



ISON Guidelines for the Diagnosis and Surgical Management of Endometriosis of the Sciatic Nerve and Sacral Plexus

International Society of Neuropelveology (ISON)

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Abstract

Endometriosis involving the sacral plexus and the sciatic nerve represents one of the most severe, disabling, and least recognized forms of deep infiltrating endometriosis. Although isolated historical reports of catamenial sciatica exist, the neuropelvic understanding of pelvic nerve endometriosis has only emerged during the last two decades through the development of laparoscopic neurofunctional pelvic surgery and systematic exploration of the pelvic somatic nerves.

These ISON Guidelines summarize the current neuropelvic concepts regarding the diagnosis, pathophysiology, and surgical management of endometriosis of the sacral plexus and sciatic nerve. Emphasis is placed on the distinction between sacral plexus endometriosis and isolated sciatic nerve endometriosis, two entities that differ considerably in anatomical origin, clinical presentation, biological behavior, and surgical implications.

Sacral plexus endometriosis most commonly results from secondary infiltration of pelvic nerves by deeply infiltrating parametric or retroperitoneal endometriosis. In contrast, isolated sciatic nerve endometriosis behaves as a primary intraneural disease characterized by

intraneural endometrioma formation, progressive axonal destruction, retroperitoneal fibrosis, and severe neurological impairment including foot drop and gait disorders.

The guidelines are based on one of the world's largest clinical and surgical experiences in pelvic nerve endometriosis, including more than 600 patients treated over more than 20 years of neuropelvic practice, as well as the largest published surgical series on isolated sciatic nerve endometriosis and sacral radiculopathies.

These guidelines aim to establish standardized principles for clinical evaluation, neurological examination, imaging, surgical indications, laparoscopic nerve decompression, intrafascicular neurolysis, partial nerve resection, nerve-sparing techniques, and postoperative neurological rehabilitation. They further emphasize that successful management of pelvic nerve endometriosis requires advanced knowledge of retroperitoneal pelvic neuroanatomy and should be performed only in specialized centers trained in neuropelvic surgery and neurofunctional pelvic surgery.

1. History

Endometriosis involving the sacral plexus and the sciatic nerve represents one of the most severe and least recognized forms of deep infiltrating endometriosis. Although isolated descriptions of catamenial sciatica had been reported previously in the literature, these observations remained anecdotal for decades and were not associated with a clear neuropathological understanding, standardized diagnostic workup, or reproducible surgical treatment strategy ^{1,2}.

Before the development of neuropelvic surgery, symptoms such as cyclical sciatica, pudendal neuralgia, gluteal pain, vulvodynia, gait disorders, or bladder dysfunctions were rarely associated with pelvic nerve pathologies. Most patients were investigated exclusively from orthopedic, spinal, neurological, or psychiatric perspectives, frequently resulting in years of diagnostic delay and inadequate treatment.

The modern neuropelvic understanding of endometriosis of the pelvic somatic nerves began with the development of laparoscopic neurofunctional surgery and the systematic exposure of the pelvic nerves by Marc Possover and collaborators in the early 2000s. The introduction of the LANN technique (Laparoscopic Neuronavigation) enabled, for the first time, safe laparoscopic identification and functional assessment of the sacral roots ^{3,4}, sacral plexus, sciatic nerve, pudendal nerve, and gluteal nerves during pelvic surgery ⁵.

In 2007, Possover et al. published the first series describing laparoscopic neurolysis of the sacral plexus and sciatic nerve for extensive endometriosis of the pelvic wall ⁶. This publication established the feasibility of laparoscopic nerve-sparing surgery for endometriotic infiltration of the pelvic somatic nerves and introduced a completely new surgical field at the intersection of gynecologic surgery, neurosurgery, and pelvic neuroanatomy.

In the same year, Possover and Chiantera reported the first description of isolated infiltrative endometriosis of the sciatic nerve ⁷. This landmark publication demonstrated that endometriosis may arise directly within the sciatic nerve itself, independently from rectovaginal, ovarian, or parametric endometriosis. This observation fundamentally changed the understanding of pelvic nerve endometriosis and established isolated sciatic nerve endometriosis as a distinct clinical and pathological entity.

Subsequent neuropelveological studies progressively demonstrated that endometriosis of the sciatic nerve and endometriosis of the sacral plexus should not be considered the same disease merely because both contain endometriotic tissue. Clinical experience and surgical observations showed major differences in origin, morphology, symptomatology, progression, and neurological consequences between these entities).

Sacral plexus endometriosis most frequently results from deeply infiltrating parametric or retroperitoneal endometriosis extending secondarily toward the sacral roots and pelvic nerves. In contrast, isolated sciatic nerve endometriosis behaves as a primary intraneural disease, characterized by the development of intraneural endometriomas with progressive axonal destruction, retroperitoneal fibrosis, and secondary infiltration of adjacent muscles and nerves. The distinction between both entities became progressively clearer through one of the largest worldwide neuropelveological experiences in pelvic nerve surgery:

- 213 consecutive patients with sacral radiculopathies and sciatic pain of endopelvic origin ⁸.
- 259 laparoscopic surgeries for sciatic nerve endometriosis with long-term neurological follow-up ⁹.
- 267 consecutive patients specifically analyzed for isolated sciatic nerve endometriosis and its pathophysiology ¹⁰.

These studies demonstrated that isolated sciatic nerve endometriosis is not simply an extension of pelvic endometriosis but may represent a unique form of intraneural endometriosis with its own biological behavior and evolution. The disease appears to begin with the formation of an intraneural endometrioma, followed by progressive perineural fibrosis, retroperitoneal extension, muscular infiltration, and secondary involvement of adjacent nerves.

The development of neuropelveology has therefore profoundly transformed the understanding, diagnosis, and surgical management of pelvic nerve endometriosis.

Endometriosis of the sciatic nerve and sacral plexus is no longer considered an anecdotal pathology, but a distinct neuropathological disease spectrum requiring specific neurological evaluation, dedicated imaging, and advanced laparoscopic nerve surgery performed by surgeons trained in retroperitoneal pelvic neuroanatomy and neurofunctional surgery.

In the years following the initial Neuropelveological description of laparoscopic management of sciatic and sacral plexus endometriosis, additional groups from the field of endometriosis surgery contributed to increasing awareness of these rare entities ¹¹⁻¹³.

2. Neuropelveological classification

From a neuropelveological perspective, endometriosis involving the sacral plexus and sciatic nerve should not be considered a single homogeneous disease entity. Clinical observations, laparoscopic findings, and long-term neurological follow-up demonstrate major differences in anatomical origin, biological behavior, progression, and neurological consequences between the various forms of pelvic nerve endometriosis.

For these reasons, a neuropathological classification of pelvic nerve endometriosis is proposed to facilitate diagnostic evaluation, surgical planning, prognostic assessment, and standardized communication among neuropelveological centers.

Type I - Secondary Sacral Plexus Endometriosis

Type I lesions correspond to secondary infiltration of the sacral plexus or sacral roots by deeply infiltrating pelvic endometriosis originating from adjacent parametrial, uterosacral, rectovaginal, or retroperitoneal disease.

In this form, endometriosis initially develops outside the nerve and progressively extends toward neural structures. Neurological symptoms are therefore secondary to external neural compression, inflammatory infiltration, or perineural fibrosis.

Clinical presentation may include:

- sacral radiculopathy,
- cyclical S2-sciatic pain,
- pudendal neuralgia,
- gluteal/lower back pain,
- bladder/bowel dysfunction,
- pelvic visceral pain.

Neurological deficits are often moderate during early disease stages, and nerve preservation is frequently achievable through laparoscopic neurolysis and decompression.

Type II - Isolated Intraneural Sciatic Nerve Endometriosis (Early Stage)

Type II lesions correspond to primary intraneural endometriotic lesions developing directly within the sciatic nerve itself, typically at the endopelvic segment proximal to the greater sciatic foramen.

At this stage, the disease is generally limited to small intraneural hemorrhagic lesions or intraneural endometriomas without major retroperitoneal fibrosis or extensive surrounding infiltration.

Clinical manifestations are predominantly characterized by:

- cyclical catamenial sciatica: Cyclical or catamenial sciatic pain typically represents only the early stage of isolated sciatic nerve endometriosis. As the disease progresses, repetitive intraneural bleeding and chronic inflammatory fibrosis progressively induce irreversible axonal damage, leading to transformation of the initially cyclical pain into permanent neuropathic pain. During the early phases of disease evolution, hormonal suppression or medical treatment for endometriosis may partially reduce the cyclical inflammatory activity and temporarily improve symptoms. However, such improvement is often incomplete and usually transient. With progressive intraneural fibrosis and neural destruction, medical therapy alone generally becomes insufficient to prevent neurological deterioration and chronic neuropathic pain progression.
- neuropathic L5-S1 sciatic pain,
- positional exacerbation,
- minimal or absent motor deficit.

Neurological examination may remain nearly normal despite severe cyclical neuropathic pain.

Type III - Advanced Intraneural Sciatic Nerve Endometriosis

Type III lesions represent progressive evolution of isolated intraneural sciatic nerve endometriosis with chronic intraneural bleeding, progressive fibrosis, fascicular destruction, and severe axonal damage.

This stage is characterized by:

- intraneural fibrosis,
- extensive retroperitoneal inflammatory reaction,
- muscular infiltration,
- secondary involvement of adjacent pelvic nerves.

Clinical manifestations frequently include:

- permanent neuropathic pain,
- motor weakness,
- gluteal muscle atrophy,
- Trendelenburg gait,
- foot drop,
- severe gait impairment.

Surgical management at this stage may require complex intrafascicular neurolysis, partial nerve resection, or extensive laparoscopic nerve decompression.

Type IV - Multineural Neuropelvecological Endometriosis

Type IV lesions correspond to extensive pelvic neuropelvecological disease involving multiple pelvic nerves simultaneously.

In addition to the sciatic nerve, associated involvement may affect:

- sacral roots,
- pudendal nerve,
- gluteal nerves,
- obturator nerve,
- autonomic pelvic nerves.

This advanced form frequently combines somatic and autonomic neurological dysfunction and may present with:

- complex pelvic neuropathic pain syndromes,
- bladder hypersensitivity,
- urinary dysfunction,
- bowel dysfunction,
- sexual dysfunction,
- multifocal neurological deficits.

These patients often require highly specialized multidisciplinary neuropelvecological management and long-term postoperative rehabilitation.

Neuropelvecological Relevance of the Classification

This proposed classification reflects the concept that pelvic nerve endometriosis represents a progressive neuropathological disease spectrum rather than a single uniform entity.

Distinguishing between secondary sacral plexus infiltration and primary intraneural sciatic nerve endometriosis is essential because both conditions differ substantially regarding:

- pathogenesis,
- biological behavior,

- neurological evolution,
- surgical strategy,
- prognosis,
- risk of irreversible axonal damage.

This neuropelvic classification may therefore contribute to improved diagnostic standardization, earlier recognition of neurological involvement, optimization of surgical timing, and more accurate long-term functional outcome evaluation.

3. Pathogenesis of isolated sciatic nerve endometriosis

Unlike sacral plexus endometriosis, which most frequently develops by secondary extension of deeply infiltrating parametrial or retroperitoneal endometriosis toward the sacral roots and pelvic nerves, isolated sciatic nerve endometriosis (ESN) appears to behave as a primary intraneural disease.

The concept of isolated ESN fundamentally differs from classical theories of pelvic endometriosis. During laparoscopic exploration, isolated ESN is characterized initially by the presence of small intraneural endometriomas located within the endopelvic portion of the sciatic nerve, typically after emergence of the superior gluteal nerve and before passage through the greater sciatic foramen. With disease progression, repetitive intraneural bleeding induces progressive fibrosis, retroperitoneal inflammatory extension, and secondary infiltration of adjacent muscles and nerves.

Based on the analysis of 267 surgically treated patients, it was proposed that isolated ESN does not represent multiple distinct forms of disease, but rather different evolutionary stages of one unique intraneural pathological process. Early stages are dominated by cyclical sciatica without neurological deficit, whereas advanced disease leads to progressive axonal destruction with motor impairment, foot drop, gluteal muscle atrophy, and involvement of adjacent pelvic nerves.

These findings challenge classical pathogenetic theories of endometriosis such as Sampson's retrograde menstruation hypothesis, lymphatic or hematogenous dissemination, and coelomic metaplasia. None of these mechanisms adequately explains how endometriosis can arise primarily within the sciatic nerve, a structure anatomically isolated from the peritoneal cavity and genital tract.

A novel hypothesis was therefore proposed suggesting that isolated ESN may originate from progenitor or stem-like cells located within the peripheral nerve itself¹⁰. Experimental studies have demonstrated that adult peripheral nerves contain precursor cells capable of proliferation and multilineage differentiation after injury or inflammation. Furthermore, damaged peripheral nerves may recruit mesenchymal progenitor cells and bone marrow - derived stem cells involved in tissue repair and regeneration^{14,16}.

The sciatic nerve may be particularly susceptible to such mechanisms because of its unique anatomical and biomechanical characteristics. As the largest peripheral nerve of the body, the sciatic nerve is exposed to repetitive torsion, traction, compression, and friction forces,

especially at the endopelvic segment where the nerve changes direction and passes through the greater sciatic foramen. Repetitive microtrauma and inflammatory repair processes at this specific location may induce activation and abnormal differentiation of local progenitor cells. An additional neurobiological component may involve the neuropeptide-Y (NPY) sympathetic nervous system. Earlier neuropelvicological studies demonstrated a close relationship between pelvic endometriotic lesions, neoangiogenesis, and NPY-containing sympathetic nerves within the inferior hypogastric plexus and sacrouterine ligaments¹⁶. NPY is recognized as one of the most potent angiogenic neuropeptides and plays an important role in vascular proliferation and tissue remodeling¹⁷. Experimental studies have also shown that NPY immunoreactivity increases after sciatic nerve injury.

These observations support the hypothesis that neurogenic inflammatory pathways, sympathetic nerve signaling, and regenerative stem-cell mechanisms may collectively contribute to the development of isolated sciatic nerve endometriosis. In this model, ESN would represent not merely a metastatic implantation disease, but a unique neuro-regenerative pathological process occurring within the peripheral nervous system itself.

Proposed Neuropathogenic Model of Isolated Sciatic Nerve Endometriosis

Based on cumulative neuropelvicological observations and currently available neurobiological evidence, a tentative neuropathogenic model for isolated sciatic nerve endometriosis may be proposed.

Stage 1 - Repetitive Intraneural Microtrauma

Because of its unique anatomical course through the endopelvic retroperitoneal compartment and the greater sciatic foramen, the sciatic nerve is continuously exposed to repetitive mechanical stress including traction, torsion, friction, and compression. Chronic microtrauma may induce repeated intraneural inflammatory and regenerative responses.

Stage 2 - Activation of Neural Regenerative and Stem-Cell Mechanisms

Peripheral nerves contain progenitor cells and mesenchymal precursor cells involved in tissue repair and neural regeneration. Chronic microinjury may stimulate abnormal activation, proliferation, and differentiation of these regenerative cellular populations within the sciatic nerve itself.

Stage 3 - Neurogenic Inflammation and Angiogenic Activation

Peripheral nerve injury is associated with activation of neurogenic inflammatory pathways and increased expression of neuropeptides such as neuropeptide-Y (NPY). NPY plays a major role in angiogenesis, vascular remodeling, and inflammatory tissue proliferation. Chronic sympathetic neuroinflammation may therefore contribute to the formation of a pathological microenvironment favorable to ectopic endometrial-like tissue development.

Stage 4 - Formation of Intraneural Endometrioma

The interaction between regenerative stem-cell activity, neurogenic inflammation, angiogenesis, and repetitive intraneural hemorrhage may progressively lead to the formation of intraneural endometriotic lesions or intraneural endometriomas within the sciatic nerve fascicles.

Stage 5 - Progressive Fibrosis and Axonal Destruction

Repeated cyclical bleeding and chronic inflammation induce progressive intraneural fibrosis, fascicular disorganization, and irreversible axonal destruction. Clinically, this stage corresponds to the progression from cyclical sciatic pain toward persistent neuropathic pain, motor deficits, gluteal atrophy, gait disorders, and foot drop.

Stage 6 - Secondary Retroperitoneal and Multineural Extension

In advanced disease stages, chronic fibrosis and inflammatory extension progressively involve adjacent retroperitoneal tissues, pelvic muscles, and neighboring pelvic nerves, thereby transforming an initially isolated intraneural lesion into a complex neuropelvic disease process.

This proposed model suggests that isolated sciatic nerve endometriosis may represent not merely a metastatic implantation disease, but rather a unique neuro-regenerative and neuro-inflammatory disorder originating within the peripheral nervous system itself.

4. Clinical presentation

The clinical presentation of endometriosis involving the sciatic nerve and sacral plexus is highly variable and depends on the exact neural structures involved, the degree of axonal damage, and the evolutionary stage of the disease. From a neuropelvic perspective, pelvic nerve endometriosis should be considered primarily a progressive neuropathic disorder rather than solely a gynecological disease.

One of the major diagnostic challenges is that symptoms frequently mimic orthopedic, spinal, rheumatological, urological, gastrointestinal, or even psychiatric disorders. Therefore, many patients experience years of diagnostic delay before the neuropelvic origin of their symptoms is recognized.

Also, the anatomical location and neuropathological behavior of isolated sciatic nerve endometriosis and sacral plexus endometriosis differ fundamentally, and these differences largely explain their distinct clinical presentations and neurological consequences.

Isolated sciatic nerve endometriosis typically involves the distal endopelvic portion of the sciatic nerve immediately before its passage through the greater sciatic foramen. From a neuropelvic perspective, this disease therefore develops predominantly in the supracardinal compartment, located above the cardinal ligament and superior to the internal iliac vessels. Consequently, the neurological involvement primarily affects the upper sacral contributions to the sciatic nerve, particularly the L5 and S1 components. Clinically, patients therefore predominantly present with gluteal pain, sciatic pain radiating into the lower extremity, motor dysfunction of the lower limb, gait disturbances, and progressive foot drop. In contrast, sacral plexus endometriosis most frequently develops below the cardinal ligament and below the internal iliac vessels within the infracardinal compartment of the pelvis. In this

anatomical region, the disease predominantly affects the lower sacral roots and pelvic nerves, especially S2, S3, and S4. Therefore, patients more commonly present with pudendal neuralgia, vulvodynia, dyspareunia, bladder hypersensitivity, urinary dysfunction, bowel dysfunction, and other pelvic autonomic symptoms, which are typically absent in isolated sciatic nerve endometriosis.

This anatomical distinction between supracardinal isolated sciatic nerve endometriosis and infracardinal sacral plexus endometriosis constitutes a fundamental neuropelvicological concept because it explains not only the major differences in symptomatology, but also the distinct surgical approaches, neurological risks, and long-term functional outcomes associated with these two disease entities.

4.1 Sciatic nerve endometriosis - Early Clinical Presentation

In the early stages of isolated sciatic nerve endometriosis, patients typically present with cyclical or catamenial sciatic pain occurring during menstruation. Pain usually begins in the gluteal region and radiates along the posterior aspect of the thigh and lower extremity following the anatomical distribution of the sciatic nerve.

Pain is frequently described as:

- burning,
- electric-shock-like,
- stabbing,
- deep gluteal neuropathic pain,
- radiating sciatic pain.

Positional aggravation may occur, particularly during prolonged sitting, walking, hip flexion, or physical activity.

At this stage, neurological examination may remain normal or reveal only minimal sensory abnormalities despite severe neuropathic pain. Because MRI of the spine is frequently normal, many patients are initially misdiagnosed with lumbar disc disease, piriformis syndrome, psychosomatic pain disorders, or idiopathic sciatica.

4.2 Sciatic nerve endometriosis - Evolution Toward Chronic Neuropathic Pain

Cyclical pain generally represents only the initial stage of disease evolution. With progressive intraneural bleeding, chronic inflammation, and perineural fibrosis, pain progressively loses its cyclical character and becomes permanent.

Although hormonal suppression or medical treatment for endometriosis may temporarily reduce cyclical inflammatory activity and partially improve symptoms during early disease stages, this benefit is often incomplete and transient. Progressive intraneural fibrosis and axonal destruction ultimately lead to chronic neuropathic pain that no longer responds adequately to medical therapy alone.

Patients progressively develop:

- constant sciatic pain,
- gluteal pain,
- neuropathic dysesthesia,
- allodynia,

- hyperesthesia,
- nocturnal pain,
- positional pain exacerbation.

At this stage, pain frequently becomes severely disabling and significantly impairs quality of life.

4.3 Sciatic nerve endometriosis - Progressive Neurological Deficits

Advanced isolated sciatic nerve endometriosis is characterized by progressive axonal destruction and neurological impairment with weakness of foot dorsiflexion, weakness of plantar flexion, toe motor deficits, gluteal muscle weakness, Trendelenburg gait, foot drop and gait instability.

Muscular denervation may progressively lead to gluteal atrophy and lower limb/calf muscular asymmetry.

Sensory abnormalities may include:

- hypoesthesia,
- dermatomal sensory deficits,
- dysesthesia,
- saddle sensory abnormalities,
- neuropathic trigger zones.

In severe cases, secondary involvement of adjacent pelvic nerves and sacral roots may induce multifocal neurological deficits.

4.4 Sacral Plexus Endometriosis

Clinical presentation differs substantially in patients with secondary sacral plexus endometriosis. Because sacral plexus involvement most frequently results from secondary infiltration by deeply infiltrating pelvic endometriosis, symptoms are often associated with concomitant pelvic disease.

Patients may present with:

- sacral radiculopathy,
- pelvic pain,
- pudendal neuralgia,
- vulvodynia,
- dyspareunia,
- bladder hypersensitivity,
- urinary dysfunction,
- bowel dysfunction,
- gluteal pain.

Compared with isolated intraneural sciatic nerve endometriosis, neurological deficits are often less severe during early disease stages because neural damage initially results predominantly from external inflammatory infiltration and fibrosis rather than primary intrafascicular destruction.

4.5 Neuropelvic Perspective

From a neuropelveological perspective, progression from cyclical neuropathic pain toward permanent neurological deficits represents one of the most important clinical characteristics of isolated sciatic nerve endometriosis.

The evolution from intermittent inflammatory symptoms toward irreversible axonal destruction emphasizes the importance of early recognition, accurate neuropelveological diagnosis, and timely surgical management before permanent neurological damage occurs.

5. Neuropelveological examination

Comprehensive neuropelveological examination represents one of the most important steps in the diagnostic work-up of patients with suspected endometriosis involving the sciatic nerve or sacral plexus. Conventional gynecological examination alone is insufficient because pelvic nerve endometriosis is fundamentally a neurological disease affecting somatic and autonomic pelvic nerves ¹⁸.

The primary objectives of the neuropelveological examination are:

- identification of the involved nerve structures,
- evaluation of the degree of axonal damage,
- differentiation between supracardinal sciatic nerve disease and infracardinal sacral plexus disease,
- assessment of motor, sensory, and autonomic dysfunction,
- exclusion of differential neurological diagnoses,
- establishment of a functional baseline prior to surgery.

5.1 Neuropelveological History

Detailed neuropelveological history-taking remains the cornerstone of diagnosis. In many patients, the clinical history already strongly suggests the involved pelvic nerve before imaging studies are performed.

Special attention should be paid to:

- cyclical versus permanent pain,
- progression of symptoms,
- response to hormonal therapy,
- positional pain aggravation,
- gait disturbances,
- lower limb weakness,
- bladder hypersensitivity,
- urinary dysfunction,
- bowel dysfunction,
- sexual dysfunction,
- vulvodynia,
- pudendal symptoms.

One of the most important neuropelveological characteristics in the clinical history of isolated sciatic nerve endometriosis is the remarkably rapid progression from cyclical neuropathic pain toward neurological impairment.

In contrast to vascular entrapment syndromes, where severe neuropathic pain may persist for many years in the absence of objective neurological deficits, isolated sciatic nerve endometriosis behaves as an invasive and neurodestructive disease. Once the endometriotic process infiltrates the sciatic nerve, progressive axonal destruction frequently develops within a relatively short period of time. In many patients, clinically detectable neurological deficits appear within only one to two years after onset of sciatic symptoms. This rapid neurological evolution constitutes a major diagnostic and differential neuropelvic feature. Patients progressively develop motor dysfunction including gluteal weakness, Trendelenburg gait, foot drop, gait instability, and muscular atrophy, reflecting progressive destruction of the sciatic nerve fascicles.

By contrast, in sacral plexus endometriosis, neurological deterioration generally evolves much more slowly over many years. Because the disease most frequently develops in the infracardinal compartment below the cardinal ligament and internal iliac vessels, the lower sacral roots and pelvic splanchnic nerves (predominantly S2-S4) are more commonly affected. Consequently, early neurological manifestations often involve autonomic pelvic dysfunction such as bladder hypersensitivity, urinary dysfunction, bowel dysfunction, or sexual dysfunction rather than severe lower limb motor deficits.

Direct motor impairment involving the sacral roots themselves, particularly S2 motor dysfunction, remains comparatively uncommon in sacral plexus endometriosis and generally appears only in advanced disease stages.

The rapid progression toward neurological deficits therefore represents one of the cardinal neuropelvic criteria differentiating isolated sciatic nerve endometriosis from vascular entrapment syndromes and other non-destructive causes of chronic pelvic neuropathic pain.

5.2 Sensory Examination

Sensory examination should evaluate the L5-S4 dermatomes for sensory deficits, hypoesthesia, hyperesthesia, allodynia, dysesthesia, neuropathic trigger zones and saddle sensory abnormalities.

Careful mapping of sensory abnormalities frequently allows identification of the involved sacral roots and differentiation between sciatic nerve disease and sacral plexus involvement. Patients with isolated sciatic nerve endometriosis most frequently present with sensory abnormalities along the posterior lower limb corresponding predominantly to L5-S1 distribution, whereas sacral plexus endometriosis more frequently affects S2-S4 territories associated with pudendal and perineal symptoms.

5.3 Motor Examination

Motor examination is essential because progressive motor impairment may indicate advanced axonal destruction.

Examination should include evaluation of:

- foot dorsiflexion,
- plantar flexion,
- toe movements,
- gluteal muscle strength,
- hip stability,

- lower limb coordination,
- gait analysis.

Attention should be paid to Trendelenburg gait, foot drop, gait instability, gluteal and calf muscle atrophy, asymmetrical muscular wasting. Motor deficits are considerably more frequent in advanced isolated sciatic nerve endometriosis than in sacral plexus disease.

5.4 Reflex Examination

Neurological reflex evaluation should include Achilles reflex, patellar reflex, sacral reflexes, and anal reflexes. Reflex abnormalities may help localize the involved sacral roots and estimate the severity of neural impairment.

5.5 Vaginal and Rectal Neuropelvecological Palpation

Direct neuropelvecological palpation through vaginal and/or rectal examination constitutes a major component of the neuropelvecological evaluation. Palpation should systematically assess:

- sacral roots S2-S4,
- pudendal nerve sub- and infrapelvic,
- obturator nerve,
- coccygeal plexus,
- pelvic floor trigger points.

Reproduction of the patient's characteristic neuropathic pain during direct nerve palpation frequently provides highly valuable diagnostic information regarding the exact nerve involved.

The lower sacral roots, particularly S2, S3, and S4, are generally accessible to direct vaginal or rectal palpation because of their infracardinal anatomical location below the cardinal ligament and internal iliac vessels. This anatomical accessibility explains why sacral plexus endometriosis involving the lower sacral roots may frequently reproduce the patient's characteristic pain during neuropelvecological vaginal examination.

In contrast, the upper sacral roots and lumbosacral trunk, particularly L5 and S1, are usually not directly reachable by vaginal palpation. First, these neural structures are located considerably higher within the pelvis, often beyond the effective reach of the examining finger. Second, the external iliac vessels are anatomically interposed between the examiner's finger and the nerve structures themselves. Therefore, the external iliac vessels effectively form a vascular barrier separating the upper sacral nerve structures from direct vaginal palpation.

This anatomical difference constitutes another important neuropelvecological element distinguishing supracardinal sciatic nerve endometriosis from infracardinal sacral plexus disease and explains why direct vaginal palpation is considerably more informative for lesions involving S2-S4 roots and pelvic splanchnic nerves than for isolated involvement of the L5-S1 sciatic components.

5.6 Evaluation of Autonomic Dysfunction

Because sacral plexus endometriosis frequently involves S2-S4 sacral roots and autonomic pelvic pathways, evaluation of autonomic dysfunction is mandatory.

Assessment should include:

- bladder hypersensitivity,
- urinary urgency,
- urinary retention,
- incomplete bladder emptying,
- bowel dysfunction,
- constipation,
- sexual dysfunction,
- dyspareunia.

Autonomic symptoms are considerably more common in infracardinal sacral plexus endometriosis than in isolated supracardinal sciatic nerve disease.

5.7 Neuropelvelogical Perspective

Neuropelvelogical examination fundamentally differs from conventional gynecological evaluation because its primary objective is not merely identification of pelvic lesions, but functional neurological analysis of pelvic nerve integrity.

The combination of detailed neuropelvelogical history, sensory mapping, motor examination, autonomic evaluation, and direct pelvic nerve palpation frequently allows highly accurate preoperative localization of the involved nerve structures and provides essential information for surgical planning and postoperative prognosis.

6. Imaging and Functional Work-up

Comprehensive imaging and neurofunctional evaluation are mandatory in all patients with suspected endometriosis involving the sciatic nerve or sacral plexus. From a neuropelvelogical perspective, imaging must not be limited to identification of endometriotic lesions alone, but should aim to evaluate the exact neural involvement, the degree of neurological damage, the relationship between the disease and adjacent pelvic structures, and the functional consequences on somatic and autonomic pelvic nerves.

Because pelvic nerve endometriosis represents fundamentally a neurodestructive disease, radiological findings must always be interpreted in correlation with neuropelvelogical clinical examination and neurological symptomatology.

6.1 Magnetic Resonance Imaging (MRI)

Contrast-enhanced pelvic MRI remains the imaging modality of choice for evaluation of pelvic nerve endometriosis¹⁹⁻²¹.

MRI objectives include:

- identification of endometriotic lesions,
- visualization of sciatic nerve and sacral plexus involvement,
- evaluation of retroperitoneal fibrosis,
- assessment of muscular infiltration (Piriform muscle, int. Obturator muscle...),
- detection of transforaminal gluteal extension,
- evaluation of vascular relationships,

- exclusion of spinal or orthopedic differential diagnoses.

In isolated sciatic nerve endometriosis, MRI may demonstrate:

- enlargement or irregularity of the sciatic nerve,
- intraneural hemorrhagic lesions,
- endometriotic nodules,
- retroperitoneal fibrosis,
- denervation muscular atrophy,
- inflammatory extension toward adjacent muscles.

Attention should be paid to the endopelvic portion of the sciatic nerve proximal to the greater sciatic foramen, which represents the typical neuropelveloical location of isolated ESN.

In sacral plexus endometriosis, MRI more frequently demonstrates:

- parametrial deep infiltrating endometriosis,
- uterosacral ligament involvement,
- retroperitoneal fibrosis,
- infiltration around the sacral roots,
- disease extension below the cardinal ligament and internal iliac vessels.

MRI additionally plays a major role in excluding:

- lumbar disc disease,
- spinal stenosis,
- piriformis syndrome,
- Tarlov cysts,
- pelvic tumors,
- congenital malformations,
- vascular abnormalities.

However, MRI findings alone are insufficient to evaluate the functional neurological severity of the disease. The degree of neuropathic pain and axonal destruction frequently exceeds the apparent radiological abnormalities.

Neuropelveloical examination remains considerably more sensitive and functionally informative than imaging alone because it allows precise motor and sensory evaluation of each individual sacral root and therefore of the different functional components of the sciatic nerve itself.

This aspect is particularly important because the sciatic nerve - the largest peripheral nerve of the human body - is composed of multiple neural contributions originating predominantly from L5, S1, S2, and partially S3 roots. Comprehensive neurological examination therefore allows functional assessment of the different fascicular territories of the sciatic nerve and enables accurate estimation of the degree and localization of axonal damage.

In contrast to MRI, which mainly provides anatomical visualization of lesions and surrounding fibrosis, neuropelveloical examination allows direct functional evaluation of:

- motor impairment,
- sensory deficits,
- reflex abnormalities,
- autonomic dysfunction,
- progression of neurological deterioration.

This explains why detailed neuropelvecological examination frequently provides more clinically relevant information regarding the severity and functional consequences of pelvic nerve endometriosis than imaging studies alone.

6.2 Transvaginal Neuropelvecological Ultrasound

Transvaginal ultrasound performed by an experienced neuropelvecological examiner may provide highly valuable complementary information.

Ultrasound evaluation should include:

- parametrial endometriosis,
- uterosacral ligaments,
- retroperitoneal fibrosis,
- pelvic vascular abnormalities,
- dilated sacral or gluteal veins,
- bladder morphology,
- pelvic floor assessment.

Dynamic neuropelvecological ultrasound may also help evaluate:

- bladder filling,
- bladder emptying,
- pelvic organ mobility,
- painful trigger zones during direct probe pressure.

From a neuropelvecological perspective, transvaginal examination additionally allows simultaneous clinical correlation between imaging findings and direct nerve palpation.

In addition to MRI, transvaginal neuropelvecological ultrasound combined with Doppler-flow evaluation plays a major role in the assessment of pelvic vascular abnormalities associated with chronic pelvic neuropathic pain syndromes.

Compared with MRI, transvaginal Doppler ultrasound is frequently considerably more sensitive for the identification of pelvic varicosities, venous dilatation, and pathological reverse venous flow, particularly in patients presenting with vascular entrapment syndromes involving the sacral plexus or pelvic nerves ²².

Special attention should be paid to:

- dilated sacral veins,
- gluteal venous dilatation,
- parametrial varicosities,
- reverse venous flow,
- venous reflux during Valsalva maneuver,
- venous diameters exceeding 5–6 mm.

From a neuropelvecological perspective, these vascular abnormalities may contribute to chronic compression or irritation of the sacral roots and pelvic nerves, particularly within the infracardinal compartment below the cardinal ligament and internal iliac vessels.

Dynamic transvaginal Doppler examination may additionally allow indirect visualization of vascular relationships surrounding the sacral roots and pelvic nerve pathways. In experienced hands, ultrasound examination may even contribute to functional assessment of the sacral plexus region and facilitate identification of painful trigger zones corresponding to vascular entrapment of pelvic nerves.

Importantly, vascular entrapment syndromes may clinically mimic isolated sciatic nerve endometriosis because both conditions frequently present with severe neuropathic sciatic pain, gluteal pain, vulvodynia, or sacral radiculopathy. However, unlike isolated sciatic nerve endometriosis, vascular entrapment syndromes usually evolve over many years without rapid progression toward motor deficits, foot drop, or severe axonal destruction.

For these reasons, transvaginal Doppler ultrasound represents an essential complementary neuropelvineological investigation, particularly for differentiation between vascular entrapment syndromes and destructive intraneural endometriotic disease.

6.3 Neuro-Urological Functional Evaluation

Because sacral plexus endometriosis frequently involves S2-S4 roots and pelvic splanchnic nerves, neuro-urological functional assessment may become essential. Evaluation may include:

- uroflowmetry,
- sonographic post-void residual urine measurement,
- urodynamic studies,
- urethral sphincter electromyography,
- bladder sensitivity assessment.

These investigations allow objective evaluation of:

- neurogenic bladder dysfunction,
- bladder atonia
- bladder hypersensitivity,
- urinary retention,
- detrusor dysfunction,
- sphincter coordination abnormalities,
- autonomic pelvic nerve impairment.

Establishing a precise preoperative neurofunctional baseline is particularly important for postoperative comparison and long-term neurological follow-up.

6.4 Electrophysiological Evaluation

Electrophysiological studies may provide complementary information regarding the severity of axonal damage and denervation. Depending on the clinical presentation, evaluation may include:

- electromyography (EMG),
- nerve conduction studies,
- pudendal nerve terminal motor latency,
- lower limb neurophysiological studies.

Electrophysiological abnormalities are particularly valuable in advanced isolated sciatic nerve endometriosis associated with:

- foot drop,
- gluteal denervation,
- muscular atrophy,
- severe motor dysfunction.

However, normal electrophysiological findings do not exclude early-stage intraneural disease.

6.5 Neuropelvecological Imaging Perspective

From a neuropelvecological perspective, imaging should never be interpreted as purely anatomical visualization of endometriosis. The fundamental objective is integration of radiological findings with clinical neurological examination to establish a functional diagnosis of pelvic nerve involvement.

The combination of MRI, neuropelvecological examination, transvaginal ultrasound, neuro-urological assessment, and electrophysiological studies frequently allows accurate differentiation between:

- isolated sciatic nerve endometriosis,
- sacral plexus endometriosis,
- vascular entrapment syndromes,
- spinal disorders,
- and other causes of chronic pelvic neuropathic pain.

Such integrated neurofunctional evaluation is essential for accurate surgical indication, operative planning, patient counseling, and long-term neurological prognosis.

7. Differential diagnosis

The diagnosis of endometriosis involving the sciatic nerve and sacral plexus remains particularly challenging because the clinical presentation frequently mimics numerous orthopedic, spinal, neurological, vascular, urological, and psychosomatic disorders. Consequently, many patients experience prolonged diagnostic delay and frequently undergo inappropriate treatments before the neuropelvecological origin of their symptoms is recognized.

From a neuropelvecological perspective, differential diagnosis must systematically distinguish between:

- destructive intraneural disease,
- inflammatory pelvic nerve infiltration,
- vascular nerve entrapment,
- spinal pathology,
- peripheral neuropathies,
- musculoskeletal disorders,
- and functional pain syndromes.

Comprehensive neuropelvecological examination combined with imaging and neurofunctional evaluation is therefore essential.

7.1 Lumbar Disc Disease and Spinal Pathology

Lumbar disc herniation and spinal degenerative disease represent the most frequent initial misdiagnoses in patients with isolated sciatic nerve endometriosis. Because patients typically present with sciatic pain radiating into the lower extremity, many undergo repeated spinal investigations, physiotherapy, spinal infiltrations, or even spinal surgery despite the absence of significant lumbar pathology.

However, several neuropelvic features may suggest pelvic nerve endometriosis rather than spinal disease:

- cyclical or catamenial symptom onset,
- association with menstruation,
- concomitant pelvic symptoms,
- gluteal trigger pain,
- progression despite normal spinal MRI,
- rapid evolution toward neurological deficits.

Importantly, isolated sciatic nerve endometriosis frequently progresses toward motor deficits within one to two years, whereas many spinal disorders evolve considerably more slowly.

7.2 Piriformis Syndrome

Piriformis syndrome may clinically resemble isolated sciatic nerve endometriosis because both conditions may induce gluteal pain and sciatic irritation.

However, piriformis syndrome usually remains non-destructive and rarely progresses toward severe motor deficits or foot drop. In contrast, isolated sciatic nerve endometriosis behaves as an invasive intraneural disease associated with progressive axonal destruction.

The presence of cyclical symptoms, rapid neurological progression, gluteal atrophy, and MRI evidence of intrapelvic disease strongly favors endometriosis.

7.3 Vascular Entrapment Syndromes

Vascular entrapment syndromes constitute one of the most important differential diagnoses from a neuropelvic perspective ^{8,23}.

Dilated sacral, gluteal, or parametrial veins may chronically compress or irritate the sacral roots and pelvic nerves, thereby inducing symptoms remarkably like pelvic nerve endometriosis, including:

- sciatic pain ²⁴,
- sacral radiculopathy,
- vulvodynia,
- pudendal neuralgia ²⁵,
- bladder hypersensitivity,
- gluteal pain.

However, unlike isolated sciatic nerve endometriosis, vascular entrapment syndromes generally remain non-destructive. Severe neuropathic pain may persist for many years without objective neurological deterioration.

The absence of rapid motor progression therefore constitutes a major differential diagnostic criterion. Patients with vascular entrapment rarely develop:

- Trendelenburg gait,
- foot drop,
- severe gluteal atrophy,
- major axonal destruction.

Transvaginal Doppler ultrasound frequently plays a major role in identifying:

- dilated pelvic veins,
- venous reflux,

- reverse flow,
- venous diameters exceeding 5–6 mm,
- vascular compression adjacent to pelvic nerves.

Another major neuropelvineological element differentiating vascular entrapment syndromes from isolated sciatic nerve endometriosis concerns the laterality of the disease. In addition to the absence of progressive motor deficits in vascular entrapment syndromes, vascular compression of the sacral plexus and pelvic nerves is bilateral in more than 80% of cases. Patients therefore frequently present with bilateral neuropathic symptoms, bilateral sacral radiculopathy, bilateral pudendal symptoms, or bilateral gluteal pain.

In contrast, isolated sciatic nerve endometriosis is overwhelmingly unilateral. Based on the largest currently available neuropelvineological experience, including more than 600 cases collected by Possover over approximately 25 years, only a single bilateral case of isolated sciatic nerve endometriosis has been observed. All other cases were unilateral, with clear predominance of right-sided involvement compared with the left side.

7.4 Pudendal Neuralgia and Alcock Canal Syndrome

Sacral plexus endometriosis involving S2-S4 roots may clinically mimic pudendal nerve entrapment syndromes. Patients may present with:

- vulvodynia,
- perineal pain,
- dyspareunia,
- sitting intolerance,
- bladder hypersensitivity,
- bowel dysfunction.

However, pure Alcock canal syndrome typically does not induce major sacral radiculopathy, gluteal pain, or progressive lower limb neurological deficits.

Neuropelvineological examination and direct vaginal palpation of the sacral roots frequently allow differentiation between proximal sacral plexus disease and distal pudendal nerve entrapment.

7.5 Pelvic Congestion Syndrome

Pelvic congestion syndrome may coexist with vascular entrapment syndromes and produce chronic visceral pelvic pain, pelvic heaviness, dyspareunia, and bladder hypersensitivity and massive vegetative symptoms.

However, isolated pelvic congestion syndrome alone usually does not induce:

- progressive neurological deficits,
- foot drop,
- gluteal denervation,
- major neuropathic sensory abnormalities.

Neuropelvineological examination remains essential to differentiate vascular pelvic pain from true neural involvement.

7.6 Tarlov Cysts and Congenital Pelvic Lesions

Tarlov cysts are frequently detected incidentally during MRI investigations and may lead to diagnostic confusion. In most patients, Tarlov cysts do not explain the severity of neuropathic symptoms and frequently represent incidental findings unrelated to the clinical presentation.

Other important differential diagnoses include:

- anterior sacral meningoceles,
- meningocele,
- congenital pelvic cysts,
- retroperitoneal tumors,
- pelvic schwannomas.

Failure to correctly identify these lesions preoperatively may lead to inappropriate or potentially dangerous surgical interventions.

7.7 Central Neurological Disorders

Central neurological diseases capable of mimicking pelvic nerve endometriosis include:

- multiple sclerosis,
- cauda equina syndrome,
- spinal cord lesions,
- neuroborreliosis,
- peripheral polyneuropathies.

Caution is required in patients presenting with multifocal neurological deficits or atypical symptom distribution.

7.8 Psychosomatic Misdiagnosis

Because imaging findings are sometimes subtle and symptoms may initially fluctuate with menstruation, many patients with pelvic nerve endometriosis are incorrectly labeled as suffering from psychosomatic or functional pain disorders.

This diagnostic error contributes substantially to delayed diagnosis and progression toward irreversible neurological damage.

From a neuropelvic perspective, the presence of:

- cyclical neuropathic pain,
- reproducible trigger pain,
- objective neurological deficits,
- progressive motor impairment,
- gluteal atrophy,
- bladder dysfunction,
- MRI abnormalities,

should always prompt careful evaluation for pelvic nerve pathology before considering psychosomatic explanations.

8. Surgical indications

The decision to perform surgery in patients with endometriosis involving the sciatic nerve or sacral plexus must be based on comprehensive neuropelvicological evaluation integrating clinical history, neurological examination, imaging findings, neurofunctional assessment, and disease progression.

From a neuropelvicological perspective:

- isolated sciatic nerve endometriosis represents a progressive neurodestructive disease capable of inducing irreversible axonal damage within a relatively short period of time. Surgical timing therefore plays a critical role in neurological prognosis.
- the principal objective of surgery is not merely excision of endometriotic tissue, but prevention of irreversible neurological destruction and preservation of neural function.

Early surgical intervention before severe axonal degeneration develops remains one of the most important factors influencing long-term neurological outcome.

Accordingly, progressive neurological deterioration should be considered a major indication for timely neuropelvicological surgical management.

8.1 Progressive Neurological Deficits

The presence of progressive neurological impairment constitutes one of the strongest indications for surgical intervention.

Neurological deficits suggesting progressive axonal destruction include:

- foot drop,
- Trendelenburg gait,
- gluteal weakness,
- muscular atrophy,
- gait instability,
- progressive motor deficits,
- worsening sensory abnormalities.

Because isolated sciatic nerve endometriosis frequently progresses rapidly toward irreversible nerve destruction, delayed surgery may significantly compromise long-term neurological recovery.

8.2 Persistent Neuropathic Pain

Persistent severe neuropathic pain despite adequate hormonal or medical therapy represents another major indication for surgery.

Although hormonal suppression may transiently improve symptoms during early disease stages, medical treatment alone frequently becomes insufficient once progressive fibrosis and intraneural destruction have developed.

Attention should be paid to:

- permanent sciatic pain,
- severe gluteal pain,
- nocturnal neuropathic pain,
- progressive positional pain,
- disabling sacral radiculopathy,
- refractory pudendal neuralgia.

The transition from cyclical pain toward constant neuropathic pain strongly suggests progressive intraneural fibrosis and worsening axonal involvement.

8.3 Rapid Clinical Evolution

Rapid progression of symptoms constitutes a major neuropelvic warning sign favoring early surgical intervention.

One of the most characteristic features of isolated sciatic nerve endometriosis is the relatively rapid evolution from cyclical sciatic pain toward objective neurological deficits, frequently occurring within one to two years after symptom onset.

Such rapid progression fundamentally differs from vascular entrapment syndromes, where severe neuropathic pain may persist for many years without development of objective neurological deficits.

8.4 Failure of Conservative Treatment

Surgical management should be considered when:

- hormonal therapy fails,
- pain progressively worsens,
- neurological deficits appear,
- quality of life becomes severely impaired,
- repeated medical treatments provide only temporary benefit.

Repeated long-term medical suppression in the presence of progressive neurological deterioration may delay definitive treatment and increase the risk of irreversible nerve damage.

8.5 Sacral Plexus Endometriosis

In sacral plexus endometriosis, surgical indication depends not only on pain severity but also on the age of the patient, the degree of autonomic pelvic dysfunction and progression of neural infiltration.

Indications may include:

- refractory pudendal neuralgia,
- severe vulvodynia,
- bladder hypersensitivity,
- urinary dysfunction,
- bowel dysfunction,
- progressive sacral radiculopathy,
- failure of hormonal therapy.

Because sacral plexus disease frequently evolves more slowly than isolated sciatic nerve endometriosis, surgical timing must be individualized according to the degree of neurological progression and the age of the patient. In postmenopause, there is usually no indication for surgery except in persistence of severe pain.

9. Surgical principles and techniques

From a neuropelveological perspective, surgery for pelvic nerve endometriosis should never be considered routine deep infiltrating endometriosis surgery. Surgical management of endometriosis involving the sciatic nerve and sacral plexus represents one of the most complex and technically demanding procedures in modern pelvic surgery. These interventions combine advanced retroperitoneal laparoscopic dissection with microsurgical nerve surgery and require profound expertise in pelvic neuroanatomy, neuropelveological diagnostics, vascular anatomy, and neurofunctional preservation. The ultimate objective is not only removal of endometriotic lesions, but preservation and restoration of neurological function while preventing irreversible axonal destruction and chronic neuropathic disability.

From a neuropelveological perspective, surgery is not limited to excision of endometriotic tissue alone. The primary objectives are:

- decompression of neural structures,
- macroscopic <R0-resection of the endometriosis in toto
- disease adapted partial resection of the sciatic nerve with maximal preservation of functional nerve fascicles and prevention of further axonal destruction,
- restoration of neural mobility,
- reduction of chronic neuroinflammation,
- and optimization of long-term neurological recovery.

9.1 Neuropelveological Surgical Philosophy

Surgery for endometriosis involving the sciatic nerve and sacral plexus represents one of the most difficult, high-risk, and technically demanding procedures in modern pelvic surgery. Unlike conventional surgery for deep infiltrating endometriosis, these procedures directly involve major somatic and autonomic pelvic nerves and therefore belong fundamentally to the field of neurofunctional pelvic surgery.

From a neuropelveological perspective, surgery for sciatic nerve endometriosis constitutes above all an act of balance between maximal disease excision and preservation of functional neural structures. The surgical strategy must therefore simultaneously aim for:

- preservation of viable nerve fascicles,
- atraumatic microsurgical dissection,
- maintenance of neural vascularization,
- minimization of thermal injury,
- avoidance of secondary fibrosis,

while also ensuring sufficiently radical excision of infiltrative endometriotic tissue to minimize persistence or recurrence of disease.

This balance is particularly challenging because sciatic nerve endometriosis frequently behaves as a destructive intraneural disease. In advanced stages, the surgeon is often confronted with the necessity of partial nerve resection in areas of severe intrafascicular infiltration and irreversible axonal destruction. Excessively conservative surgery may leave active intraneural disease behind and expose the patient to persistence or recurrence, whereas excessively aggressive resection may worsen neurological deficits ⁹.

Importantly, surgery for sciatic nerve endometriosis should generally be considered a “single shot” procedure. Reoperations in this anatomical region are dramatically more difficult because extensive postoperative fibrosis progressively distorts the normal anatomy. During secondary procedures, it frequently becomes nearly impossible to distinguish whether fibrosis originates from persistent endometriosis or from the previous surgical intervention itself. Every additional surgery therefore considerably increases the technical complexity and the risk of irreversible neurological injury.

For this reason, if the surgeon does not possess sufficient neuropelvic expertise (certification ISON level 3!) and experience in advanced pelvic nerve surgery, it is preferable not to operate. Inappropriate initial surgery may significantly compromise the patient’s long-term neurological prognosis and make future definitive management substantially more difficult.

Attention must also be paid to the strict avoidance of foreign material directly adjacent to nerves, especially clips. Foreign material may induce chronic fibrosis, secondary nerve irritation, and persistent neuropathic pain syndromes. Furthermore, surgical removal of clips or fibrotic foreign-body reactions near major pelvic nerves is itself extremely difficult and hazardous.

Another major principle concerns vascular management. The greatest intraoperative risk during surgery for sciatic nerve and sacral plexus endometriosis is severe hemorrhage, which may become life-threatening within minutes. Extensive retroperitoneal fibrosis, inflammatory vascular adhesions, distortion of the gluteal vessels, presacral veins, and internal iliac vascular branches considerably increase the hemorrhagic risk.

For this reason, advanced expertise in retroperitoneal vascular dissection and pelvic vascular surgery is highly desirable. The surgeon must be capable not only of nerve dissection, but also of immediate management of potentially catastrophic vascular complications.

In cases requiring extensive retroperitoneal resection with removal of large portions of the pelvic muscular wall - including the obturator internus muscle, coccygeus muscle, or extensive parietal pelvic tissues - particular caution must be exercised regarding simultaneous digestive surgery. From a neuropelvic and surgical safety perspective, when associated intestinal endometriosis is present, delayed secondary bowel resection may in certain cases represent the safer strategy. Indeed, extensive retroperitoneal dissection around the sciatic nerve and sacral plexus creates a large devascularized and highly vulnerable pelvic cavity. In this situation, postoperative complications such as anastomotic leakage or digestive fistula may lead to severe pelvic infection, diffuse retroperitoneal contamination, and pelvic sepsis. Because of the extensive retroperitoneal exposure and communication with the gluteal and lower limb compartments, infectious complications may propagate beyond the pelvis and potentially induce severe cellulitis, deep soft tissue infection, or descending infectious spread into the lower extremity. For these reasons, in selected patients requiring highly extensive neuropelvic retroperitoneal resection, staged surgical management should be considered. The neuropelvic nerve surgery may first be performed as the primary procedure, whereas intestinal segmental resection may be delayed to a second operative stage under safer conditions. Such staged management may significantly reduce the risk of

catastrophic infectious complications while preserving optimal neurological and surgical outcomes.

The surgical philosophy of neuropelveology therefore differs fundamentally from conventional endometriosis surgery. The objective is not merely excision of lesions, but preservation of neurological function while preventing progressive axonal destruction and minimizing the long-term risk of chronic neuropathic disability.

9.2 Retroperitoneal Nerve Exposure

Complete retroperitoneal exposure constitutes the fundamental prerequisite for safe neuropelveological surgery.

The surgical procedure generally requires:

- extensive ureterolysis,
- dissection of the pararectal and paravesical spaces,
- identification of the internal iliac vessels,
- exposure of the cardinal ligament with, if possible, exposure of the pelvic splanchnic nerves
- identification of the sacral roots,
- exposure of the sciatic nerve,
- dissection of the gluteal vascular region.

The anatomical relationship between the disease and the supracardinal or infracardinal compartments must always be clearly identified before initiating nerve dissection.

This surgical philosophy follows the fundamental principles of oncological surgery and particularly the “no-touch” principle. The primary objective is therefore not immediate excision of the lesion itself, but complete retroperitoneal exposure and isolation of all anatomical structures surrounding the nodule before any attempt at resection is undertaken. Accordingly, all adjacent retroperitoneal structures must first be meticulously identified and dissected circumferentially. Only after complete neurovascular exposure and isolation of the lesion should definitive excision be initiated.

Excision of the endometriotic nodule itself should preferentially be performed using cold scissors to minimize thermal injury to adjacent neural structures. Bipolar coagulation and suction should primarily be reserved for hemostatic control in the event of bleeding.

Whenever technically feasible, the lesion should be removed “*en bloc*” in one single specimen together with the surrounding fibrotic tissue. Fragmentation of the lesion should be avoided because piecemeal excision may increase the risk of incomplete removal, persistence of disease, secondary fibrosis, and difficult reoperations.

This “*en bloc no-touch*” neuropelveological approach is particularly important in isolated sciatic nerve endometriosis because distorted anatomy, intraneural infiltration, fibrosis, and hemorrhagic risk may rapidly transform the operation into an uncontrolled and potentially dangerous dissection if the retroperitoneal anatomy has not first been completely exposed and mastered.

9.3 LANN Technique and Neurofunctional Identification

The principles of the LANN technique (Laparoscopic Neuro-navigation) remain fundamental during surgery for pelvic nerve endometriosis. Intraoperative nerve stimulation may provide additional information regarding the functional integrity of motor pathways.

9.4 Surgical Management of Sacral Plexus Endometriosis

In sacral plexus endometriosis, the disease most frequently develops by secondary infiltration from adjacent parametrial or retroperitoneal endometriosis. Surgical management therefore primarily consists of:

- retroperitoneal excision of deep infiltrating endometriosis,
- nerve decompression,
- neurolysis of sacral roots,
- excision of perineural fibrosis,
- preservation of pelvic autonomic nerves whenever feasible.

Because lower sacral roots S2-S4 and pelvic splanchnic nerves are frequently involved, special attention must be paid to preservation of bladder, bowel, and sexual function.

9.5 Surgical Management of Isolated Sciatic Nerve Endometriosis

Surgery for isolated sciatic nerve endometriosis is considerably more complex because the disease frequently behaves as an intraneural destructive process.

Depending on disease stage, surgical management may require:

- epineurolysis,
- intrafascicular neurolysis,
- excision of intraneural endometriomas,
- decompression of the sciatic nerve,
- partial nerve resection,
- excision of extensive retroperitoneal fibrosis.

During excision of intraneural endometriotic lesions, the use of cold microsurgical scissors is strongly recommended whenever dissection is performed directly on or within the nerve itself. From a neuropelvic perspective, every form of thermal energy applied near the sciatic nerve may potentially induce additional neural injury. Monopolar and bipolar energy devices may provoke sudden involuntary muscle contractions and lower limb movements secondary to direct nerve stimulation. Such abrupt movements during delicate intrafascicular dissection may result in traction injury, fascicular tearing, or accidental damage to functional nerve fibers. Furthermore, thermal spread may induce secondary axonal injury, devascularization of neural fascicles, postoperative fibrosis, and worsening neuropathic pain. Excessive coagulation near the nerve may also increase the risk of secondary scar formation and chronic neural irritation.

For these reasons, direct intraneural dissection and excision of intraneural endometriomas should preferentially be performed using cold scissors under high magnification with meticulous microsurgical technique.

At the same time, the surgeon must constantly maintain precise hemostatic control because hemorrhage itself may rapidly obscure the operative field and significantly increase the risk of

neural injury. One of the greatest technical challenges in surgery for isolated sciatic nerve endometriosis therefore consists of maintaining the balance between atraumatic nerve dissection and safe vascular control without inducing secondary thermal damage to the nerve.

9.6 Prevention of Neural Injury

Because pelvic nerve endometriosis surgery directly involves major pelvic nerves, meticulous microsurgical principles are mandatory.

Attention should be paid to:

- minimal traction on nerves,
- avoidance of excessive bipolar coagulation,
- avoidance of monopolar energy near neural structures,
- preservation of neural vascularization,
- minimization of foreign material and clips adjacent to nerves.

Microsurgical bipolar coagulation under high magnification should generally be preferred.

9.7 Vascular Management - Major Vascular Complications and Post-operative Monitoring

Major vascular structures are frequently located immediately adjacent to the disease.

Caution is required regarding:

- internal iliac vessels,
- superior and inferior gluteal vessels,
- pudendal vessels,
- presacral veins,
- parametrial venous plexuses,
- dilated sacral varices.

Extensive fibrosis and chronic inflammation may considerably distort the normal anatomy and increase the risk of severe hemorrhage.

In advanced cases of isolated sciatic nerve endometriosis, hemorrhage prevention represents a major surgical priority because extensive retroperitoneal fibrosis and inflammatory vascularization may considerably increase intraoperative bleeding risk.

When the patient no longer desires future fertility, preventive occlusion or ligation of the internal iliac artery may be considered in selected cases to reduce the risk of potentially catastrophic hemorrhage during deep retroperitoneal nerve dissection. Such vascular control may significantly improve operative safety in cases with extensive parametrial fibrosis, gluteal extension, or severe inflammatory distortion of the pelvic vascular anatomy.

In contrast, in patients with persistent reproductive wishes, preservation of the internal iliac artery should generally be attempted whenever technically feasible to maintain optimal pelvic vascularization.

From a neuropelvic perspective, the primary objective of surgery is not simply “resection of the disease,” but rather complete and safe retroperitoneal exposure of all anatomical structures surrounding the endometriotic lesion. This includes meticulous identification of:

- pelvic nerves,
- sacral roots,

- internal iliac vessels,
- gluteal vessels,
- ureter,
- parametrial structures,
- and retroperitoneal connective planes.

Only after precise anatomical exposure and neurovascular identification should excision of the disease be progressively undertaken. This principle is particularly important in isolated sciatic nerve endometriosis because the combination of fibrosis, hemorrhage, distorted anatomy, and intraneural infiltration may otherwise rapidly transform the procedure into a dangerous and uncontrolled dissection with major neurological and vascular risks.

The most serious complications of laparoscopic neurovascular decompression are vascular complications. Among these, the three most critical complications are:

- major pelvic hemorrhage,
- dissection or thrombosis of the external iliac artery,
- and distal lower-limb ischemia.

9.7.1. Major pelvic hemorrhage

Major hemorrhage remains the principal intraoperative danger because surgery is performed in direct contact with major pelvic vessels, collateral venous circulation, and frequently abnormal or fragile vascular anatomy. Because of the potential risk of catastrophic hemorrhage and major vascular complications, laparoscopic surgery for pelvic neurovascular entrapment should never be considered suitable for ambulatory surgery centers or isolated office-based surgical facilities.

These procedures should preferentially be performed in hospital environments providing immediate access to:

- emergency blood transfusion,
- intensive care support,
- advanced anesthesiology,
- vascular surgical assistance; whenever the operating surgeon does not possess advanced expertise in pelvic vascular surgery, the possibility of immediate assistance by an experienced vascular surgeon should be available.
- emergency imaging,
- multidisciplinary perioperative management.
- immediate access to interventional radiology and emergency embolization techniques should ideally be available whenever pelvic neurovascular surgery is performed. In cases of severe postoperative or delayed pelvic hemorrhage, selective arterial or venous embolization may represent a highly effective minimally invasive lifesaving strategy and may, in some situations, avoid the need for difficult reoperation within previously dissected retroperitoneal spaces.

9.7.2. Lower Limb Ischemia

A second major complication is injury or dissection of the external iliac artery secondary to prolonged manipulation, traction, compression, or distortion during retroperitoneal dissection. Even without direct arterial injury, prolonged surgical manipulation may induce:

- arterial spasm,
- intimal injury,
- thrombosis,
- or delayed arterial dissection.

Such vascular complications may subsequently lead to acute distal ischemia of the lower limb and represent true vascular surgical emergencies. For this reason, meticulous intraoperative protection of the external iliac artery is mandatory. Excessive compression, prolonged traction, thermal injury, or torsion of the vessel should be strictly avoided throughout the procedure.

Postoperative surveillance of distal limb perfusion must be considered systematic after major pelvic neurovascular surgery. Clinical evaluation should include:

- limb temperature,
- skin coloration,
- capillary refill,
- pain,
- motor function,
- and distal arterial pulses.

However, digital palpation of pedal or retromalleolar pulses is often difficult and unreliable, particularly in obese patients, elderly patients, edematous postoperative patients, or patients presenting vascular disease. For this reason, systematic postoperative Doppler monitoring of distal arterial flow should be considered mandatory rather than optional.

A small handheld vascular Doppler device should therefore be available routinely after surgery to assess:

- dorsalis pedis artery flow,
- posterior tibial artery flow,
- arterial symmetry,
- and postoperative distal perfusion.

From a practical perspective, postoperative Doppler localization of distal pulses should ideally be marked directly on the skin in the recovery room to facilitate systematic nocturnal monitoring by nursing staff. This allows rapid identification of pulse disappearance or arterial flow deterioration during the postoperative period.

Early recognition of vascular compromise is essential because delayed diagnosis may result in:

- irreversible limb ischemia,
- muscular necrosis,
- neurological damage,
- compartment syndrome,
- need for emergency vascular reconstruction.
- leg amputation

Any postoperative reduction or disappearance of distal Doppler signals should therefore immediately prompt urgent vascular reassessment and, if necessary, emergency vascular imaging or surgical exploration.

9.8 Expertise Requirements and Reference Centers ²⁶

Surgical treatment of endometriosis involving the sciatic nerve and sacral plexus should be performed exclusively in highly specialized neuropelveological centers with extensive expertise in pelvic nerve surgery.

From a neuropelveological perspective, isolated sciatic nerve endometriosis represents one of the most difficult and potentially dangerous procedures in pelvic surgery. The operation itself is technically highly demanding, but postoperative management and long-term neurological rehabilitation are often even more challenging than the surgery itself.

Successful treatment requires not only advanced laparoscopic skills, but also:

- profound knowledge of pelvic neuroanatomy,
- expertise in neuropelveological diagnostics,
- experience in microsurgical nerve dissection,
- understanding of neuro-urological dysfunction,
- long-term neurological follow-up,
- multidisciplinary rehabilitation management.

For these reasons, the International Society of Neuropelveology (ISON) considers that independent surgical management of pelvic nerve endometriosis should ideally be limited to ISON Level 3 Master Centers and surgeons specifically trained in advanced neuropelveological surgery.

These centers must be capable of ensuring the complete management of the patient before, during, and after surgery, including:

- neuropelveological diagnosis,
- neurofunctional assessment,
- advanced laparoscopic nerve surgery,
- postoperative neurological rehabilitation,
- pain management,
- neuro-urological follow-up,
- and long-term multidisciplinary care.

10. Postoperative Rehabilitation

Importantly, long-term neurological follow-up data after extensive sciatic nerve surgery remain extremely limited in the current literature. To date, apart from the five-year follow-up study by Possover on large sciatic nerve resections for deep infiltrating sciatic nerve endometriosis ⁹, virtually no other studies have specifically evaluated long-term functional neurological recovery after extensive pelvic nerve surgery.

Consequently, current knowledge regarding postoperative neural regeneration, gait recovery, motor improvement, and long-term functional prognosis remains largely based on this unique neuropelveological experience. This study therefore currently represents one of the only available reference frameworks for understanding the long-term neurological evolution following extensive surgery for isolated sciatic nerve endometriosis.

One of the major observations from this long-term follow-up is that neurological recovery continues progressively over several years. Functional improvement frequently remains incomplete during the first postoperative months, whereas significant gait normalization, muscular recovery, and improvement of motor deficits may continue progressively for approximately three years after surgery.

These findings have major implications for both postoperative rehabilitation and patient counseling. Patients must be informed that neurological recovery after extensive sciatic nerve surgery is typically slow, progressive, and long-term. Early postoperative neurological deficits do not necessarily predict poor final functional outcome because peripheral nerve regeneration and central motor adaptation continue over prolonged periods of time.

From a neuropelvineological perspective, this prolonged recovery process further emphasizes the critical importance of sustained rehabilitation, continuous lower limb activation, and long-term multidisciplinary follow-up after surgery for isolated sciatic nerve endometriosis.

11. Long-term neurological outcomes

Long-term neurological outcomes following surgery for isolated sciatic nerve endometriosis depend primarily on:

- the extent of preoperative axonal destruction,
- the duration of neurological symptoms before surgery,
- the degree of intraneural fibrosis,
- the extent of nerve resection,
- and the quality of postoperative rehabilitation.

Current knowledge regarding long-term neurological recovery after extensive sciatic nerve surgery remains extremely limited. To date, the five-year follow-up study after large sciatic nerve resections for deep infiltrating sciatic nerve endometriosis represents one of the only available long-term neuropelvineological analyses specifically evaluating postoperative functional evolution after major pelvic nerve surgery.

One of the most important observations from this long-term follow-up is the dissociation between pain recovery and motor neurological recovery.

11.1 Pain Evolution

Neuropathic pain generally improves considerably faster than motor deficits. In most patients, severe cyclical sciatic pain, gluteal pain, and chronic neuropathic pain improve relatively rapidly after adequate decompression or resection of the diseased nerve segment. Reduction of intraneural inflammatory activity and interruption of chronic neural irritation frequently induce early postoperative pain relief.

This relatively rapid improvement of pain often represents one of the earliest positive postoperative signs and may significantly improve quality of life even before major neurological recovery becomes apparent.

However, transient postoperative neuropathic exacerbation may occasionally occur during the early phases of neural healing and regeneration.

11.2 Motor Recovery

In contrast to pain improvement, motor neurological recovery progresses considerably more slowly. Recovery of foot dorsiflexion, plantar flexion, gluteal muscle function, gait stability, and lower limb coordination frequently requires several years.

The long-term follow-up data suggest that functional neurological improvement may continue progressively for approximately three years after surgery before reaching near-maximal recovery.

This prolonged evolution most likely reflects:

- slow peripheral axonal regeneration,
- muscular reconditioning,
- progressive collateral reinnervation,
- central motor adaptation,
- and neuroplasticity mechanisms.

Consequently, early postoperative motor deficits should not be interpreted prematurely as definitive functional failure.

11.3 Prognostic Factors

Several factors appear to influence long-term neurological outcomes:

- duration of symptoms before surgery,
- severity of preoperative motor deficits,
- degree of gluteal atrophy,
- extent of intraneural fibrosis,
- rapidity of disease progression,
- quality of postoperative rehabilitation,
- patient compliance and motivation with long-term physiotherapy.

Patients operated before development of severe foot drop or advanced muscular denervation generally demonstrate better long-term recovery.

11.4 Persistent Neurological Sequelae

Despite significant postoperative improvement, some patients may continue to present residual:

- sensory abnormalities,
- mild motor deficits,
- gluteal weakness,
- gait asymmetry,
- chronic neuropathic hypersensitivity.

These sequelae are particularly frequent in patients with advanced preoperative axonal destruction or extensive nerve resections.

Nevertheless, even partial neurological recovery may result in major functional improvement and substantial enhancement of quality of life.

The available long-term data strongly suggest that early recognition and timely surgical intervention before irreversible axonal destruction remain the most important factors influencing final neurological prognosis.

12. Postoperative Pain Management and Central Sensitization

Postoperative pain management following surgery for isolated sciatic nerve endometriosis and sacral plexus endometriosis represents a major neuropelological challenge. Because these procedures directly involve major peripheral nerves and frequently require extensive retroperitoneal dissection, postoperative neuropathic pain may remain significant even after technically successful surgery.

From a neuropelological perspective, postoperative pain should not be managed exclusively with central opioid medication. Excessive reliance on morphine or other opioids may increase sedation, impair mobilization, delay rehabilitation, and contribute to long-term central pain sensitization and opioid dependence.

12.1 Multimodal Neuropathic Pain Management

Postoperative pain management should therefore preferentially rely on a multimodal neuropathic pain strategy combining:

- limited opioid use,
- progressive opioid reduction,
- local anesthetic techniques,
- neuropathic pain medication,
- physiotherapy,
- early mobilization,
- and psychological support.

Attention should be paid to minimizing prolonged high-dose opioid exposure whenever possible.

12.2 Intravenous Lidocaine (Xylocaine) and Peripheral Neural Modulation

Intravenous lidocaine (xylocaine) infusion may represent a particularly valuable adjunctive treatment in patients presenting with severe postoperative neuropathic pain.

From a neurophysiological perspective, lidocaine acts as a sodium-channel blocker capable of reducing ectopic neural hyperexcitability and abnormal peripheral nerve firing. Intravenous lidocaine has been increasingly investigated for chronic neuropathic pain and chronic post-surgical pain syndromes.

In the setting of extensive pelvic nerve surgery, lidocaine infusions may potentially:

- reduce peripheral neural hyperexcitability,
- decrease postoperative neuropathic pain,
- facilitate early mobilization,
- reduce opioid requirements,
- and limit central sensitization phenomena.

From a practical neuropelological perspective, reduction of central opioid medication while promoting peripheral functional rehabilitation appears particularly important in these patients.

12.3 Central Sensitization

One of the major neuropelveloical challenges after long-standing sciatic nerve endometriosis concerns central sensitization.

Many patients suffer from chronic neuropathic pain for years before diagnosis and surgery. Persistent nociceptive and neuropathic input may progressively induce hyperexcitability of the central nervous system with amplification of pain perception, allodynia, hyperalgesia, sleep disturbances, emotional exhaustion, and chronic pain memory.

Importantly, even after technically successful surgery and adequate decompression of the nerve, central pain circuits may remain activated for prolonged periods of time.

Consequently, persistence of postoperative pain does not necessarily indicate surgical failure or persistence of disease.

12.4 Multidisciplinary Long-Term Follow-Up

Patients presenting with severe central sensitization frequently require prolonged multidisciplinary follow-up involving:

- chronic pain specialists,
- physiotherapists,
- psychologists,
- psychotherapists,
- rehabilitation specialists,
- osteopaths,
- and neuropelveloical follow-up teams.

Supportive strategies may include:

- cognitive behavioral therapy,
- relaxation techniques,
- hypnosis,
- chronic pain rehabilitation programs,
- graded motor rehabilitation,
- sleep management,
- and progressive functional reintegration.

From a neuropelveloical perspective, patient education remains fundamental. Patients must understand that neural recovery and central desensitization often require prolonged periods of time extending over months or even years.

12.5 Neuropelveloical Perspective

The management of postoperative pain after surgery for isolated sciatic nerve endometriosis fundamentally differs from conventional postoperative care because the underlying disease itself is neurodestructive and neuropathic in nature.

Successful postoperative management therefore requires simultaneous treatment of:

- peripheral nerve injury,
- chronic neuroinflammation,
- muscular dysfunction,

- central sensitization,
- and long-standing pain memory.

The ultimate objective is not merely reduction of pain intensity, but progressive restoration of neurological function, reduction of central hypersensitivity, recovery of functional autonomy, and long-term improvement of quality of life.

13. Conclusions

Endometriosis involving the sciatic nerve and sacral plexus represents one of the most severe, complex, and least recognized forms of deep infiltrating endometriosis. Over the last two decades, the development of neuropelveology and laparoscopic neurofunctional surgery has profoundly transformed the understanding of these diseases, demonstrating that pelvic nerve endometriosis constitutes not merely a gynecological disorder, but a true neuropathological disease spectrum involving progressive neural destruction.

One of the most important neuropelveological concepts emerging from cumulative clinical and surgical experience is the fundamental distinction between sacral plexus endometriosis and isolated sciatic nerve endometriosis. These entities differ substantially regarding:

- anatomical localization,
- pathogenesis,
- biological behavior,
- clinical evolution,
- neurological consequences,
- and surgical management.

Sacral plexus endometriosis most frequently develops as secondary infiltration of the lower sacral roots and pelvic nerves within the infracardinal compartment below the cardinal ligament and internal iliac vessels.

In contrast, isolated sciatic nerve endometriosis behaves as a predominantly unilateral supracardinal intraneural disease involving mainly the L5-S1 sciatic components proximal to the greater sciatic foramen. The progressive evolution from cyclical neuropathic pain toward irreversible axonal destruction, gluteal atrophy, Trendelenburg gait, and foot drop constitutes one of the cardinal neuropelveological characteristics of isolated sciatic nerve endometriosis. This rapid neurodestructive progression fundamentally differentiates the disease from vascular entrapment syndromes and other chronic pelvic neuropathic disorders.

These guidelines additionally propose a novel neuropathogenic concept suggesting that isolated sciatic nerve endometriosis may represent a unique neuro-regenerative and neuro-inflammatory disease process originating within the peripheral nervous system itself. The potential roles of intraneural progenitor cells, neurogenic inflammation, neuropeptide-Y signaling, and regenerative neural mechanisms may open entirely new perspectives regarding the pathophysiology of pelvic nerve endometriosis.

The diagnosis of pelvic nerve endometriosis requires comprehensive neuropelveological evaluation integrating:

- detailed neurological history,
- sensory and motor examination,
- direct vaginal nerve palpation,
- MRI,
- transvaginal Doppler ultrasound,
- neurofunctional evaluation,
- and long-term clinical observation.

Surgical management represents one of the most technically demanding procedures in pelvic surgery and should therefore be performed only in highly specialized neuropelvic centers with expertise in advanced pelvic nerve surgery, retroperitoneal vascular dissection, and long-term neurofunctional rehabilitation.

Importantly, surgery itself represents only one component of treatment. Long-term postoperative rehabilitation, prevention of central sensitization, progressive functional lower limb activation, chronic pain management, and multidisciplinary follow-up are essential for optimal neurological recovery. Current long-term data suggest that neurological recovery may continue progressively for approximately three years after surgery, whereas pain improvement frequently occurs considerably earlier than motor recovery.

Because of the rarity and complexity of these diseases, current knowledge remains based on limited long-term neuropelvic experiences. Further multicentric studies and international collaboration will therefore be essential to refine diagnostic criteria, optimize surgical strategies, better understand the pathophysiology of intraneural endometriosis, and improve long-term neurological outcomes.

Nevertheless, the development of neuropelvicology has already demonstrated that pelvic nerve endometriosis is no longer an anecdotal or poorly understood condition, but a distinct and identifiable neurofunctional disease requiring dedicated expertise, early recognition, and specialized multidisciplinary management.

Conflict of Interest

Marc Possover is the founder of Neuropelvicology and Chairman of the International Society of Neuropelvicology (ISON).

Dany Chou, Alejandro M. Gonzalez and Dogyun Kim are Board Member of the ISON

Ethical Statement

This guideline does not involve human participants, patient-identifiable data, biological material, or experimental interventions. Ethical approval was therefore not required.

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