

Epiduroscopy for Chronic Lumbar and Radicular Pain: A Review of Recent Clinical Findings

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Abstract

Introduction: Epiduroscopy has emerged as a minimally invasive diagnostic and therapeutic option for chronic low back and radicular pain. This review summarises evidence from the past five years to evaluate its role in contemporary clinical practice.

Methods: This review is based on selected peer-reviewed literature that addresses the mechanisms of action, diagnostic and therapeutic role, efficacy and safety of epiduroscopy in the treatment of chronic pain. Relevant literature was identified by searching PubMed and Scopus databases, published in the span of 2021.- 2026. The aim of this review is to present the contemporary use of epiduroscopy in the treatment of chronic lumbar and radicular pain with an emphasis on recent clinical studies and to summarize recent clinical findings on the use of epiduroscopy in clinical practice.

Discussion: Current evidence supports epiduroscopy as an effective treatment for Persistent Spinal Pain Syndrome type 2 (PSPS type 2, formerly called Failed Back Surgery Syndrome – FBSS), lumbar spinal stenosis and radicular pain. It may also serve as a transitional therapy that may delay or reduce the need for spinal cord stimulation (SCS). In addition, epiduroscopy enables targeted delivery of therapeutic agents, including platelet-rich plasma (PRP) and corticosteroids. Although generally safe, potential complications necessitate monitoring of intracranial pressure (ICP).

Conclusion: Epiduroscopy is a valuable tool in the management of chronic spinal pain and has an expanding role in clinical practice. However, the available evidence is limited by retrospective study designs and clinical heterogeneity, highlighting the need for well-designed randomised controlled trials.

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Introduction

Epiduroscopy, also known as epidural spinal endoscopy is a minimally invasive procedure used to treat and diagnose chronic lumbar and leg pain. It allows a specialist to directly visualise the epidural space using a camera in real time. Most common use of epiduroscopy is adhesiolysis and targeted therapy.

History of epiduroscopy dates to early 1930s, gradually making its way into an official clinical method of treating chronic back pain in 1989 (1). In 1996, technology advanced, leading to creation of flexible endoscopes and micro video cameras. As early as 2004., clinical trials had been done on how epiduroscopy may provide pain relief (2).

Clinical significance of epiduroscopy as a diagnostic tool is not widely understood, and its main use is for therapeutic purposes. Diagnostic information is sometimes provided during the procedure itself. Therefore, epiduroscopy serves a crucial role in the potential discovery of underlying problems and provide a proper treatment plan to successful pain relief. It is important to note that no patient is the same and this method reveals anatomical changes and potential fibrous tissue issues (3).

Procedure begins with tiny incision near the sacral hiatus, through which a fiber optic camera with a light source is guided through epidural space using X-ray fluoroscopy. Whole process lasts around 45 minutes under analgesedation. After completed, it is advised to rest for 1-2 days, and a mild physical activity is advised during a week after the procedure.

This narrative review aimed to evaluate and provide an update on the clinical effectiveness of epiduroscopy and its use in clinical practice.

Methods

This review is based on selected peer-reviewed literature that addresses the mechanisms of action, diagnostic and therapeutic role, efficacy and safety of epiduroscopy in the treatment of chronic pain. Relevant literature was identified by searching PubMed and Scopus databases,

with an emphasis on publications published in the last five years, in the span of 2021.- 2026. The review included original clinical trials, systematic reviews, meta-analyses, and other relevant scholarly publications. The research was conducted between May and 15th of July, 2026. Older key papers were used to illustrate the development of the method and to place new insights into an appropriate clinical context. Literature search was done using „epiduroscopy“ as a key word and only included papers published in english. Additional relevant publications were identified by manually reviewing the bibliography and related articles. No formal systematic search strategy, risk-of-bias assessment, or meta-analysis was performed

Discussion

Clinical indications for epiduroscopy

Epiduroscopy is an advanced, minimally invasive procedure that allows real-time visualisation of epidural space. According to recent clinical studies, epiduroscopy is indicated for patients whom standard conservative or minimally invasive interventions, such as epidural steroid injection (ESI) have failed. Main diagnosis in patients overall were chronic lumbar and radicular pain. Clinical studies show improvement in pain levels in patients, which also confirms therapeutic capabilities of epiduroscopy (4,5). One of the indications for epiduroscopy is also PSPS type 2. This condition is defined by chronic lumbar pain of unknown origin after previous surgical intervention (6). In this case, results show improvement and pain relief after epiduroscopy was performed (7). Literature also shows that most common indication for performing epiduroscopy is chronic spinal pain, which is also most frequent reason of disability worldwide (8).

Diagnostic role for epiduroscopy

While most common use of epiduroscopy is for therapeutic purpose in treating chronic lumbar and radicular pain, such as targeted drug delivery and adhesiolysis, recent studies also

show that it also serves a purpose as a diagnostic tool. Given that it enables visualization of epidural space and epidural adhesions, it also provides mechanical release of fibrotic scars in epidural space (9). Sometimes, radiological tests do not provide a clear answer to why are patients suffering from chronic, severe pain. In such cases, epiduroscopy is used as a diagnostic tool and studies have shown that radiological imaging can fail to recognize mild adhesions which can be a reason of chronic lumbar and radicular pain (10).

Therapeutic use of epiduroscopy

The therapeutic application of epiduroscopy represents a major shift in pain management. It bridges the gap between conservative therapy and surgical treatment. Indications for adhesion lysis include nerves that may be inflamed, trapped, or compressed by engorged veins due to epidural scarring. Recent studies show that PSPS type 2 has a major impact on quality of life and that, despite conservative and surgical interventions, pain often persists. The next line of treatment is epiduroscopy, which provides mechanical adhesiolysis of epidural fibrosis. Studies demonstrate clinically relevant reductions in pain and disability (11,12).

Postoperative epidural fibrosis is a major limitation to successful spine surgery. Patients often report that their pain has returned after surgical treatment. Studies show that PSPS type 2 is one of the most common causes of chronic pain and that, in some cases, revision surgery is needed. Some adhesions cannot be seen on radiological imaging, and in such patients epiduroscopy has been performed, providing pain relief and mechanical adhesiolysis (10,13).

An extended epiduroscopic method to which laser technology is added is called trans-sacral epiduroscopic laser decompression (SELD). Studies have shown that SELD can be used to treat lumbar disc herniations. Trans-sacral epiduroscopic laser decompression improves quality of life by decreasing lumbar and/or radicular pain in patients who do not respond to other treatments (14). Epiduroscopy can also serve as a route for administering medication;

studies show that epidural steroid injections are most commonly used to treat pain.

Diagnostic targeted epidural injection appears to be a valuable diagnostic tool with significant therapeutic potential (15). Some studies have also used epiduroscopy to inject corticosteroids and PRP into the epidural space of both operated and unoperated patients with radicular pain and reported a significant decrease in pain levels (16). It is important to note that this is a new method with limited data and studies available, which represents a new field of research. In some studies, when a combination of corticosteroids and ozone was administered, patients had a significantly greater reduction in pain than with corticosteroids alone (16).

Epiduroscopy prior to SCS implantation

Spinal cord stimulation is a surgical treatment for chronic pain refractory to conservative pain management (17). In some studies, epiduroscopy was used as a last-resort treatment before

SCS implantation and was found to provide pain relief for up to 24 months after the procedure (7). Studies suggest that epiduroscopy may delay SCS implantation in some patients; however, due to the limitations of certain studies, it is not possible to draw definitive conclusions.

Safety of the procedure

Complications are mostly the same as other interventional procedures with certain specifics. For adhesiolysis, most concern comes from subarachnoid spread of hypertonic saline. Targeted epidural adhesiolysis may reduce the risk of motor weakness by enabling more precise delivery of local anesthetics (12). Potential complications occur due to increased intracranial pressure (ICP). Example of complications of increased ICP include palsies, tinnitus, blindness, stroke and death. Due to seriousness of potential risks all epiduroscopy procedures should be performed in awake, responsive patient. Studies show that neurological complications occur when subarachnoid pressure exceeds 20 mmHg and

will be probable at pressure >50 mmHg, especially if such pressures persists (18). Although serious complications have not frequently been reported, potential complications can be severe, and the small number of patients and study designs do not allow for a reliable assessment of safety.

Principal findings

The main findings of this review is that epiduroscopy demonstrates a significant therapeutic benefits in reducing pain levels, especially in patients with PSPS type 2. Across some of the included studies, they report reduction in Visual Analogue Scale (VAS) scores as well as Oswestry Disability Indeks (ODI) (4,15,16). Furthermore, results among the studies conclude improvement in patients quality of life with substantially less pain. However, it is important to note that epiduroscopy does not provide life long period without pain and that its long term efficacy is limited by possibility of recurring epidural fibrosis which has been proven by older studies (11). Overall, epiduroscopy is proven to be generally safe, with low complication rate. Most common reported adverse effects post procedurally are headaches and pain at the injection site, which is also known in both old and new studies (19).

Clinical implications

The use of percutaneous epiduroscopy as a transitional treatment for Persistent Spinal Pain Syndrome type 2 is one of the most important clinical consequences of recent research. Epiduroscopy is a highly valuable intermediate step in the treatment algorithm for chronic lumbar pain, as it can effectively break down epidural fibrosis and facilitate targeted drug delivery, thereby reducing the immediate need for expensive and invasive spinal cord SCS implantations. Furthermore, the development of epiduroscopy enables direct visualisation of diseased areas, allowing highly targeted injection of medicines such as corticosteroids or PRP. By minimising the "washout" effect that is common with blind or fluoroscopy-guided epidural injections, this direct visual guidance

maximises the local anti-inflammatory response and enhances long-term therapeutic outcomes. Although epiduroscopy has historically been used only for postoperative fibrosis, new research indicates that it is also effective for patients who have not yet received treatment for severe spinal stenosis, persistent radicular limb pain, and disc herniations. For patients who are not yet candidates for open decompressive surgery but are not responding to conservative treatment, clinicians should consider early endoscopic procedures. Recent research also emphasises the crucial relationship between the volume of epidural fluid and potential neurological complications. Because elevated epidural pressure is directly transmitted to the cerebrospinal fluid (CSF) and may result in sudden spikes in intracranial pressure (ICP), clinicians performing epiduroscopy must be acutely aware of continuous fluid administration. Consequently, strict volume control and continuous patient monitoring for signs of ICP elevation, such as headache or visual disturbance, are now crucial, non-negotiable elements of the procedural safety checklist.

Heterogeneity and quality of evidence

The studies examined showed significant clinical and methodological variability. Clinically, patient demographics varied widely, from those with isolated radicular pain or treatment-naïve lumbar stenosis to those with PSPS type 2. There were also differences in therapeutic approaches; although all studies used epiduroscopy, adjuvant treatments included PRP administration, corticosteroid injections, and mechanical adhesiolysis. Methodologically, follow-up periods ranged from nonspecific short-term evaluations to 12- and 24-month longitudinal studies. A quantitative meta-analysis was therefore not possible because of this substantial clinical and methodological heterogeneity, and the pooled results should be interpreted with caution. To establish conclusive evidence, future research must prioritise well-powered, multicentre, randomised controlled trials with uniform follow-up periods and clearly defined methodologies.

Limitations

These findings should be interpreted in the context of several limitations due to the design of the studies and the nature of included literature. Results may not be as applicable to bigger studies or populations because several studies have relatively small sample sizes. Notable difference among them is follow-up time and it is important to note that some studies have not reported follow up data at all. Those differences in reporting and duration of the studies make it difficult to evaluate long-term therapeutic benefits. Future studies need more RCTs, unitary objectives and standardized techniques. Most available evidence is based on retrospective and observational studies, whereas randomized controlled trials are very rare. All this limits the strength of existing evidence and highlights the need for future high-quality RCTs. Methodology review was

strictly and intentionally restricted to PubMed and Scopus publications in the last five years. This time frame was used to make a comprehensive systematic review of relevant epiduroscopic techniques and its current use in clinical practice.

Conclusion

Recent literature evidence supports therapeutic use of epiduroscopy in treating persistent, chronic lumbar and radicular pain. Its biggest advantage is combining visual, diagnostic and therapeutic interventions when conservative treatment fails. Despite all the positive outcomes, current studies are in need of new, bigger, well- designed RCTs to further investigate this method.

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Epiduroskopija kod kronične lumbalne i radikularne boli: pregled novijih kliničkih spoznaja

Sažetak

Uvod: Epiduroskopija se pojavila kao minimalno invazivna dijagnostička i terapijska opcija za kroničnu bol u donjem dijelu leđa i radikularnu bol. Ovaj pregled sažima dokaze iz proteklih pet godina kako bi se procijenila njezina uloga u suvremenoj kliničkoj praksi.

Metode: Ovaj pregled temelji se na odabranoj recenziranoj literaturi koja se bavi mehanizmima djelovanja, dijagnostičkom i terapijskom ulogom, učinkovitosti i sigurnošću epiduroskopije u liječenju kronične boli. Relevantna literatura identificirana je pretraživanjem baza podataka PubMed i Scopus, objavljenih u razdoblju od 2021. do 2026. Cilj ovog pregleda je predstaviti suvremenu upotrebu epiduroskopije u liječenju kronične lumbalne i radikularne boli s naglaskom na nedavne kliničke studije i sažeti nedavne kliničke nalaze o upotrebi epiduroskopije u kliničkoj praksi.

Rasprava: Trenutni dokazi podupiru epiduroskopiju kao učinkovit tretman za sindrom perzistentne spinalne boli tipa 2 (PSPS tip 2, ranije nazvan Sindrom neuspjele operacije leđa - FBSS), lumbalnu spinalnu stenožu i radikularnu bol. Također može poslužiti kao prijelazna terapija koja može odgoditi ili smanjiti potrebu za stimulacijom leđne moždine (SCS). Osim toga, epiduroskopija omogućuje ciljanu primjenu terapijskih sredstava, uključujući plazmu bogatu trombocitima (PRP) i kortikosteroide. Iako je općenito sigurna, potencijalne komplikacije zahtijevaju praćenje intrakranijskog tlaka (ICP).

Zaključak: Epiduroskopija je vrijedan alat u liječenju kronične spinalne boli i ima sve veću ulogu u kliničkoj praksi. Međutim, dostupni dokazi ograničeni su retrospektivnim dizajnom studija i kliničkom heterogenošću, što naglašava potrebu za dobro osmišljenim randomiziranim kontroliranim ispitivanjima.

Ključne riječi: kronična bol; endoskopija; bol u donjem dijelu leđa; radikulopatija; spinalna stenoza