 51.94-55.64; $t(199) = 57.41$, $p < 0.001$). A comparable moderate correlation was observed between pre- and post-treatment ODI scores ($r = 0.421$, $p < 0.001$). The effect size for ODI improvement was also extremely large, with Cohen's $d = 4.06$ (95% CI: 3.64-4.48) and Hedges' $g = 4.04$ (95% CI: 3.62-4.46), supporting the robustness of the observed functional. The relative magnitude of improvement was considerable, with a mean percentage improvement of 68.9% for VAS and 73.2% for ODI. Clinically meaningful response was achieved in many patients: 191 patients (95.5%) met the responder criterion of ≥50% improvement in both pain and disability outcomes. Furthermore, 194 patients (97.0%) demonstrated at least some reduction in pain intensity, while 6 patients (3.0%) showed no change and nonexperience worsening. Escalation to surgery was uncommon, with only 5 patients (2.5%) requiring surgical conversion during follow-up. Similarly, only 4 patients (2.0%) required central painkillers. No major patient-reported adverse complaints or serious treatment-related complications were observed.

VAS_Responder					
		Frequency	Percent	Valid Percentages	Cumulative Percentages
Valid	0	9	4,5	4,5	4,5
	1	191	95,5	95,5	100,0
	In total	200	100,0	100,0	
ODI_Responder					
		Frequency	Percent	Valid Percentages	Cumulative Percentages
Valid	0	9	4,5	4,5	4,5
	1	191	95,5	95,5	100,0
	In total	200	100,0	100,0	

A complementary non-parametric paired-rank analysis confirmed the robustness of the findings, demonstrating that 97.0% of patients experienced a reduction in VAS scores, while 3.0% showed no change and no patients deteriorated. The need for treatment escalation remained low, with only 5 patients (2.5%) requiring surgical conversion and 4 patients (2.0%) requiring central analgesics during follow-up. No major patient-reported adverse events or serious treatment-related complications were observed. Exploratory multivariate analysis suggested that younger age and absence of motor deficit were associated with a higher likelihood of treatment success; however, these findings should be interpreted with caution given the retrospective study design. With regards to SHIM and IPSS records had been documented prior and after treatment we registered SHIM improvement from 11 at baseline to 21 after Tx. IPSS from 19 to 9 score with $p < 0.001$ highly significant in both OAB and ED.

Clinical Outcomes

During patient follow-up, clinical improvement was observed in approximately 75-85% of cases, with a progressive increase in treatment effectiveness over time. With regards to SHIM and IPSS records had been documented prior and after treatment we registered SHIM improvement from 11 at baseline to 21 after Tx. IPSS from 19, to 9 score.

Discussion

The present retrospective study indicates that percutaneous epidural catheter-based therapy ECT is associated with clinically meaningful and sustained reductions in pain intensity, accompanied by functional improvements, in patients with central lumbar disc herniation and related degenerative spinal conditions. These findings support the potential role of minimally invasive epidural interventions as a therapeutic option in carefully selected patients Overall [3,4]. Our results align with previously published observational studies, randomized controlled trials, and systematic reviews evaluating percutaneous epidural adhesiolysis and catheter-based interventions, which have reported clinically relevant improvements in pain and disability, particularly among patients with chronic radicular symptoms refractory to conventional conservative management. Reported response rates in prior literature range from approximately 60% to 80%, depending on patient selection, underlying pathology, and duration of follow-up. While direct comparisons across studies are limited by methodological heterogeneity, the magnitude of improvement observed in this cohort appears comparable to, and in some instances favorable relative to, earlier reports. Several factors may have influenced the observed clinical outcomes. Early intervention, particularly in patients with acute or subacute symptoms, was associated with improved treatment response. Exploratory subgroup analyses suggested that patients treated within six months of symptom onset demonstrated higher rates of pain and functional improvement compared with those with longstanding chronic symptoms. This observation is consistent with existing evidence indicating that prolonged nerve root compression and sustained inflammatory processes may reduce responsiveness to interventional pain therapies. However, these subgroup findings should be interpreted cautiously due to their exploratory nature and the retrospective design. Procedural and anesthetic factors likely contributed to the observed efficacy as well.

All interventions were performed under short-duration propofol-based sedation, which facilitated patient comfort, minimized procedural stress, and allowed precise catheter placement [5,6]. Radiological and anatomical characteristics further influenced outcomes, with patients exhibiting extruded or contained disc fragments demonstrating particularly favorable responses [7,15,16].

These findings suggest that ECT may be especially effective in central disc herniation compared with advanced degenerative spinal stenosis, likely due to its capacity for targeted mechanical decompression and localized drug delivery [7,8]. The standardized multimodal treatment protocol applied at our center may have also contributed to favorable outcomes. This protocol included catheter-directed saline infusion, low-dose corticosteroid therapy, and hyaluronidase. Enzymatic agents such as hyaluronidase have been proposed to enhance the spread of epidural injectates and facilitate both mechanical and pharmacological effects of adhesiolysis. In this study, adjunctive use of hyaluronidase was associated with improvements in pain relief, perceived quality of quality, and patient satisfaction, although these findings should be interpreted with caution. Previous evidence indicates that hyaluronidase may enhance the absorption and dispersion of injectable medications, potentially increasing the bioavailability of co-administered agents by degrading hyaluronic acid within the interstitial matrix, consistent with its FDA-approved indications. From a safety perspective, ECT represents a minimally invasive treatment option with a favorable safety profile, and available evidence suggests a low incidence of clinically relevant adverse events, with limited risk of epidural fibrosis or clinically significant scar formation. Clinical deterioration directly attributable to catheter-based procedures appears uncommon, and repeated treatments may be considered in selected patients with insufficient initial response, provided careful monitoring and appropriate patient selection are maintained [9,10,11]. While surgical management remains an established option for lumbar spinal disorders, it is associated with recognized risks, including nerve or spinal cord injury, dural tears with cerebrospinal fluid leakage, postoperative epidural fibrosis, persistent neural compression, or suboptimal fusion outcomes, sometimes necessitating revision surgery. In contrast, epidural catheter-based therapy offers a minimally invasive alternative with a comparatively favorable safety profile. Notably, the low rate of subsequent surgical intervention observed in this cohort suggests that ECT may delay or potentially obviate the need for surgery in a substantial proportion of patients [12,13], particularly in the absence of progressive neurological deficits. In this context, based on the Schizas grading classification, ECT can be considered a potential non-surgical treatment option for lumbar spinal canal stenosis up to Grade C in appropriately selected patients. The responder analysis is particularly noteworthy, as 95.5% of patients achieved a clinically meaningful improvement in both pain and disability outcomes. This suggests that the observed treatment effect was not limited to statistical group differences but was also highly relevant at the individual patient level. With regards to SHIM and IPSS records had been documented prior and after treatment we registered SHIM improvement from 11 at baseline to 21 after Tx. IPSS score from 19 to 9. This confirms that ED and OAB accompanied with spine problems is temporary and reversible [11,18,,19,14,16].

Infection Occurred					
		Frequency	Percent	Valid Percentages	Cumulative Percentages
Valid	No	200	100	100	100

Strengths and Limitations

Strengths: The strengths of this study include the relatively large patient cohort, a standardized treatment protocol, long-term follow-up, an outpatient-based procedural setting, and strict safety-oriented patient selection criteria. Additionally, protocol modifications implemented in response to observed adverse effects allowed individualized patient management, potentially enhancing both treatment safety and tolerability.

Limitations: Several limitations warrant consideration. First, the single-center design may limit the generalizability of the findings to other clinical settings with differing patient populations or procedural expertise. Second, the retrospective nature of the study and absence of a control group preclude definitive causal inference. Third, although pain and functional outcomes were assessed using validated instruments, patient-reported measures remain susceptible to subjective influences and placebo effects, which are inherent challenges in interventional pain research.

Conclusion

Percutaneous epidural catheter-based therapy appears to be a safe and potentially effective minimally invasive treatment option for selected patients with lumbar central disc herniation and chronic spinal pain. Early intervention and careful patient selection may optimize clinical outcomes and reduce the need for subsequent surgical intervention. Prospective, controlled studies are warranted to further clarify the role of ECT within evidence-based treatment algorithms.

Conflict of Interest: The authors declare no conflict of interest.

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