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Research Article

Clinical Phenotypes and Prognostic Factors in Posterior Interosseous Nerve Syndrome: A Structured Narrative Review

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Abstract

Posterior Interosseous Nerve (PIN) syndrome is a motor entrapment neuropathy of the deep (motor) branch of the radial nerve, most often involving the supinator canal and the arcade of Frohse, which produces weakness of finger and wrist extension and may lead to lasting functional loss if not recognized early. This structured narrative review summarizes the published literature on the anatomy, clinical phenotypes, diagnostic evaluation, prognostic factors, and management of PIN syndrome. A structured search of biomedical databases was performed, and eligible anatomical, electrophysiological, imaging, surgical, and clinical studies were synthesized qualitatively. Across the available literature, diagnosis rests on integrating clinical examination with electrodiagnostic testing, high-resolution ultrasonography, and magnetic resonance imaging, as no single modality is sufficiently sensitive or specific in isolation. Reported clinical phenotypes range from painless progressive motor palsy to mixed sensorimotor and pain-predominant presentations, and the prognostic factors most often described include symptom duration, patient age, the degree of axonal loss, and the underlying etiology. The literature consistently suggests that earlier decompression of structural entrapment is associated with more favourable motor recovery. In contrast, conservative management is generally reserved for cases without progressive deficit or demonstrable structural compression. Overall, the current evidence is dominated by case reports, small retrospective series, anatomical studies, and narrative reviews, with few prospective controlled studies and no randomized trials directly comparing treatment strategies. These limitations preclude definitive prognostic or therapeutic conclusions and highlight the need for prospective, multicentre studies using standardized diagnostic criteria and validated outcome measures.

Introduction

Posterior Interosseous Nerve (PIN) syndrome is an often-underrecognized motor disorder affecting the deep branch of the radial nerve, leading to functional decline in hand and forearm strength [1-3]. Despite decades of clinical observation, the condition continues to challenge practitioners because of its variable presentation and the multiplicity of underlying etiologies, ranging from congenital anatomical variation to acquired compression by tumours, post-traumatic scarring, or iatrogenic surgical injury [4-6].

The anatomical complexity of the radial tunnel explains much of the diagnostic difficulty encountered in clinical practice. As the PIN courses distally through the supinator muscle complex, it traverses several points where compression may occur. The arcade of Frohse, a fibrous arch within the supinator, has long been recognized as a potential site of entrapment. Beyond this classical landmark, the nerve may be compressed by the radial recurrent vessels, the supinator muscle fibres themselves, or, less commonly, by vascular anomalies (Figure 1) [8-11].

Anatomical studies have revealed greater variability in these structures than previously appreciated, with some

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individuals possessing accessory muscle heads or anomalous fascial bands that may predispose to nerve compression. Such variation may partly explain why some patients develop symptoms spontaneously while others remain asymptomatic despite similar anatomical arrangements [12-15].

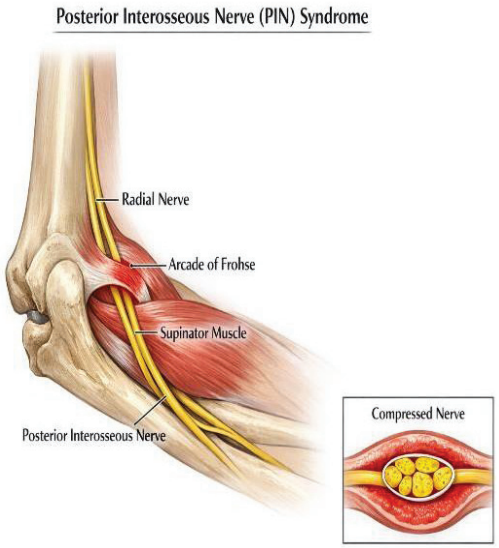

Figure 1: Anatomical overview of the radial nerve and the posterior interosseous nerve beneath the arcade of Frohse, illustrating the typical site of compression. PIN, posterior interosseous nerve. *Source: Original figure created by the authors based on a narrative synthesis of the anatomical literature; no previously published image was reproduced, and no patient-level data are represented.*

The clinical picture of PIN syndrome typically involves progressive weakness of finger and wrist extension, particularly of the thumb interphalangeal joint and the fingers, often with radial deviation on wrist extension. Pain, when present, tends to be localized to the dorsolateral forearm rather than radiating distally (Figure 2) [16-19].

This presentation distinguishes PIN syndrome from radial tunnel syndrome, which classically produces lateral elbow pain without a motor deficit. The two conditions may coexist, and lateral epicondylitis frequently occurs alongside them, further obscuring the diagnosis [20-23].

Physical examination findings, including weaknesses on resisted finger extension and supination, provide useful clues but lack adequate sensitivity and specificity when used in isolation. A definitive diagnosis, therefore, requires integration of clinical findings with objective testing [24-26].

Electromyography and nerve conduction studies can document denervation of PIN-innervated muscles while helping to exclude more proximal radial nerve or root involvement; however, they may yield false-negative results in mild or very early cases [28-30].

Ultrasonography has emerged as a valuable adjunct, allowing direct visualization of the nerve and identification of focal enlargement, mass lesions, or anatomical anomalies. Magnetic resonance imaging provides superior soft-tissue

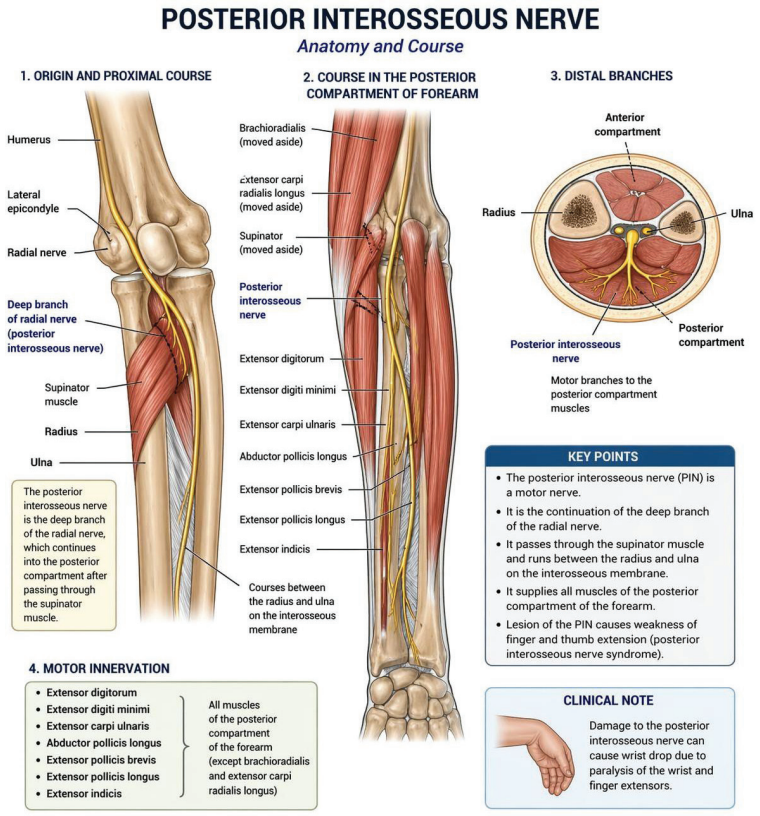

Figure 2: Schematic anatomical illustration of the radial nerve and posterior interosseous nerve beneath the arcade of Frohse, highlighting the typical compression site and the dorsolateral forearm region in which pain may be reported. PIN, posterior interosseous nerve. *Source: Conceptual figure developed by the authors based on published anatomical and clinical descriptions; no previously published image was reproduced, and no patient-level primary data are represented.*

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characterization and can reveal denervation-related muscle oedema or atrophy. Nevertheless, no single test has perfect diagnostic accuracy, and clinicians must synthesize information from multiple sources [31-33].

Management spans a broad spectrum. Conservative treatment, including activity modification, anti-inflammatory medication, and physiotherapy, is the usual initial approach for patients without progressive deficit [39]. When conservative measures fail, injection-based treatments, including ultrasound-guided hydrodissection, have been proposed as minimally invasive alternatives. Surgical decompression is generally regarded as the reference treatment for progressive neurological decline or failure of conservative measures [34-38].

Open decompression through an anterolateral approach remains the most commonly described technique, although endoscopic and ultrasound-guided approaches are increasingly reported. In chronic cases with significant muscle atrophy and irreversible denervation, tendon transfer procedures may be required to restore functional grip and pinch [39-42].

Despite the available options, important gaps persist in the evidence base. Most published series comprise relatively few patients with heterogeneous presentations and variable follow-up, and outcome measures differ substantially between studies, making cross-study comparison difficult [15]. Few prospective controlled studies and no randomized controlled trials directly compare conservative versus surgical approaches, or newer minimally invasive techniques with traditional open surgery. The optimal timing of intervention remains debated [43-47].

Current knowledge of the epidemiology of PIN syndrome is limited; the true incidence and prevalence are uncertain, partly because many mild cases likely go undiagnosed, and risk factors have not been rigorously characterized in prospective cohorts [48-50]. The natural history of untreated PIN syndrome is also poorly defined [51].

Given these gaps, a structured synthesis of the current literature is warranted. The objective of this narrative review is to consolidate existing knowledge of PIN syndrome anatomy, clarify the mechanisms of nerve compression, delineate contemporary diagnostic strategies, and summarize therapeutic options, together with a critical, qualitative appraisal of the supporting evidence. By identifying areas of relative consensus and highlighting persistent uncertainties, this work aims to support clinical decision-making and to define priorities for future research.

Methods

Study design

This work is a structured narrative review (narrative review with a structured search strategy). It is not a systematic review or meta-analysis. No review protocol was registered (e.g., PROSPERO or OSF), no PRISMA workflow was followed, no formal risk-of-bias instrument (such as RoB 2, ROBINS-I, QUADAS-2, or the Newcastle-Ottawa Scale) was applied, and no GRADE assessment of certainty of evidence was performed. The aim was to provide an integrative, critically appraised overview of the literature rather than a quantitative pooled estimate.

Information sources and search strategy

Biomedical databases were searched for relevant publications, including PubMed/MEDLINE, Embase, Scopus, Web of Science, the Cochrane Library, and SciELO. Google Scholar was additionally consulted to identify further references, including theses, conference proceedings, and other sources not always indexed in the principal databases. The search combined controlled vocabulary (Medical Subject Headings / DeCS) with free-text keywords addressing the anatomy of the radial nerve and supinator, the clinical syndromes of nerve entrapment, relevant diagnostic tests, and treatment options.

A representative PubMed/MEDLINE search string was:

("Posterior Interosseous Nerve Syndrome" OR "Posterior Interosseous Nerve Palsy" OR "posterior interosseous nerve" OR "radial nerve compression" OR "supinator syndrome" OR "arcade of Frohse" OR "radial tunnel syndrome") AND (phenotype OR "clinical presentation" OR diagnosis OR prognosis OR "prognostic factors" OR electromyography OR ultrasonography OR "magnetic resonance" OR treatment OR decompression OR management OR outcome).

The string was adapted to the syntax of each database (Emtree terms for Embase; TITLE-ABS-KEY fields for Scopus; Topic fields for Web of Science; and a simplified keyword combination for Google Scholar). Reference lists of relevant articles were also screened to identify additional sources.

Eligibility criteria

Inclusion criteria comprised peer-reviewed studies addressing the anatomy, pathophysiology, clinical presentation, diagnosis, prognosis, or treatment of PIN syndrome and closely related radial nerve entrapments, including anatomical and cadaveric studies, electrophysiological and imaging studies, surgical technique reports and series, observational studies, and previous reviews. Case reports were included selectively when they illustrated instructive presentations, complications, or techniques not well covered elsewhere. Exclusion criteria were laboratory studies without clinical relevance, conference abstracts lacking sufficient methodological detail, publications in languages for which a reliable translation was not available, and editorials without original content. The search considered publications up to the date of manuscript preparation; English-language publications predominated.

Selection, synthesis, and critical appraisal

Titles, abstracts, and full texts were screened for relevance by the authors. Information on study design, diagnostic approach, treatment, and reported outcomes was extracted descriptively and organized thematically. Because of substantial heterogeneity in study designs, diagnostic criteria, interventions, and outcome measures, the evidence was

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synthesized qualitatively; no quantitative pooling or meta-analysis was performed. Studies were appraised informally and narratively, taking into account study design, sample size, presence or absence of a control group, and consistency with other reports; this appraisal was used to weight the interpretation of findings but did not involve a formal scoring instrument. Evidence was organized into thematic domains: (1) anatomy and mechanisms of compression; (2) clinical presentation and differential diagnosis; (3) diagnostic evaluation (electrodiagnostic studies, ultrasonography, and MRI); (4) conservative and image-guided treatment; (5) surgical and reconstructive treatment; and (6) prognostic factors and outcomes.

Methodological limitations of the review

As a narrative review, this work is subject to inherent limitations, including the absence of a registered protocol, the possibility of selection and citation bias, reliance on qualitative rather than quantitative synthesis, and dependence on the methodological quality of the underlying primary studies. Findings should therefore be interpreted as an integrative overview rather than as definitive, quantitatively pooled estimates.

Synthesis of the level and quality of evidence

The literature on PIN syndrome is methodologically heterogeneous and, overall, of limited strength. The evidence base is dominated by lower-level study designs: individual case reports and small case series, retrospective surgical series, anatomical and cadaveric studies, electrophysiological and imaging studies, and narrative or systematic reviews of these primary sources. Several systematic reviews and meta-analyses exist, but they generally address narrow questions (for example, anatomy of the arcade of Frohse, lipoma-related compression, or tendon and nerve transfers) and themselves report high heterogeneity and small numbers of primary cases.

Prospective controlled studies are scarce, and no adequately powered randomized controlled trials directly compare conservative, image-guided, open, and ultrasound-guided surgical strategies. Diagnostic criteria differ markedly across studies, ranging from clinical diagnosis alone to combinations of electrodiagnostic testing, ultrasonography, and MRI, which limits comparability. Therapeutic approaches and outcome measures are similarly heterogeneous, and validated, standardized functional outcome instruments are inconsistently applied. Standardized longitudinal outcome data are lacking, so robust, quantitative prognostic inferences cannot be drawn from the current literature.

Taken together, these features mean that the diagnostic and prognostic patterns described below should be regarded as reported associations and clinically reasonable observations rather than as validated, generalizable estimates. Prospective, multicentre studies with harmonized diagnostic criteria, validated outcome measures, and prespecified prognostic analyses are needed to place these observations on a firmer evidentiary footing (Table 1).

Results and discussion

The reviewed literature shows substantial heterogeneity in methodology, patient populations, and outcome measurement. With this caveat, several consistent themes emerge regarding diagnosis, phenotype, treatment, and prognosis.

Diagnostic evaluation

No single test is sufficiently accurate to confirm or exclude PIN syndrome in isolation, and the literature consistently supports an integrated approach. Electrodiagnostic testing (electromyography and nerve conduction studies) can localize the lesion to the PIN and exclude more proximal involvement, but reported sensitivity varies, and false-negative results occur, particularly in mild or very early disease and when testing is performed soon after symptom onset (Figure 3) [52-54].

High-resolution ultrasonography allows direct visualization of the nerve and of focal enlargement, mass lesions, perineural changes, and anatomical anomalies, and several studies report that it improves localization of the compression site, including technically difficult settings such as the presence of metallic hardware [55-57]. Magnetic resonance imaging, particularly MR neurography, offers superior soft-tissue contrast and can demonstrate denervation-related muscle signal change, and is described as complementary to ultrasonography, especially in deep compartments [58-60]. Across studies, the arcade of Frohse is the most frequently identified site of entrapment, although the reported proportion varies widely between cadaveric and imaging-based investigations (Figures 4 and 5) [61-63]. Sequential evaluation — for example, ultrasonography followed by electrodiagnostic testing — has been proposed as a pragmatic strategy, but comparative diagnostic-accuracy data with standardized thresholds and blinded reference standards are limited.

Clinical phenotypes

The literature describes a spectrum of clinical phenotypes rather than a single uniform presentation. These include a painless, progressive motor phenotype with isolated finger and wrist extension weakness; a pain-predominant phenotype with dorsolateral forearm pain and little or no motor deficit (overlapping with radial tunnel syndrome); and mixed presentations. Etiology further shapes presentation, with spontaneous/idiopathic cases, compressive structural lesions (e.g., lipoma, ganglion, synovial proliferation), post-traumatic and iatrogenic injury, inflammatory disease (e.g., rheumatoid arthritis), and rare causes such as hourglass-like fascicular constrictions all reported. Overlap with lateral epicondylitis is common and contributes to diagnostic delay [16-23, 64-67].

Treatment

Conservative management — activity modification, anti-inflammatory medication, and physiotherapy — is generally appropriate for patients without progressive motor deficit or demonstrable structural compression, and image-guided injection or hydrodissection has been described as a minimally

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Table 1: Representative studies on posterior interosseous nerve syndrome and related radial nerve entrapments: study type, main contribution, limitations, and interpretive weight.

Study (first author, year)	Evidence source/study type	Main contribution (diagnosis/treatment / reported outcome)	Main limitations	Interpretive weight (evidence level)
Apard T, Martinel V (2025)	Case series/technique report	High-resolution ultrasound for real-time identification of lateral intermuscular septum compression and focal nerve narrowing; ultrasound-guided radial nerve release. Early symptom relief reported.	Small series; short follow-up; non-comparative; preliminary data.	Low
Marès O, Ferreira J (2025)	Technical / feasibility report (first experience)	Total ultrasound-guided visualization of the arcade of Frohse and PIN course; release performed under WALANT. Feasibility and early clinical improvement.	Pilot data; limited follow-up; no control group.	Very low
Keles A, Palamar D (2026)	Observational study	Combined high-resolution ultrasound and electrophysiology improved diagnostic yield in refractory lateral epicondylitis, supporting guided decision for decompression.	Single centre; author's note: need for larger prospective validation.	Low
Kowalski B, Zarkadis NJ, Harris M (2025)	Systematic review (PIN palsy in rheumatoid arthritis)	Aggregated imaging/electrodiagnostic findings across RA cases; recovery linked to RA control; medical management ± surgical decompression.	Heterogeneous, low-quality primary evidence; variable sensitivity.	Low–moderate
Patterson JMM (2024)	Clinical/narrative review	Emphasizes clinical diagnosis with EMG/NCS and ultrasound as adjuncts; outlines conservative care, injections, decompression, neurolysis, and tendon transfer.	Narrative: outcomes depend on etiology/timing; inconsistent outcome reporting noted.	Low (expert synthesis)
Abate B, Cozzolino A (2024)	Narrative review (surgical approaches)	Imaging/intraoperative findings guide approach selection; open decompression techniques by site of entrapment.	Technique-focused; comparative data lacking.	Low (expert synthesis)
Cheng C (2024)	Systematic review/meta-analysis (lipoma-related PIN compression)	MRI/US reliably identified space-occupying lesions; surgical excision with decompression, and more favourable motor recovery when decompressed early.	Limited by small case numbers across pooled studies.	Moderate (within a narrow question)
Hill EJR (2023)	Surgical series	Clinical–imaging correlation for radial sensory compression; decompression with brachioradialis tenotomy improved pain and quality of life.	Moderate sample; non-randomized.	Low–moderate
Zhang JY (2023)	Epidemiologic / dataset analysis	Quantified overlap between radial tunnel syndrome and lateral epicondylitis and diagnostic ambiguity; implications for misclassification.	Administrative data; diagnostic misclassification possible.	Moderate (descriptive)
Wolf JM, Patel R (2023)	Review article (best-evidence synthesis)	Summarizes EMG, US, MRI roles and limited diagnostic specificity; evidence graded; recommends standardized outcome measures.	Concludes that high-quality evidence is scarce.	Low (expert synthesis)
Benes M (2021)	Systematic review/meta-analysis (arcade of Frohse anatomy)	Pooled prevalence of anatomical variants at the arcade of Frohse informs surgical planning.	High heterogeneity across cadaveric studies; limited clinical correlation.	Moderate (anatomical)
Jain NS (2024)	Systematic review (tendon/nerve transfers for radial palsy)	Selection criteria and comparison of nerve transfers, tendon transfers, and grafting; functional gains across techniques; rehabilitation is critical.	Comparative evidence limited.	Low–moderate
Hones KM, Cueto RJ (2024)	Systematic review (diagnosis of radial tunnel syndrome)	Synthesizes clinical tests, EMG, and imaging; documents variable diagnostic criteria; calls for standardized protocols.	Inconsistent diagnostic standards across the included series.	Low–moderate
Apard T (2024)	Technique report/case series	Ultrasound-guided radial nerve release at the arm under WALANT; intraoperative US visualization; early positive outcomes.	Small series; feasibility emphasis.	Very low
Gill B (2022)	Case series + scoping review (hydrodissection)	US shows perineural adhesions; ultrasound-guided hydrodissection ± corticosteroid; reported symptom resolution.	Limited controlled data; short follow-up.	Very low–low
Belón-Pérez P (2022)	Cadaveric + ultrasound validation	Anatomical validation of US-guided percutaneous electrolysis at the arcade of Frohse as a proposed treatment.	Anatomical feasibility only; clinical efficacy not established.	Low (translational)
Shen J (2021)	Diagnostic accuracy study	High-resolution US is effective for visualizing radial nerve lesions adjacent to metallic hardware; it supports preoperative planning.	Single-centre.	Low–moderate
Qi W, Shen Y (2021)	Surgical series (hourglass-like constrictions)	EMG/US/MRI identified focal constrictions; neurolysis/resection with repair when needed; guarded prognosis if chronic.	Small series.	Low
Marchese J (2019)	Prospective evaluation	Single corticosteroid injection for radial tunnel syndrome; short-term pain relief with limited durability.	Small sample; no randomized comparison.	Low–moderate
Sigamoney KV (2017)	Narrative review (atraumatic PIN palsy)	EMG/imaging to exclude structural causes; individualized conservative vs surgical management.	Evidence largely low-level; variable prognosis.	Low (expert synthesis)
Maldonado AA (2017)	Case reports (2 cases)	MRI-identified lipoma compressing PIN with supportive EMG; motor recovery after surgical excision/decompression.	Case reports: limited generalizability.	Very low

Legend: Studies are listed in reverse chronological order. "Interpretive weight" reflects an informal, narrative judgement of evidence level based on study design, sample size, and presence of a control group; it is not the output of a formal grading instrument (e.g., GRADE). Abbreviations: EMG, electromyography; MRI, magnetic resonance imaging; NCS, nerve conduction studies; PIN, posterior interosseous nerve; RA, rheumatoid arthritis; US, ultrasonography; WALANT, wide-awake local anaesthesia no tourniquet.

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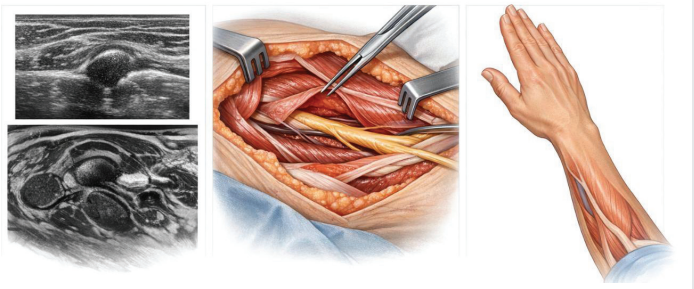

Figure 3: Conceptual three-stage clinical pathway for posterior interosseous nerve syndrome: multimodal diagnosis (clinical assessment, ultrasonography, and MRI), surgical decompression at the arcade of Frohse where indicated, and functional recovery. MRI, magnetic resonance imaging; PIN, posterior interosseous nerve. *Source: Conceptual schematic created by the authors to summarize management principles described in the literature; it does not represent original patient data.*

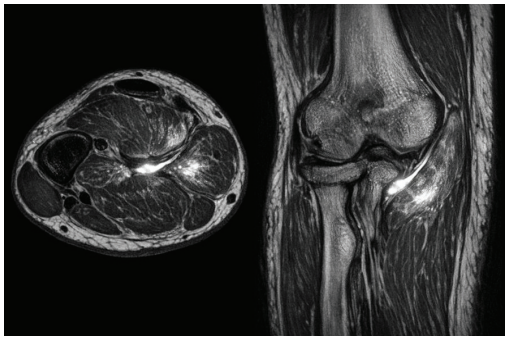

Figure 4: Conceptual illustration of integrated neuroimaging in posterior interosseous nerve syndrome, depicting features described in the literature on MR neurography and high-resolution ultrasonography (e.g., focal nerve enlargement at the supinator entrance and denervation-related muscle signal change). MR, magnetic resonance; US, ultrasonography; PIN, posterior interosseous nerve. *Source: Conceptual figure created by the authors based on imaging features described in the cited literature; no previously published radiological image was reproduced, and no patient-level data are represented.*

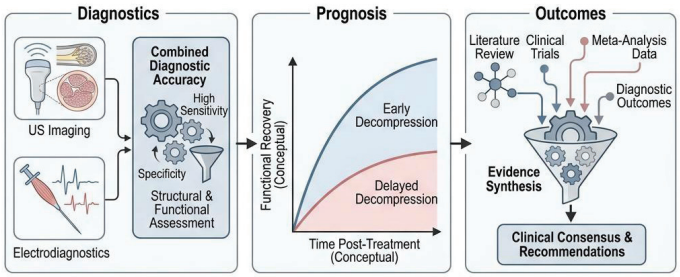

Figure 5: Conceptual summary integrating anatomical, diagnostic, and prognostic elements of posterior interosseous nerve syndrome, illustrating the principle that earlier and more accurate lesion localization is generally associated, in the reported literature, with a higher probability of functional recovery. PIN, posterior interosseous nerve. *Source: Conceptual schematic developed by the authors based on a narrative synthesis of the literature; it summarizes qualitative relationships and does not depict original quantitative data.*

invasive adjunct with reported short-term symptom relief but limited durable, controlled evidence [34-39]. Surgical decompression is the most consistently described treatment for progressive deficit or failed conservative care; open anterolateral decompression remains the reference technique, while endoscopic and ultrasound-guided percutaneous releases are increasingly reported, with feasibility and early positive outcomes, so far, small and largely non-comparative series. Reported safety patterns suggest that major complications are uncommon with open surgery, whereas minimally invasive techniques carry a learning curve and a risk of incomplete decompression; these comparisons, however, derive from heterogeneous series rather than from controlled trials [78,79]. For chronic cases with established denervation and atrophy, nerve and tendon transfer procedures are described as important reconstructive options [39-42].

Prognostic factors

The literature repeatedly identifies several factors as associated with more favourable motor recovery, although these associations come from heterogeneous, mostly retrospective sources and have not been validated in a prospective prognostic model. The factors most consistently reported are shorter symptom duration before treatment, younger patient age, a lesser degree of axonal loss on electrophysiology (with relatively preserved motor units), and an identifiable, treatable structural etiology addressed early. Conversely, long-standing symptoms, advanced age, predominant axonal degeneration, and chronic hourglass-like constrictions are associated with more guarded recovery [17-20, 33-36, 64-77]. Electrophysiological measures such as motor unit estimation have been proposed as quantitative aids to decision-making (for example, in selecting between nerve and tendon transfer), but their prognostic value requires prospective validation.

Timing of intervention

A recurring theme is that the timing of decompression matters: across reported series, earlier surgical decompression of structural entrapment is generally associated with better motor outcomes than delayed intervention, and the literature suggests that prolonged, unsuccessful conservative management should not be continued indefinitely when a progressive deficit or a structural lesion is present, given the risk of irreversible axonal loss with chronicity. The exact thresholds, however, vary between studies and are not established by controlled trials [72-77].

Critical appraisal and limitations of the evidence

The principal limitation of this field is methodological. A large proportion of the primary literature consists of retrospective designs vulnerable to selection bias, frequently without contemporaneous control groups and without standardized, validated outcome measures. Diagnostic inclusion criteria are heterogeneous, ranging from clinical diagnosis alone to multimodal confirmation, which precludes meaningful quantitative aggregation. Publication bias may inflate apparent success rates, since unfavourable outcomes are less likely to be reported. These limitations constrain the strength of any prognostic or therapeutic inference and reinforce the need for prospective, multicentre studies with harmonized protocols and validated outcomes [8,10,29,47-52,65].

Clinical implications

On the basis of this qualitative synthesis, a pragmatic, evidence-informed approach can be outlined while

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acknowledging the limited certainty of the underlying evidence. For patients with an acute or progressive motor deficit and imaging evidence of a structural, space-occupying lesion, early surgical decompression is reasonable and is the approach most consistently supported by the reported literature. For patients without progressive deficit or demonstrable structural compression, conservative management is appropriate, with image-guided injection considered as a temporizing measure; persistent failure of conservative treatment should prompt timely reconsideration of surgery to limit the risk of irreversible denervation. In chronic cases with established denervation, reconstructive strategies should be individualized according to clinical and electrophysiological findings, patient age, and rehabilitation capacity, and structured multidisciplinary rehabilitation is consistently emphasized as important across all pathways [18, 21, 34, 43, 48, 55-57, 64, 78,79].

Conclusion

Posterior interosseous nerve syndrome is a clinically challenging entrapment neuropathy whose accurate characterization depends on integrating clinical examination with electrodiagnostic testing, high-resolution ultrasonography, and MRI, since no single modality is adequate alone. The published literature describes a spectrum of clinical phenotypes and a recurring set of prognostic factors — notably symptom duration, patient age, the degree of axonal loss, and the underlying etiology — and consistently suggests that earlier decompression of structural entrapment is associated with more favourable motor recovery. In contrast, conservative management is appropriate for cases without progressive deficit or structural compression.

These observations, however, derive from literature dominated by small, heterogeneous, mostly retrospective studies, with few prospective controlled studies and no randomized trials directly comparing therapeutic modalities. The current evidence, therefore, supports clinically reasonable, individualized management informed by clinical, imaging, and electrophysiological findings, but it does not permit definitive causal or validated prognostic conclusions. Prospective, multicentre studies with standardized diagnostic criteria, validated functional outcome measures, and prespecified prognostic and, where appropriate, quantitative electrophysiological biomarkers represent the principal research priorities. Until such data are available, optimal care rests on diagnostic precision, timely intervention, and structured rehabilitation, supported by continued methodological standardization and coordinated research.

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Highlights

- Diagnosis of posterior interosseous nerve (PIN) syndrome is most reliable when clinical assessment is integrated with electrodiagnostic studies, high-resolution ultrasonography, and magnetic resonance imaging, because no single modality is sufficient in isolation.
- The published literature consistently suggests that the timing of treatment is important: earlier decompression of structural entrapment is associated with more favourable reported motor recovery than delayed intervention.
- Several clinical phenotypes are described, ranging from painless progressive extensor palsy to pain-predominant and mixed sensorimotor presentations, with frequent overlap with radial tunnel syndrome and lateral epicondylitis.
- Prognostic factors repeatedly reported in the literature include symptom duration, patient age, the degree of axonal loss on electrophysiology, and the underlying etiology.
- The evidence base is dominated by small, heterogeneous, mostly retrospective studies, anatomical work, and narrative reviews, with no randomized trials directly comparing therapeutic modalities, underscoring the need for prospective multicentre research with standardized protocols and validated outcomes.

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