Received: 13 February 2026 | Revised: 24 April 2026 | Accepted: 5 May 2026

DOI: 10.1002/ijgo.71087

SYSTEMATIC REVIEW

Efficacy and safety of laparoscopic nerve decompression for neuropathic sciatic pain due to endometriosis: A systematic review and meta-analysis

Camille Racca[1,2,3] | Julia Franken[1,3] | Marion Cahen[1,4,5] | Aurelly Cicchelero[1,6] | Murielle Mormont[7] | Raphaël Cinotti[8,9]

[1]Pain Management Unit, Draw Your Fight, Paris, France

[2]Department of Genetics, Pitié-Salpêtrière University Hospital (AP-HP), Paris, France

[3]Clinical Research Committee, Rare Disease Pain Network (REDOMA), Paris, France

[4]Neurology Department, Draw Your Fight, Paris, France

[5]Faculty of Medicine, Sorbonne University, Paris, France

[6]Gynecology Department, Draw Your Fight, Paris, France

[7]General Surgery Department, Clinique de Valère, Sion, Switzerland

[8]Anesthesiology Department, Hôtel-Dieu Hospital (CHU Nantes), Nantes, France

[9]INSERM U1246 SPHERE (Methods in Patient-Centered Outcomes and Health Research), Nantes University, Nantes, France

Correspondence
Camille Racca, Pitié-Salpêtrière Hospital (AP-HP), 93 Boulevard de l'Hôpital, 75013 Paris, France.
Email: camille.racca@drawyourfight.org

Abstract

Objective: Endometriosis is associated with neuropathic pain in approximately 40% of cases. Involvement of the sciatic nerve or sacral plexus represents one of the most frequently reported neuropathic pain presentations in endometriosis, for which no specific management guidelines currently exist. This study evaluate the efficacy and safety of laparoscopic decompression of the sciatic nerve or the sacral plexus for neuropathic sciatic pain caused by endometriosis.

Method: A systematic search was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Meta-analysis Of Observational Studies in Epidemiology (MOOSE) guidelines using PubMed, Embase, the Cochrane Library, and ClinicalTrials.gov for studies published between 2000 and 2025. Eligible studies included interventional and observational studies reporting outcomes in women undergoing laparoscopic decompression for neuropathic pain located along the sciatic nerve distribution due to endometriosis involving the sciatic nerve and/or the sacral plexus. Data extraction was performed independently by two reviewers. WIe, a random-effects meta-analysis was conducted. The primary outcome was the variation of sciatic pain intensity from baseline to postoperative follow-up, assessed at least 3 months after surgery using validated pain scales. Risk of bias was evaluated using the Joanna Briggs Institute critical appraisal checklists.

Results: The search identified 933 records, of which eight studies were included in the final analysis, comprising 744 individuals. Preoperative sciatica attributable to endometriosis was reported in 83.2% of cases ($n = 619$). Operative findings revealed sciatic nerve involvement in 52.3% of cases ($n = 389$) and sacral nerve root involvement in 45.0% ($n = 335$). In a minority of individuals, involvement of other pelvic nerves was also reported. Across five studies with extractable pain-intensity data ($n = 520$), the pooled mean reduction in sciatic pain was 6.47 points (95% confidence interval 5.55–7.43) on validated 10-point scales. Complete resolution

of neuropathic symptoms in the lower limb was reported in a subset of individuals. Major complications occurred in 8% of cases and were mainly associated with concomitant pelvic procedures.

Conclusion: Laparoscopic nerve decompression appears to be associated with a clinically significant reduction in neuropathic sciatic pain related to endometriosis, with a low incidence of major nerve-related complications. However, as the available evidence is predominantly observational and characterized by a low to moderate risk of bias, these findings should be interpreted with caution and highlight the need for further well-designed studies.

PROSPERO Registration: The study protocol was prospectively registered in PROSPERO (CRD420251107880) on July 19, 2025.

KEYWORDS
chronic pain, endometriosis, laparoscopic, meta-analysis, neuropathic pain, systematic review

1 | INTRODUCTION

Endometriosis is a highly prevalent gynecological disorder characterized by the presence of endometrium-like tissue outside of the uterine cavity.[1] Affecting approximately 10% of women of reproductive age, it commonly presents with severe menstrual pain (dysmenorrhea) and frequently with dyspareunia and chronic pelvic pain (CPP).[2]

Chronic pain affects more than 60% of individuals with endometriosis and profoundly impairs quality of life, restricting daily activities, reducing work capacity, and disrupting sexual and interpersonal functioning. This burden is further exacerbated by frequent comorbidities such as depression, irritable bowel syndrome, painful bladder syndrome, chronic fatigue, and migraine, collectively contributing to a significant clinical and socioeconomic impact.[3,4]

Pain in endometriosis encompasses heterogeneous mechanisms and phenotypes, including nociceptive, inflammatory, and neuropathic components.[2,5] While therapeutic strategies for inflammation-related or infiltration-related pelvic pain are relatively well established, the management of neuropathic pain specifically associated with endometriosis remains markedly less structured. Despite neuropathic features (e.g. burning pain, electric shocks, paresthesia, and allodynia) being reported in approximately 35–40% of affected individuals, no specific clinical recommendations currently exist for this pain subtype in the context of endometriosis.[6–8]

Neuropathic pain in endometriosis might arise either as a consequence of prior surgical procedures or from direct infiltration, compression, or irritation of neural structures by endometriotic lesions. In this context, neuropathic sciatic pain refers to a chronic pain persisting for at least 3 months, located along the sciatic nerve distribution, and consistent with neuropathic characteristics. The sacral plexus (approximately 57% of reported cases) and the sciatic nerve (approximately 39%) represent the most frequently described sites of neural involvement, although the mechanisms underlying endometriotic implantation at these locations remain poorly understood.[9]

Among the therapeutic options described for this specific pain phenotype, surgical decompression of the sciatic nerve or sacral plexus is the only approach that has been evaluated in large, structured case series and interventional studies, particularly using nerve-sparing techniques such as laparoscopic neuro-navigation (LANN) to facilitate nerve identification and preservation.[10] However, despite growing clinical interest, the current evidence base remains limited, and no systematic review to date has specifically evaluated this surgical approach in the context of neuropathic sciatic pain caused by endometriosis.[11]

The present systematic review and meta-analysis aims to address this gap by synthesizing the available evidence and evaluating the efficacy and safety of laparoscopic decompression of the sciatic nerve or the sacral plexus for neuropathic sciatic pain caused by endometriosis.

2 | METHODS

2.1 | Protocol and registration

The study protocol was prospectively registered in PROSPERO (CRD420251107880) on July 19, 2025. The full review protocol is available at https://doi.org/10.17504/protocols.io.bp2l6zn5dgqe/v1.

The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[12] Given that the meta-analysis primarily included observational studies, reporting also adhered to the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) guidelines.[13]

2.2 | Eligibility criteria

Studies published in all languages were eligible if they were prospective or retrospective cohort studies, randomized controlled trials, or case series and included at least five participants. Eligible studies had to include women with neuropathic sciatic pain attributable to endometriosis involving the sciatic nerve and/or the sacral plexus, who underwent laparoscopic decompression and for whom both preoperative and postoperative outcome data were reported. All laparoscopic decompression techniques were considered eligible.

Studies were excluded if they were review articles, case reports, or small case series (≤4 participants), as well as unpublished studies or conference abstracts without sufficient outcome data. Studies lacking extractable data or not clearly specifying the pelvic nerve structure involved in the surgical intervention were also excluded. Articles published in languages other than English or French were excluded when reliable translation was unavailable.

2.3 | Information sources

A systematic literature search was conducted in PubMed (MEDLINE), Embase, the Cochrane Library, and ClinicalTrials.gov to identify relevant studies. The search covered the period from January 1, 2000, to December 31, 2025.

2.4 | Search strategy

The search strategy was designed and executed by two investigators (C.R. and J.F.) and tailored to the specific syntax and indexing of each database. Searches were conducted through the respective database interfaces (PubMed.gov, Elsevier, Embase.com, and the Cochrane Library), and all records were imported into Rayyan (Rayyan Systems, version web-based systematic review software) for deduplication and study screening.

The strategy combined controlled vocabulary terms (Medical Subject Headings [MeSH] for PubMed and the Cochrane Library; Emtree terms for Embase) with free-text keywords related to endometriosis, pelvic nerve involvement, neuropathic pain, and surgical management. For ClinicalTrials.gov, searches relied on conditions and keyword fields, as the registry does not use a controlled vocabulary. Boolean operators (AND, OR) were applied to combine search terms in PubMed, the Cochrane Library, and Embase.

In addition, reference lists of all included studies and relevant reviews were manually screened to identify additional eligible studies. The complete electronic search strategies for each database are provided in Appendix S1.

2.5 | Study selection

Titles and abstracts were independently screened by two investigators (C.R. and J.F.) according to predefined eligibility criteria. The full text of each potentially relevant study was then assessed. Duplicate records were excluded. Any disagreements were resolved by consensus, with arbitration by a third reviewer (M.C.) when necessary.

2.6 | Data extraction

The full texts of all eligible studies were independently reviewed by two investigators (C.R. and M.C.). Data was extracted according to predefined criteria, including author(s), year of publication, study period, country of origin, study design, sample size, demographic characteristics, inclusion and exclusion criteria, detailed description of the intervention, duration of follow-up, and reported primary and secondary outcomes. Any discrepancies were resolved by consensus, with arbitration by a third reviewer (J.F.) when required.

When additional information or clarification was needed, corresponding authors were contacted by email to request missing or unpublished data. If standard deviations (SDs) were not reported and could not be obtained from the authors, they were estimated from reported ranges using the method described by Hozo et al.[14] Postoperative complications were classified according to the Clavien–Dindo system, with major complications defined as grade ≥III.[15]

2.7 | Primary outcome

The primary outcome, used to assess surgical effectiveness, was the change in sciatic pain intensity from baseline to postoperative follow-up, measured as the difference between preoperative and postoperative scores on the Visual Analog Scale (VAS) or the Numeric Rating Scale (NRS), assessing pain located along the sciatic nerve distribution, with postoperative assessment performed at least 3 months after surgery.

2.8 | Secondary outcomes

To evaluate safety and further characterize surgical effectiveness, the following secondary outcomes were prespecified:

- perioperative and postoperative complications, classified according to the Clavien–Dindo system, with particular focus on grade ≥III events, defined as complications requiring surgical, radiological, or endoscopic intervention and associated with substantial morbidity.
- complete postoperative resolution of sciatica was defined as the absence of residual neuropathic pain following

decompression, as reported by the original study authors, and corresponding to a pain score of 0 on validated pain intensity scales when available
- neurological and functional outcomes, including motor, sensory, and functional impairments, are assessed through clinical examination or validated scales when available
- recurrence of sciatica was defined as the reappearance of neuropathic pain in the lower limb following an initial documented postoperative improvement, occurring at any time during the follow-up
- diagnosis and/or therapeutic delays, and their potential influence on preoperative clinical status and postoperative recovery trajectories
- changes in health-related quality of life, assessed using validated patient-reported outcome instruments.

When sufficient data was available, a subgroup analysis according to the surgical approach was planned to explore the potential impact of different laparoscopic decompression techniques on clinical outcomes.

Studies were not excluded when specific secondary outcome data was unavailable. All eligible studies were retained in the qualitative synthesis and contributed to quantitative analyses whenever extractable data was available.

2.9 | Data synthesis and statistical analysis

Data from the included studies were analyzed using the meta package in R, following methodological recommendations for meta-analyses of continuous and single-arm outcomes. For the primary outcome, a change in neuropathic sciatic pain intensity was analyzed as a continuous variable. When available, mean preoperative and postoperative pain scores (with SD and sample size) were extracted to compute mean differences, which were pooled using random-effects inverse-variance models. Between-study heterogeneity was assessed using the I^2 statistic and τ^2.

A sensitivity analysis was planned in the presence of substantial heterogeneity (I^2 >75%) that could not be explained by clinical or methodological differences or when influential studies were suspected. In addition, a leave-one-out sensitivity analysis was planned to assess the influence of individual studies on the pooled estimates.

For secondary outcomes, meta-analyses were performed only when at least two studies provided comparable data. Continuous outcomes were synthesized using the same random-effects inverse-variance method. Proportional outcomes (e.g., postoperative pain resolution or complication rates) were analyzed using random-effects meta-analyses of binomial data with logit transformation and Wilson confidence intervals for individual studies. When pooling was not feasible, results were summarized narratively.

Publication bias was planned to be assessed using funnel plot asymmetry when at least 10 studies were available for the primary outcome, in accordance with methodological recommendations.

2.10 | Assessment of risk of bias

The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools, selected according to the study design of each included study.[16–18]

Two reviewers (M.C. and J.F.) independently performed the risk of bias assessment. Discrepancies were resolved through discussion, and when necessary, a third reviewer (C.R.) acted as an arbitrator.

Based on the pattern of responses across the JBI appraisal domains, studies were categorized as having a low, moderate, or high risk of bias. Particular attention was given to participant selection, diagnostic validity, outcome measurement, and completeness of postoperative follow-up.

Risk of bias assessments were not used as exclusion criteria, to preserve the comprehensiveness of the evidence base, but were considered in the interpretation of the results.

3 | RESULTS

3.1 | Study selection

The database search identified 933 records, of which 528 were duplicates. After title and abstract screening, 64 full-text articles were assessed for eligibility, and eight studies met the inclusion criteria (Figure 1).

These studies, published between 2000 and 2025, included sample sizes ranging from 13 to 259 participants. The studies were conducted in Switzerland, France, Germany, Austria, Italy, Canada, Mexico, and Brazil.

3.2 | Demographic data

A total of 744 individuals were included across the analyzed studies, of whom 83.2% reported preoperative sciatica attributable to endometriosis ($n = 619$). The weighted mean age at baseline was 30.75 years (SD 8.81).

Study designs comprised four prospective cohort studies, including 516 individuals (69.4%), three retrospective case series with 128 individuals (17.2%), and one retrospective comparative study involving 100 individuals (13.4%).

Across the pooled cohort, intraoperative findings revealed sacral nerve root involvement in 335 cases (45.0%), predominantly affecting the S2–S3 nerve roots, and sciatic nerve involvement in 389 cases (52.3%). In a small proportion of individuals, additional pelvic nerve involvement was reported.

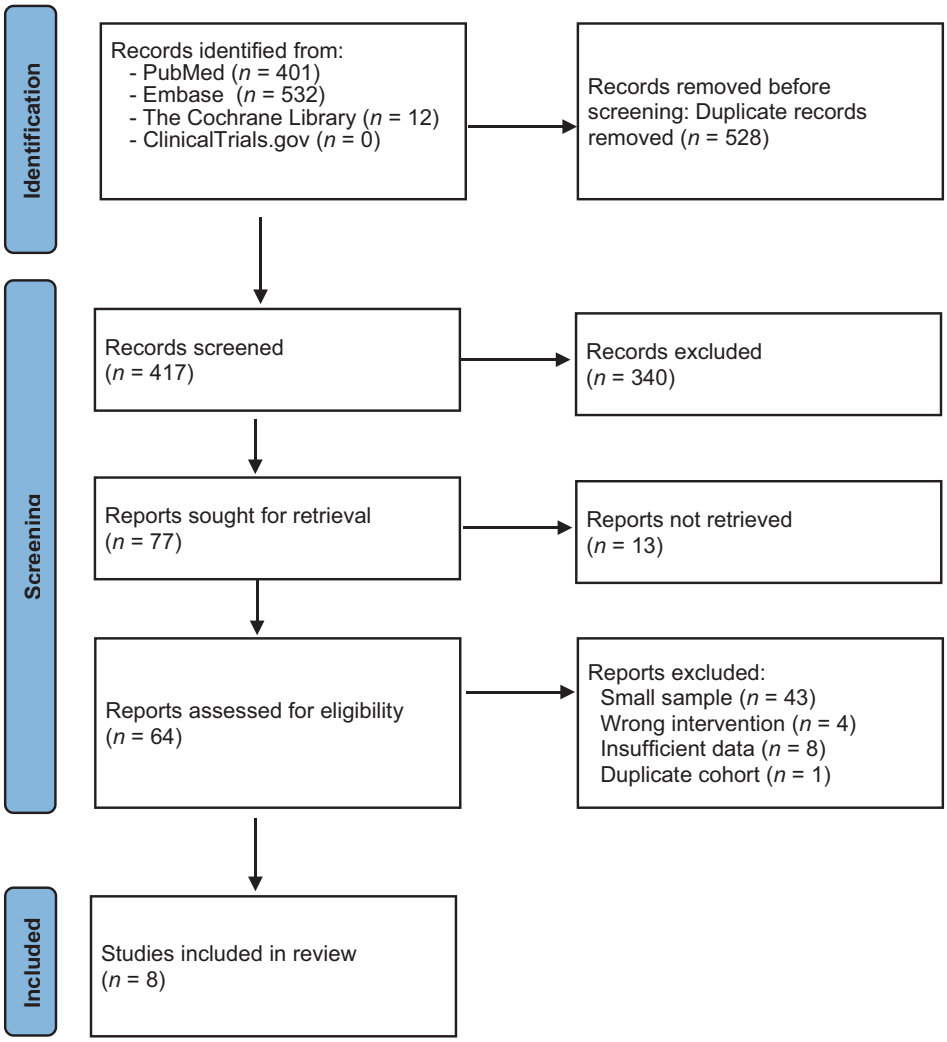

FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 flow diagram.

Detailed study characteristics and baseline demographics are summarized in Table 1.

3.3 | Type of interventions

Despite variability in inclusion criteria, the surgical techniques reported across studies were broadly comparable and relied on a shared principle: precise identification of pelvic neural structures followed by targeted decompression.

The LANN technique, first described by Possover et al., was the most frequently used approach, reported in six studies and involving 562 participants (75.5% of the total cohort). This technique combines anatomical dissection with intraoperative neurostimulation to enable functional mapping of the pelvic autonomic nervous system, including the sacral roots (S2–S4) and pelvic splanchnic nerves, thereby facilitating accurate identification of neural pathways and targeted nerve-sparing dissection.[10]

Alternative approaches included conventional laparoscopy ($n = 153$) and robotic-assisted laparoscopy ($n = 29$). Regardless of the surgical platform, procedures followed a standardized stepwise approach, as described by Roman et al., including ureterolysis, opening of the pararectal and presacral spaces, identification of the hypogastric nerves and sacral roots, and progressive dissection of the sacral plexus or sciatic nerve to achieve complete excision or decompression of endometriotic lesions.[22]

Across all studies, two main surgical strategies were identified: nerve-sparing decompression and partial or complete nerve excision. Nerve-sparing procedures consisted of meticulous dissection and release of the nerve from surrounding endometriotic tissue, with preservation of neural continuity. In contrast, neural excision was performed in 282 cases (36.8%) and was generally reserved for cases of extensive infiltration or suspected irreversible nerve damage.

Surgical management frequently extended beyond the nerve itself due to the multifocal nature of deep infiltrating endometriosis. Concomitant procedures were common and included vaginal resection ($n = 125$), rectal or colorectal resection ($n = 187$), and ureterolysis or ureteral resection ($n = 161$), reflecting both the anatomical complexity and severity of disease in this population.

TABLE 1 Study and demographic characteristics of included participants.

Study (author, year)	Study design	Country	N	Mean (±SD)	Sciatic nerve involvement (%)	Sacral roots involvement (%)	Preoperative sciatica due to histologically confirmed endometriosis (%)	Follow-up (months, mean ± SD)
Brozon et al. 2025[19]	Prospective cohort study	Mexico	14	34 (±5.6)	8 (57.1)	5 (35.7)	6 (42.9)	6 (0)
Hudelist et al. 2024[20]	Prospective cohort study	Austria	30	36.8 (±5.51)	0 (0)	30 (100)	30 (100)	25.5 (±20.2)
Massimello et al. 2024[21]	Retrospective comparative study	France	100	34.6 (±5.9)	11 (11)	99 (99)	70 (70)	12.10 (±11.6)
Roman et al. 2021[22]	Retrospective consecutive case series	Germany and France	52	32.2 (±5.1)	49 (94.2)	3 (5.8)	43 (82.7)	23 (±8.7)
Lemos et al. 2021[23]	Retrospective consecutive case series	Brazil	63	39.7 (±10.5)	26 (43)	28 (47)	23 (36.7)	36 (±21.6)
Possover 2017[24]	Prospective cohort study	Switzerland	259	28 (±2)	259 (100)	0 (0)	259 (100)	60 (0)
Lemos et al. 2015[25]	Retrospective consecutive case series	Brazil	13	34.5 (±5.1)	9 (69.2)	4 (30.7)	13 (100)	12.5 (±14.6)
Possover et al. 2011[26]	Prospective cohort study	Switzerland	213	28 (±10.3)	27 (12.7)	185 (86.9)	175 (82.2)	21 (±11.5)

Abbreviation: SD, standard deviation.

A detailed summary of surgical techniques and intervention characteristics is provided in Table S1.

3.4 | Quality assessment

Based on the JBI critical appraisal tools, among the eight included studies, three were rated as having a low risk of bias, four a moderate risk of bias, and one a moderate to high risk of bias.

Overall, the studies demonstrated good methodological reporting, with clearly defined inclusion criteria, reliable diagnostic confirmation, standardized descriptions of surgical decompression techniques, validated pain assessment tools, and adequate postoperative follow-up.

Nevertheless, several methodological limitations were identified. Reporting the postoperative discontinuation of medical treatments was inconsistent and rarely quantitative, limiting the interpretation of treatment effects. In addition, none of the studies included a medical-management control group, precluding a robust comparison between surgical and non-surgical outcomes.

Importantly, concomitant pelvic procedures were performed in four studies, representing 53% of the total study population ($n = 395$). This intervention heterogeneity constitutes a major source of residual confounding, as these additional procedures may independently influence both pain outcomes and complication rates, thereby potentially overestimating the effect attributed to nerve decompression.

A detailed study design and methodological appraisal based on the JBI critical appraisal domains for each included study is presented in Table 2.

3.5 | Primary outcome

Five studies reported extractable data on changes in sciatic pain intensity following surgery. In total, 520 individuals with preoperative neuropathic sciatic pain due to endometriosis were included in the pooled analysis. The random-effects model estimated a pooled mean difference of 6.47 points (95% CI 5.55–7.43) on validated 10-point scales, indicating a marked postoperative reduction in neuropathic pain. The forest plot of individual and pooled estimates is presented in Figure 2.

3.6 | Heterogeneity and interpretation

Statistical heterogeneity was high ($I^2 = 97.0\%$). However, the individual study estimates were remarkably consistent in magnitude, with all reporting marked postoperative improvements ranging from 5.10 to 7.62 points. This pattern indicates strong clinical coherence across studies. The high I^2 value therefore likely reflects differences in study precision and the highly unequal distribution of sample sizes rather than true inconsistency in clinical effect.

TABLE 2 Summary of methodological quality and risk of bias based on JBI critical appraisal domains.

Study (author, year)	Study design and methodological appraisal	Risk of bias (JBI)
Brozon et al. 2025[19]	Prospective cohort study with standardized inclusion and outcome assessment; JBI limitations include lack of a control group and residual confounding due to intervention heterogeneity from concomitant pelvic procedures	Moderate risk of bias
Hudelist et al. 2024[20]	Prospective multicenter cohort study with standardized inclusion and outcome assessment. Under the JBI framework, lack of a control group and frequent concomitant pelvic procedures represent major sources of bias	Moderate risk of bias
Massimello et al. 2024[21]	Retrospective comparative study based on a prospective single-center database. According to the JBI checklist for comparative studies, intervention heterogeneity related to concomitant pelvic procedures and group imbalance introduce substantial residual confounding	Moderate to high risk of bias
Roman et al. 2021[22]	Retrospective consecutive case series with standardized inclusion criteria, prospectively collected data, and validated outcome measures. According to the JBI Case Series Checklist, intervention heterogeneity related to concomitant pelvic procedures represents a significant source of bias	Moderate risk of bias
Lemos et al. 2021[23]	Retrospective consecutive case series meeting all major JBI methodological criteria, with validated outcomes, appropriate follow-up, and no major sources of confounding identified within the case series framework	Low risk of bias
Possover 2017[24]	Prospective cohort study with homogeneous surgical management and long-term follow-up. According to the JBI cohort checklist, most methodological domains were adequately addressed despite the absence of a control group	Low risk of bias
Lemos et al. 2015[25]	Retrospective consecutive case series fulfilling all key JBI criteria, with validated outcomes and no sources of confounding identified according to JBI standards	Low risk of bias
Possover et al. 2011[26]	Prospective cohort study with standardized inclusion criteria and outcome assessment. According to the JBI cohort checklist, intervention heterogeneity related to frequent concomitant pelvic procedures introduces substantial residual confounding	Moderate risk of bias

Abbreviation: JBI, Joanna Briggs Institute.

3.7 | Sensitivity analysis

Despite substantial heterogeneity, sensitivity analyses could not be conducted due to the limited number of included studies and the marked imbalance in sample sizes, which restricted their interpretability.

Nevertheless, effect estimates were consistent in magnitude across studies, supporting the robustness of the pooled results.

Similarly, a leave-one-out sensitivity analysis was not performed, as these same limitations would likely have produced unstable and potentially misleading estimates.

Assessment of publication bias using funnel plot asymmetry was not performed, as fewer than 10 studies were available for quantitative synthesis.

3.8 | Perioperative and postoperative complications

Surgical complications were reported with sufficient detail in six studies, encompassing 517 individuals with either symptomatic or asymptomatic nerve compression at baseline. The random-effects model estimated a pooled proportion of major complications (Clavien–Dindo grade ≥III) of 0.08 (95% CI 0.02–0.27). The individual and pooled estimates are illustrated in Figure 3.

Major complications were predominantly associated with concomitant pelvic procedures, such as rectovaginal or bowel fistula, rather than with the nerve-directed surgical approach itself. The substantially higher complication rates observed in studies including additional pelvic resections further support this interpretation. Minor complications, including transient obturator nerve neurapraxia or new-onset allodynia, were more frequently reported but typically resolved without long-term sequelae.

Taken together, these findings suggest that laparoscopic nerve decompression is generally safe, with major complications remaining rare, particularly when performed without extensive concomitant pelvic surgery.

3.9 | Complete postoperative resolution of sciatica

Six studies provided extractable data on the postoperative resolution of sciatic pain. Across these studies, 183 individuals presented preoperative sciatic pain and were, therefore, included in the pooled analysis. The random-effects model estimated a pooled proportion of sciatic pain resolution of 0.73 (95% CI 0.45–0.90).

Although between-study heterogeneity was moderate-to-high ($I^2 = 69.1\%$), the pooled estimate suggests that a substantial proportion of individuals experience postoperative resolution of neuropathic sciatic pain following surgical intervention.

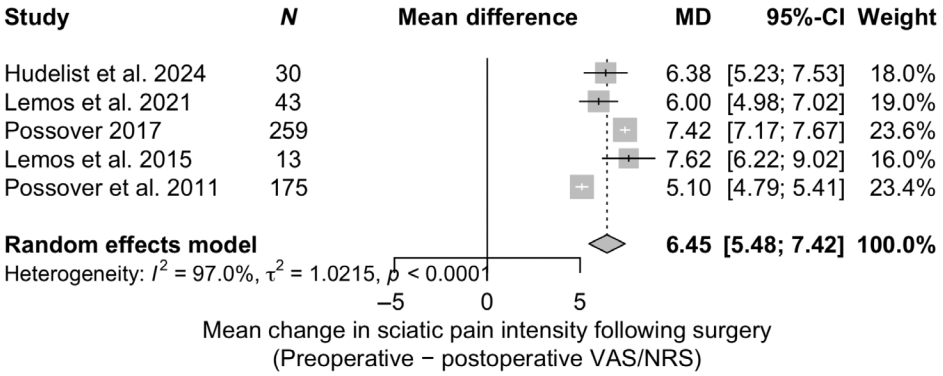

FIGURE 2 Forest plot of the primary outcome: Mean change in sciatic pain intensity. CI, confidence interval; MD, mean difference.

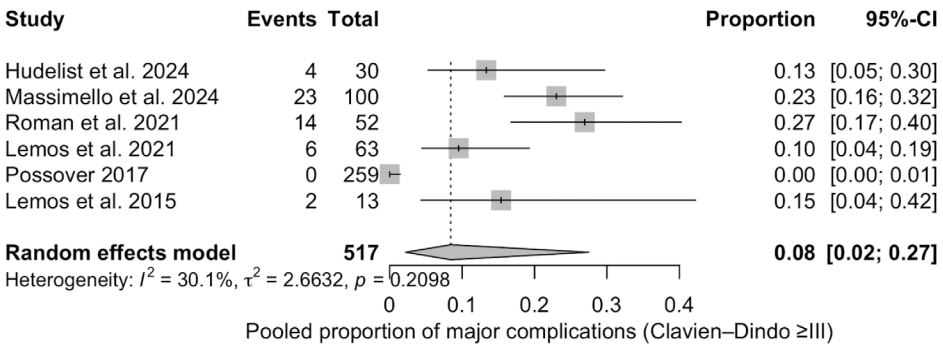

FIGURE 3 Forest plot of major complications (Clavien–Dindo grade ≥III). CI, confidence interval.

3.10 | Neurological and functional outcomes

Pain assessment across the included studies relied predominantly on unidimensional scales, namely the VAS and the NRS, with limited reporting of neurological and functional outcomes.

When available, assessments were primarily based on clinical neurological examination, with no use of standardized neuropathic pain–specific instruments, such as the Neuropathic Pain Symptom Inventory, across the included studies.

Preoperative motor deficits were documented in four studies, with complete postoperative recovery ranging from 15% to 65% of the affected individuals. These findings suggest that neurological improvement is achievable following decompression. However, the limited number of studies, variability in outcome definitions, and lack of standardized functional assessment tools precluded quantitative synthesis and limit the interpretation of these results.

3.11 | Recurrence of sciatica, quality of life, and diagnostic and therapeutic delays

Data on postoperative recurrence of neuropathic sciatic pain, health-related quality of life, and the impact of diagnostic and therapeutic delays on clinical outcomes were scarce and inconsistently reported. Follow-up duration varied across studies, with only limited data extending beyond 24 months, which further limited the assessment of recurrence over time.

Consequently, quantitative synthesis was not feasible, and no pooled estimates could be generated. The available evidence therefore remains insufficient to draw robust conclusions regarding long-term outcomes and the broader clinical impact of surgical intervention.

3.12 | Impact of the surgical approach

Evidence comparing surgical approaches remains limited overall. No study directly compared LANN with alternative techniques, and only one study evaluated conventional versus robotic-assisted laparoscopy, reporting broadly similar outcomes; however, the available comparative data was sparse and insufficiently detailed to support robust conclusions.

Moreover, variation in outcomes according to surgical technique could not be reliably assessed. This limitation is primarily explained by the small number of eligible studies and the marked predominance of LANN, which accounted for 75.5% of the total cohort. As a result, the available data lacked the statistical power and balance required to perform meaningful subgroup analyses comparing nerve-sparing strategies, conventional laparoscopy, and robotic-assisted approaches.

4 | DISCUSSION

To our knowledge, this systematic review and meta-analysis is the first to specifically evaluate laparoscopic decompression of the sciatic nerve or the sacral plexus for neuropathic sciatic pain caused by endometriosis. Across the included studies, surgical intervention was associated with a marked reduction in sciatic pain intensity, with a pooled mean difference of 6.47 points (95% CI 5.55–7.43) on validated 10-point scales. Complete postoperative resolution of neuropathic symptoms in the lower limb was reported in a subset of individuals. In contrast, outcomes related to neurological recovery, recurrence of sciatic pain, and health-related quality of life were infrequently reported, limiting the ability to draw robust conclusions regarding these outcomes.

The pooled proportion of major postoperative complications (Clavien–Dindo grade ≥III) was 0.08 (95% CI 0.02–0.27). These complications were predominantly associated with concomitant pelvic procedures rather than the nerve-directed component of surgery. Minor complications were more frequently reported but were generally transient. These findings reflect postoperative safety outcomes as reported in the included studies and do not allow conclusions regarding comparative safety.

This study has several strengths. By synthesizing data from more than 500 individuals, this meta-analysis provides the most comprehensive quantitative estimate to date of postoperative pain reduction following laparoscopic treatment for sciatic endometriosis. Beyond this quantitative contribution, it offers a focused synthesis of a rare and underexplored clinical condition, helping to clarify the role of nerve-directed surgical approaches in this specific context.

In addition, several methodological features support the internal validity of the primary outcome, including the use of validated pain assessment instruments, consistency in both the direction and magnitude of reported effects, and postoperative follow-up of sufficient duration to assess pain outcomes. The review methodology was robust, with prospective protocol registration, comprehensive database searching, and independent study selection, data extraction, and risk-of-bias assessment conducted by multiple reviewers. Random-effects modeling was used to account for clinical and methodological heterogeneity across observational studies.

Despite these strengths, several limitations must be acknowledged. First, outcome assessment relied predominantly on unidimensional pain intensity scales such as VAS and NRS. While these instruments are validated and facilitate quantitative synthesis, they do not capture the multidimensional nature of neuropathic pain. Notably, none of the included studies used standardized neuropathic pain–specific instruments, and neurological or functional outcomes were inconsistently reported. This lack of comprehensive and standardized assessment limits the ability to fully characterize the clinical effect of the intervention.

Second, the evidence base remains predominantly observational. Although some studies reported postoperative modifications in medical treatment, these data were rarely quantified. Further, no study included a medical management control group, hindering any possible meaningful comparison between surgical and non-surgical approaches. As a result, while our findings support the effectiveness of surgery in reducing pain, they do not allow any conclusions regarding its relative benefit compared with optimized medical management.

Third, substantial clinical heterogeneity must be considered. The frequent use of concomitant pelvic procedures, along with the variability in inclusion criteria across studies, might have influenced the observed outcomes. In addition, heterogeneity in surgical approaches likely contributed to outcome variability. Differences between techniques primarily relate to visualization and instrument articulation, which might influence surgical precision and, consequently, the accurate identification of pelvic neural structures and the ability to achieve targeted decompression.

Finally, the lack of long-term follow-up data represents an important limitation. Most studies reported short- to mid-term outcomes, with only limited data beyond 24 months. This restricts the ability to assess the durability of pain relief and the long-term risk of recurrence.

Despite these limitations, the magnitude and consistency of postoperative pain improvement observed across studies strongly suggest that laparoscopic decompression represents a clinically meaningful therapeutic option for individuals with sciatic pain secondary to endometriotic involvement of neural structures. The relatively low rate of major nerve-related complications further supports the feasibility of this approach when performed by surgeons with expertise in advanced laparoscopy and pelvic neuroanatomy.

This review also identifies several priorities for future research. Prospective studies using standardized diagnostic criteria and harmonized outcome measures are essential to more accurately define the effectiveness of laparoscopic nerve decompression. In particular, future studies should incorporate multidimensional assessment approaches, combining pain intensity scales, neuropathic pain–specific instruments, and standardized neurological and functional outcome measures to better capture the complexity of neuropathic pain and treatment response.

In addition, longer-term follow-up is needed to assess the durability of treatment effects and the risk of recurrence over time. Comparative studies evaluating surgical and medical management strategies are required to clarify relative efficacy and safety.

Further research should specifically investigate the impact of surgical techniques on clinical outcomes, including comparisons between different surgical modalities. Such studies should also incorporate validated patient-reported outcomes, such as functional capacity and return to work, to better capture the broader postoperative impact. Finally, research focusing on perioperative medical management might help identify modifiable factors to optimize

outcomes and reduce the risk of persistent or recurrent pain following decompression.

AUTHOR CONTRIBUTIONS

C.R. conceived and designed the study, registered the protocol, performed the literature search, contributed to study selection, data extraction, risk-of-bias assessment, conducted the data analysis, and drafted the manuscript. J.F. contributed to the study design, literature search, study selection, data extraction, and risk-of-bias assessment. M.C. contributed to data extraction, risk-of-bias assessment, and arbitration of discrepancies. A.C. contributed to data interpretation and provided clinical expertise from a patient-centered perspective. R.C. and M.M. critically reviewed the manuscript for important intellectual content. All authors approved the final version of the manuscript.

ACKNOWLEDGMENTS

Open access publication funding provided by COUPERIN CY26.

FUNDING INFORMATION

This research received no specific grant or financial support from any funding agency in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST STATEMENT

All authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

All data analyzed in this study were obtained from previously published articles. The dataset is available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study is a systematic review and meta-analysis of previously published data and did not involve direct participation of human subjects or the use of identifiable personal information. Ethical approval and informed consent were, therefore, not required.

ORCID

Camille Racca https://orcid.org/0009-0006-1248-7452
Marion Cahen https://orcid.org/0009-0004-1410-1352
Raphaël Cinotti https://orcid.org/0000-0001-9217-8532

REFERENCES

1. Horne AW, Missmer SA. Pathophysiology, diagnosis, and management of endometriosis. *BMJ*. 2022;379:e070750.
2. Howard FM. Endometriosis and mechanisms of pelvic pain. *J Minim Invasive Gynecol*. 2009;16:540-550.
3. Maddern J, Grundy L, Castro J, Brierley SM. Pain in endometriosis. *Front Cell Neurosci*. 2020;14:590823.
4. De Graaff AA, D'Hooghe TM, Dunselman GA, et al. The significant effect of endometriosis on physical, mental and social wellbeing: results from an international cross-sectional survey. *Hum Reprod*. 2013;28:2677-2685.
5. Gentles A, Goodwin E, Bedaiwy Y, Marshall N, Yong PJ. Nociplastic pain in endometriosis: a scoping review. *J Clin Med*. 2024;13:7521.
6. Coxon L, Wiech K, Vincent K. Is there a neuropathic-like component to endometriosis-associated pain? Results from a large cohort questionnaire study. *Front Pain Res (Lausanne)*. 2021;2:743812.
7. Bouko-Levy E, Auditeau E, Margueritte F, Lacorre A, Gauthier T. Prevalence of neuropathic pain in patients with symptomatic endometriosis: assessment using the DN4 score. *Eur J Obstet Gynecol Reprod Biol*. 2024;300:196-201.
8. Dolci C, Jean Dit Gautier E, Lannez L, Lebuffe G, Wattier JM, Rubod C. Neuropathic-like pain affects pain perception in patients with deep endometriosis: an observational study. *Arch Gynecol Obstet*. 2025;312:1789-1797.
9. Siquara De Sousa AC, Capek S, Amrami KK, Spinner RJ. Neural involvement in endometriosis: review of anatomic distribution and mechanisms. *Clin Anat*. 2015;28:1029-1038.
10. Possover M, Rhiem K, Chiantera V. The "laparoscopic neuronavigation" (LANN): from functional cartography of the pelvic autonomic nervous system to a new field of laparoscopic surgery. *Minim Invasive Ther Allied Technol*. 2004;13:362-367.
11. Gharaei H, Gholampoor N. The role of interventional pain management strategies for neuropathic pelvic pain in endometriosis. *Pain Physician*. 2023;26:E487-E495.
12. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71.
13. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. *JAMA*. 2000;283:2008-2012.
14. Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variance from the median, range, and sample size. *BMC Med Res Methodol*. 2005;5:13.
15. Clavien PA, Barkun J, de Oliveira ML, et al. The Clavien–Dindo classification of surgical complications: five-year experience. *Ann Surg*. 2009;250:187-196.
16. Munn Z, Barker TH, Moola S, et al. Methodological quality of case series studies: an introduction to the JBI critical appraisal tool. *JBI Evid Synth*. 2020;18:2127-2133.
17. Moola S, Munn Z, Tufanaru C, et al. Systematic reviews of etiology and risk. In: Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. JBI; 2020.
18. Barker TH, Stone JC, Sears K, et al. The revised JBI critical appraisal tool for the assessment of risk of bias for randomized controlled trials. *JBI Evid Synth*. 2023;21:494-506.
19. Brozon AGS, Rios XR, Flores JP, et al. Multimodal neurophysiological monitoring during laparoscopic pelvic nerve decompression in deep endometriosis: results from a prospective single-center cohort. *Med Res Arch*. 2025;13:7.
20. Hudelist G, Darici Kurt E, Szabó G, Miklos D, Hudelist T, Bokor A. Surgical outcomes of women undergoing radical resection of deep endometriosis of the sacral plexus: a prospective cohort study. *Acta Obstet Gynecol Scand*. 2025;104:95-101.
21. Massimello F, Merlot B, Chanavaz-Lacheray I, et al. Robotic-assisted versus conventional laparoscopic management of deep endometriosis involving the sacral plexus and sciatic nerve. *Int J Gynecol Obstet*. 2024;167:839-850.
22. Roman H, Dehan L, Merlot B, et al. Postoperative outcomes after surgery for deep endometriosis of the sacral plexus and sciatic nerve. *J Minim Invasive Gynecol*. 2021;28:1375-1383.
23. Lemos N, Sermer C, Fernandes G, et al. Laparoscopic approach to refractory extraspinal sciatica and pudendal pain caused by intrapelvic nerve entrapment. *Sci Rep*. 2021;11:10820.
24. Possover M. Five-year follow-up after laparoscopic large nerve resection for deep infiltrating sciatic nerve endometriosis. *J Minim Invasive Gynecol*. 2017;24:822-826.
25. Lemos N, D'Amico N, Marques R, Kamergorodsky G, Schor E, Girão MJ. Recognition and treatment of endometriosis involving the sacral nerve roots. *Int Urogynecol J*. 2016;27:147-150.

26. Possover M, Schneider T, Henle KP. Laparoscopic therapy for endometriosis and vascular entrapment of sacral plexus. *Fertil Steril*. 2011;95:756-758.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Racca C, Franken J, Cahen M, Cicchelero A, Mormont M, Cinotti R. Efficacy and safety of laparoscopic nerve decompression for neuropathic sciatic pain due to endometriosis: A systematic review and meta-analysis. *Int J Gynecol Obstet*. 2026;00:1-11. doi:10.1002/ijgo.71087