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Sciatic nerve injury after hip arthroscopy in a patient with marked hamstring tightness: a case report and narrative review

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Case Report

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Abstract

Background

Sciatic nerve injury is an uncommon but potentially serious complication of hip arthroscopy. Reduced hamstring flexibility has been associated with greater resistance to hip distraction, but clinical observations linking preoperative hamstring tightness, difficult distraction, and postoperative sciatic neuropathy are limited.

Case presentation:

An 18-year-old man with femoroacetabular impingement and an acetabular labral tear had marked preoperative hamstring tightness, with a passive straight-leg raise of 41°, an active knee extension angle of approximately 130°, and a popliteal angle of 50°. Preoperative neurological examination was normal. Initial joint distraction during arthroscopic labral repair, acetabuloplasty, and femoroplasty was inadequate and required stepwise increases in traction. Total traction time was approximately 70 minutes; the applied force was not quantitatively recorded. Severe sensory and motor deficits developed immediately after surgery. Ultrasonography at 1 month showed focal sciatic nerve thickening, and electromyography at 3 months demonstrated severe proximal sciatic neuropathy. Following ankle-foot orthosis use and rehabilitation, ankle dorsiflexion and plantar flexion recovered to grades 4 + and 5, respectively, at 1 year, while sensory recovery remained incomplete.

Literature review:

A narrative search of PubMed and Web of Science through August 27, 2026 identified 19 eligible original clinical studies, 14 reporting sciatic or named-branch nerve injuries and five reporting no target events. Reported proportions ranged from 0.04% to 19.1%, reflecting heterogeneous populations and ascertainment. Evidence linking nerve injury to traction magnitude and duration was inconsistent.

Conclusions

This case documents the clinical sequence of marked preoperative hamstring tightness, difficult hip distraction requiring increased traction, and severe postoperative sciatic nerve injury. Hamstring tightness may be a warning feature for increased distraction resistance and possible neural vulnerability. Preoperative flexibility assessment and individualized traction management merit consideration. This observation supports further investigation of the association without establishing causality.

Background

Hip arthroscopy is an established minimally invasive approach for treating femoroacetabular impingement (FAI), acetabular labral tears, and other intra-articular hip disorders [1]. During hip arthroscopy, adequate working space within the central compartment is essential for the safe performance of intra-articular procedures. This space is typically obtained by applying longitudinal traction to separate the femoral head from the acetabulum. However, while facilitating joint distraction, traction may also increase mechanical loading on surrounding neural structures, making traction-related neurologic injury an important complication of hip arthroscopy [2, 3].

Previous studies of traction-related neurologic injury after hip arthroscopy have focused primarily on intraoperative factors, including traction magnitude and duration, perineal-post compression, patient positioning, and distraction technique [2–4]. However, the traction required to achieve adequate joint distraction varies among patients, and this variability may be influenced by patient-specific characteristics such as sex, body mass index, generalized joint laxity, hip range of motion, and periarticular soft-tissue properties [5–7]. Among these characteristics, reduced hamstring flexibility has been associated with greater holding distraction stiffness in male patients, suggesting a possible relationship between hamstring flexibility and the traction required to maintain joint distraction [6]. Studies of hamstring lengthening and limb positioning have demonstrated changes in sciatic nerve electrophysiologic responses and strain [8, 9]. Whether preoperative hamstring tightness increases neural vulnerability during hip arthroscopy remains uncertain.

- In this study, we report the first case of a patient with marked preoperative hamstring tightness who required stepwise increases in traction because of inadequate initial joint distraction during hip arthroscopy and developed symptoms of sciatic nerve injury immediately after surgery. This case provides initial case-based clinical evidence that preoperative hamstring tightness may be a patient-specific risk factor for traction-related sciatic nerve injury after hip arthroscopy. Given the limited evidence directly examining the relationship between hamstring tightness and traction-related sciatic nerve injury, we conducted a narrative review of original clinical studies reporting postoperative injury to the sciatic nerve or its named branches after hip arthroscopy, with the aim of summarizing the occurrence and potential associated factors.

Case presentation

Patient history and preoperative assessment

An 18-year-old man underwent right hip arthroscopy for FAI and an acetabular labral tear. Preoperative neurological examination was normal. Hamstring flexibility was markedly restricted, with a passive straight-leg raise (P-SLR) of 41°, an active knee extension (AKE) angle of approximately 130°, and a popliteal angle of 50° (Fig. 1).

Surgical procedure and traction exposure

The patient underwent right hip arthroscopy with labral repair, acetabuloplasty, and femoroplasty. Initial longitudinal traction did not provide adequate joint distraction; traction was increased progressively until access was obtained. Traction was applied for approximately 70 minutes during a 100-minute operation. The traction force was not measured or recorded.

Postoperative neurological findings and investigations

Immediately after surgery, the patient developed complete sensory loss over the distal lateral lower leg and foot, corresponding to modified British Medical Research Council (BMRC) grade S0. Ankle and toe dorsiflexion and plantar flexion were markedly weak, with Medical Research Council (MRC) grade 1 strength. High-resolution ultrasonography (HRUS) at 1 month demonstrated focal sciatic nerve thickening with preserved fascicular architecture (Fig. 2). Electromyography (EMG) at 3 months demonstrated severe proximal right sciatic neuropathy.

Management and clinical outcome

Management and clinical outcome
The patient used an ankle-foot orthosis and underwent rehabilitation. Neurological function gradually improved. At the one-year follow-up, the patient reported approximately 90% overall recovery. Ankle dorsiflexion and plantar flexion were MRC grades 4 + and 5, respectively, and sensation was modified BMRC grade S3+, with persistent sensory symptoms. Hip-related functional outcomes following treatment of the underlying hip disorder were assessed using the 12-item International Hip Outcome Tool [10]. The iHOT-12 score improved from 42.5 before surgery to 83.7 at one year. Pain on a 0–10 visual analogue scale decreased from 4 to 0 at rest and from 7 to 1 with activity.

Review of the literature

PubMed and the Web of Science Core Collection were searched from inception through August 27, 2026, using complementary broad neurological-event and targeted sciatic-nerve strategies. No language restrictions were applied. Full search strategies are provided in Additional file 1. After deduplication, records underwent title and abstract screening followed by full-text assessment.

Original human clinical studies of hip arthroscopy were included if they reported new postoperative injury involving the sciatic nerve or an explicitly named branch, or explicitly reported no such events after assessing the target nerves. Named branches included the common peroneal (common fibular), superficial peroneal, and tibial nerves. Reviews, commentaries, nonclinical studies, and single-case reports were excluded from the cohort summary. Intraoperative monitoring changes without clinical deficits, preexisting neurological symptoms, and unlocalized postoperative numbness were not counted as target clinical events. A distal branch event was retained as reported by the study and was not assumed to represent a proximal sciatic lesion.

Study selection and extraction were performed by one reviewer and independently checked by a second reviewer. Extracted data included study size, all new clinical neurological events, target clinical events, and proposed associated factors. Evidence concerning associated factors was distinguished as statistical analysis of target-nerve outcomes, statistical analysis of broader outcomes, or author attribution without comparative analysis. Intraoperative monitoring abnormalities and postoperative clinical injuries were considered separately when interpreting associated factors. These categories describe the analyses and are not evidence grades. Findings were synthesized narratively without pooling.

The searches identified 707 records, comprising 404 from PubMed and 303 from Web of Science. After removal of 324 duplicates, 383 records were screened and 358 were excluded. Of 25 reports sought for retrieval, one could not be obtained. Twenty-four full texts were assessed; five were excluded, leaving 19 studies (Fig. 3). Fourteen studies reported target events and five reported none. Among studies with target events, reported proportions ranged from 0.04% to 19.1%. Möckel et al. reported five events among 13154 procedures [11]. Shelton et al. reported 17 transient common peroneal or tibial nerve events among 89 pediatric patients, all resolving within 1–2 days [12]. The clinical studies are summarized in Table 1 [13–28].

Eight included studies evaluated or discussed possible associated factors. Two used statistical analyses involving target nerves, four evaluated broader outcomes, and two relied on author attribution. Seven addressed at least one traction parameter: traction duration was addressed in seven and magnitude in three. These analyses used different endpoints and cannot be interpreted as equivalent tests of clinical sciatic nerve injury risk.

Table 1
Clinical studies reporting sciatic or named branch events after hip arthroscopy

Study	Sample Size, n	All Clinical Neurologic Events, n (%)	Sciatic Nerve or Named-Branch Injuries, n (%)	Potential Associated Factors and Evidence Basis
Sampson [13], 2001	530	20 (3.8)	15 (2.8)	NR
Clarke [14], 2003	1054	4 (0.38)	3 (0.28)	NR
Lo [15], 2006	73	5 (6.8)	5 (6.8)	Author attribution: longer mean traction in affected patients (132 vs 59 min); no comparative risk model.
Larson [16], 2008	100	1 (1.0)	1 (1.0)	NR
Byrd [17], 2011	200	5 (2.5)	2 (1.0)	NR
Telleria [3], 2012	60	4 (6.7)	4 (6.7)	Target-nerve analysis: maximum traction weight associated with the monitoring-defined nerve endpoint (OR 1.04 per 1 lb; P = 0.043); duration not significant. Clinical injuries shown separately.
Möckel [11], 2014	13154	590 (4.5)	5 (0.04)	Author attribution: sciatic injury described as traction-related stretch injury; suggested limiting force and duration.
Larson [18], 2016	1615	NR	1 (0.1)	Broader outcome: overall complications increased with longer operative and traction times; traction > 60 min associated with higher complication rate (16.7% vs 7.1%; P < 0.001).
Sharfman [19], 2016	62	8 (12.9)	5 (8.1)	Broader outcome: age, sex, and operative time not significantly associated with overall complications.

NOTE. Values are based on the denominator used for the reported clinical outcome. Target events were defined as new postoperative injuries involving the sciatic nerve or an explicitly named branch, including the common peroneal/common fibular, superficial peroneal, or tibial nerve. Intraoperative electrophysiologic abnormalities without a postoperative clinical deficit, preexisting neurologic symptoms, and unlocalized postoperative numbness were not considered target events. The evidence categories describe the analytic outcome and approach and do not constitute a formal evidence-grading system. Larson et al. reported neurologic complications in separate categories, precluding calculation of a nonoverlapping overall event count. BMI, body mass index; NR, not reported; OR, odds ratio.

Study	Sample Size, n	All Clinical Neurologic Events, n (%)	Sciatic Nerve or Named-Branch Injuries, n (%)	Potential Associated Factors and Evidence Basis
Li [20], 2017	39	2 (5.1)	2 (5.1)	NR
Kern [21], 2018	100	13 (13.0)	2 (2.0)	Broader outcome: no notable associations between overall nerve injury and traction time, sex, or BMI.
Zhao [22], 2019	13	0 (0)	0 (0)	NR
Welton [23], 2019	40	0 (0)	0 (0)	NR
Moon [24], 2020	90	3 (3.3)	1 (1.1)	NR
Shelton [12], 2020	89	17 (19.1)	17 (19.1)	Target-nerve analysis: longer operative and traction times in patients with transient neurapraxia.
Su [25], 2021	25	1 (4.0)	0 (0)	NR
Hwang [26], 2023	13	2 (15.4)	0 (0)	NR
Fırat [27], 2024	90	15 (16.7)	3 (3.3)	NR
Kodra [28], 2025	242	4 (1.7)	0 (0)	Broader outcome: male patients required more traction; sex comparison used all reported neuropathic complaints, including preexisting radicular exacerbations (6.59% vs 0.66%; P = 0.012).

NOTE. Values are based on the denominator used for the reported clinical outcome. Target events were defined as new postoperative injuries involving the sciatic nerve or an explicitly named branch, including the common peroneal/common fibular, superficial peroneal, or tibial nerve. Intraoperative electrophysiologic abnormalities without a postoperative clinical deficit, preexisting neurologic symptoms, and unlocalized postoperative numbness were not considered target events. The evidence categories describe the analytic outcome and approach and do not constitute a formal evidence-grading system. Larson et al. reported neurologic complications in separate categories, precluding calculation of a nonoverlapping overall event count. BMI, body mass index; NR, not reported; OR, odds ratio.

Discussion

This study reports the first case of severe sciatic nerve injury after hip arthroscopy in a patient with marked preoperative hamstring tightness and difficult joint distraction requiring progressively increased

traction. The accompanying review showed that injuries involving the sciatic nerve or its named branches were generally uncommon and mostly transient, with traction magnitude and duration being the most frequently discussed associated factors. These findings suggest that preoperative assessment of characteristics likely to substantially increase traction requirements may be warranted.

Occurrence and Clinical Presentation

Available evidence suggests that events involving the sciatic nerve or its clearly identified branches are uncommon after hip arthroscopy. Most reported events are transient, whereas persistent severe injuries are rarely described. The marked variation in reported proportions may largely reflect differences in study populations, surveillance intensity, assessment timing, and outcome definitions rather than corresponding differences in the underlying incidence. Shelton et al. reported the highest proportion using systematic postoperative neurologic assessment, but all events resolved within 1 to 2 days [12]. In contrast, Möckel et al. reported the lowest proportion in a multicenter survey [11], which may have been less likely to capture mild or transient neurologic abnormalities. Reported proportions should therefore be interpreted in the context of case-ascertainment methods and should not be regarded as directly comparable estimates of clinically significant nerve injury.

The clinical presentation of sciatic nerve injury spans a continuum of severity, ranging from transient numbness, hypoesthesia, or paresthesia to ankle and toe weakness, foot drop, and other motor deficits [12, 13, 15, 21]. The common peroneal and tibial divisions of the sciatic nerve may be involved separately or together, with the common peroneal division often more severely affected, possibly because of its relatively lateral position within the nerve and its fascicular architecture. Most previously reported events consisted of transient sensory disturbances or neuropraxia [12, 15, 16, 19, 21], whereas severe motor deficits and long-term incomplete recovery were uncommon. Our patient developed marked sensory loss and weakness of ankle and toe movement immediately after surgery; dorsiflexion was more severely affected and showed greater residual impairment than plantar flexion, consistent with a proximal sciatic nerve injury predominantly involving the common peroneal division. This case illustrates that rare but severe nerve injuries can occur after hip arthroscopy.

Traction-Related Factors

During hip arthroscopy, axial traction is required to create working space within the central compartment; however, joint distraction may also subject the sciatic nerve to longitudinal mechanical loading [2, 3]. Experimental studies have shown that nerve stretch can reduce intraneural blood flow and alter evoked potentials, with greater nerve elongation producing more pronounced changes [29, 30]. In addition, sustained traction may prolong neural hypoperfusion and conduction impairment, thereby further increasing the risk of nerve injury. Thus, traction-related nerve injury may be influenced by both the magnitude and duration of traction.

Clinical studies have examined the relationship between traction parameters and sciatic nerve dysfunction, but their findings have been inconsistent. Telleria et al. found that maximum traction weight was associated with intraoperative sciatic nerve dysfunction, whereas total traction time was not, suggesting that peak traction load may be relevant [3]. In contrast, Shelton et al. reported longer operative and traction times among pediatric patients who developed common peroneal or tibial nerve neuropraxia [12], suggesting that exposure duration may also contribute. Other studies, however, found no significant associations between traction force or duration and postoperative neurologic abnormalities [19, 21]. Taken together, traction loading may contribute to sciatic nerve dysfunction, but the relative effects of traction magnitude and duration remain uncertain, and no reliable force or time threshold has been established.

Patient-Specific Factors and Potential Mechanisms

Evidence regarding the relationship between traction exposure and nerve injury remains inconsistent, suggesting that traction magnitude or duration alone may not fully explain interpatient differences in risk. Patient-specific factors that influence hip-distraction mechanics should therefore also be considered. Studies using direct intraoperative measurement of traction force have demonstrated substantial interpatient variation in the traction load required to achieve adequate joint exposure [5–7]. Reduced hamstring flexibility has been associated with greater maximal and holding distraction stiffness [6], whereas male sex, lower Beighton scores, and restricted hip range of motion have been associated with greater initial traction force [5]. The effect of higher BMI appears to be primarily observed in male patients. Greater muscle volume has also been associated with increased distraction stiffness [31]. Collectively, body habitus, joint mobility, and soft-tissue mechanical characteristics may contribute to individual variation in traction requirements, although their relationship with postoperative sciatic nerve injury remains unclear.

Among these factors, hamstring tightness was most directly relevant to our case and may increase the mechanical load on the sciatic nerve through 2 potential pathways (Fig. 4). First, reduced hamstring flexibility may reflect decreased posterior soft-tissue compliance, thereby increasing resistance to hip distraction and the required traction load. In our patient, marked preoperative hamstring tightness was accompanied by inadequate initial joint distraction and the need to progressively increase traction, consistent with this pathway. Second, hamstring tightness may alter the mechanical response of the sciatic nerve to traction. Katz et al. observed reductions in evoked EMG amplitude during hamstring lengthening in children with spastic cerebral palsy [8]. Fleming et al. demonstrated increased sciatic nerve strain with hip flexion and knee extension during total hip replacement [9]. These findings provide indirect evidence that limb positioning and soft-tissue lengthening can affect sciatic nerve loading and function. We therefore hypothesize that hamstring tightness may increase neural vulnerability during hip distraction, potentially through reduced nerve excursion or tolerance to traction. This proposed mechanism has not been directly demonstrated during hip arthroscopy.

Diagnosis, Management, and Prognosis

When neurologic dysfunction occurs after hip arthroscopy, the timing, anatomic distribution, and severity of the deficits should be considered to distinguish transient neuropraxia from axonal injury, direct nerve injury, or secondary compression. Electrodiagnostic testing can help localize the lesion and assess injury severity, whereas high-resolution ultrasonography can evaluate nerve continuity, focal swelling, and surrounding compression [32, 33]. These modalities provide complementary information. Progressive weakness, severe buttock pain, or local swelling should prompt imaging to exclude reversible causes such as hematoma or pseudoaneurysm [34]. Management should prioritize identification and relief of mechanical compression. In the absence of nerve discontinuity or persistent compression, conservative treatment generally includes ankle-foot orthosis use, contracture prevention, progressive strengthening and gait training, and serial clinical, electrodiagnostic, and ultrasonographic follow-up [35].

Prognosis depends primarily on the type and severity of injury. Neuropraxia typically resolves within days to weeks, whereas axonal injury may require several months and can result in incomplete recovery. Across previous studies [12, 21], reported neurologic abnormalities resolved within periods ranging from 1 day to 9 months. At 1 year postoperatively, ankle dorsiflexion had recovered to MRC grade 4 and plantar flexion to grade 5, but sensory recovery remained incomplete, indicating a severe postoperative sciatic nerve injury.

Clinical Implications

Given the absence of reliable safety thresholds for traction force or duration and the substantial interpatient variability in the mechanical response to hip distraction, preoperative assessment should include hamstring flexibility, hip range of motion, and generalized joint laxity to identify patients who may require greater traction loads and to develop an individualized distraction strategy [5, 6]. If initial traction fails to achieve adequate joint distraction, the traction force should not simply be progressively increased. The surgeon should first reassess hip rotation and avoid unnecessary internal or external rotation [36]. If distraction remains insufficient, joint venting may be performed [37]. After safe access to the central compartment has been established, a limited capsulotomy may be performed, followed by reassessment and reduction of the traction force [7]. If substantial resistance persists despite these measures, traction should be paused or the strategy modified, using the minimum effective force, limiting uninterrupted traction time, and intermittently releasing traction [2, 3]. Selective intraoperative neurophysiologic monitoring may be considered in patients who continue to require greater traction force or prolonged traction [38, 39].

Limitations

Several limitations should be acknowledged. First, this single case lacked real-time traction force and intraoperative neurophysiologic monitoring data, precluding accurate quantification of sciatic nerve loading or causal inference. Second, substantial heterogeneity in study design, patient populations, surveillance methods, outcome definitions, and follow-up duration limited comparisons across studies and precluded a reliable pooled incidence estimate. Third, the search was limited to PubMed and Web of

Science, and no formal risk-of-bias assessment or evidence grading was performed; therefore, the certainty of the synthesized evidence could not be formally evaluated.

Conclusion

This case documents the clinical sequence of marked hamstring tightness, difficult joint distraction, stepwise increases in traction, and subsequent severe sciatic nerve injury, providing new case-based clinical evidence that preoperative hamstring tightness may be a patient-specific risk factor for traction-related sciatic nerve injury. Sciatic nerve injury is an uncommon complication of hip arthroscopy, and traction loading is an important cause; however, no reliable safety threshold for traction force or duration has been established. Preoperative assessment of hamstring flexibility and other patient characteristics that may substantially increase traction requirements may be warranted. For patients expected to require greater traction loads, surgical indications, anticipated benefits, and the feasibility of safe joint distraction should be carefully evaluated. Individualized measures, including adjustment of hip position, joint venting, and use of the minimum effective traction, should be implemented to minimize the risk of nerve injury.

Declarations

Authors contributions

Weifeng Li conceived the study, collected clinical patient data, drafted the original manuscript, and documented the case. Tong Zheng performed literature retrieval and screening, curated the data, and revised the manuscript. Pu Shao prepared the figures and tables, screened references, and revised the article. Xianglin Wen verified the clinical data and interpreted the clinical findings. Yingchao Cao conducted the narrative literature review and critically revised the manuscript. Jianlin Xiao supervised the whole project, designed the study, reviewed and edited the manuscript, and gave final approval for submission. All authors read and approved the final manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article. No additional datasets were generated.

Ethics approval and consent to participate

Institutional review board approval was not required for a single-patient case report in our institution.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

Competing interests

The authors declare that they have no competing interests.

Clinical trial number

Not applicable.

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Figures

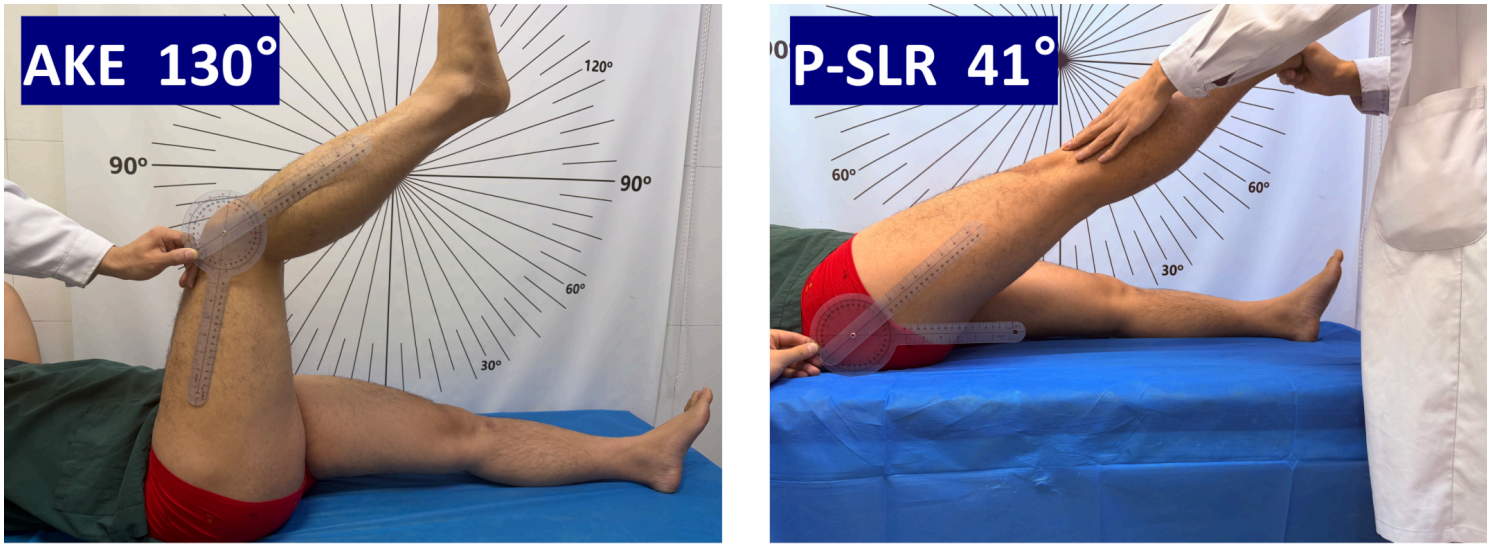


Figure 1

Preoperative hamstring flexibility assessment showing P-SLR of 41°, AKE of approximately 130°.

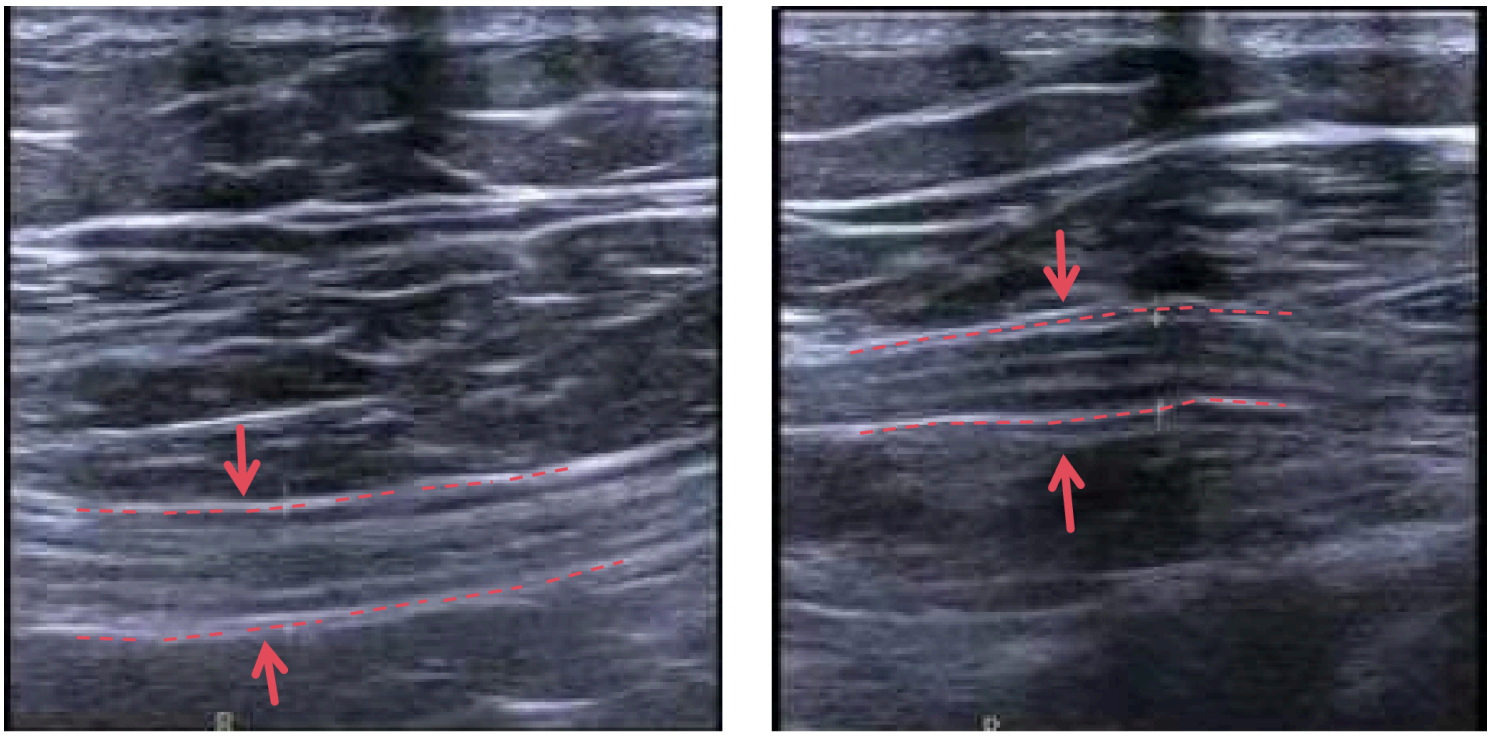


Figure 2

High-resolution ultrasonography at 1 month showing focal sciatic nerve thickening with preserved fascicular architecture.

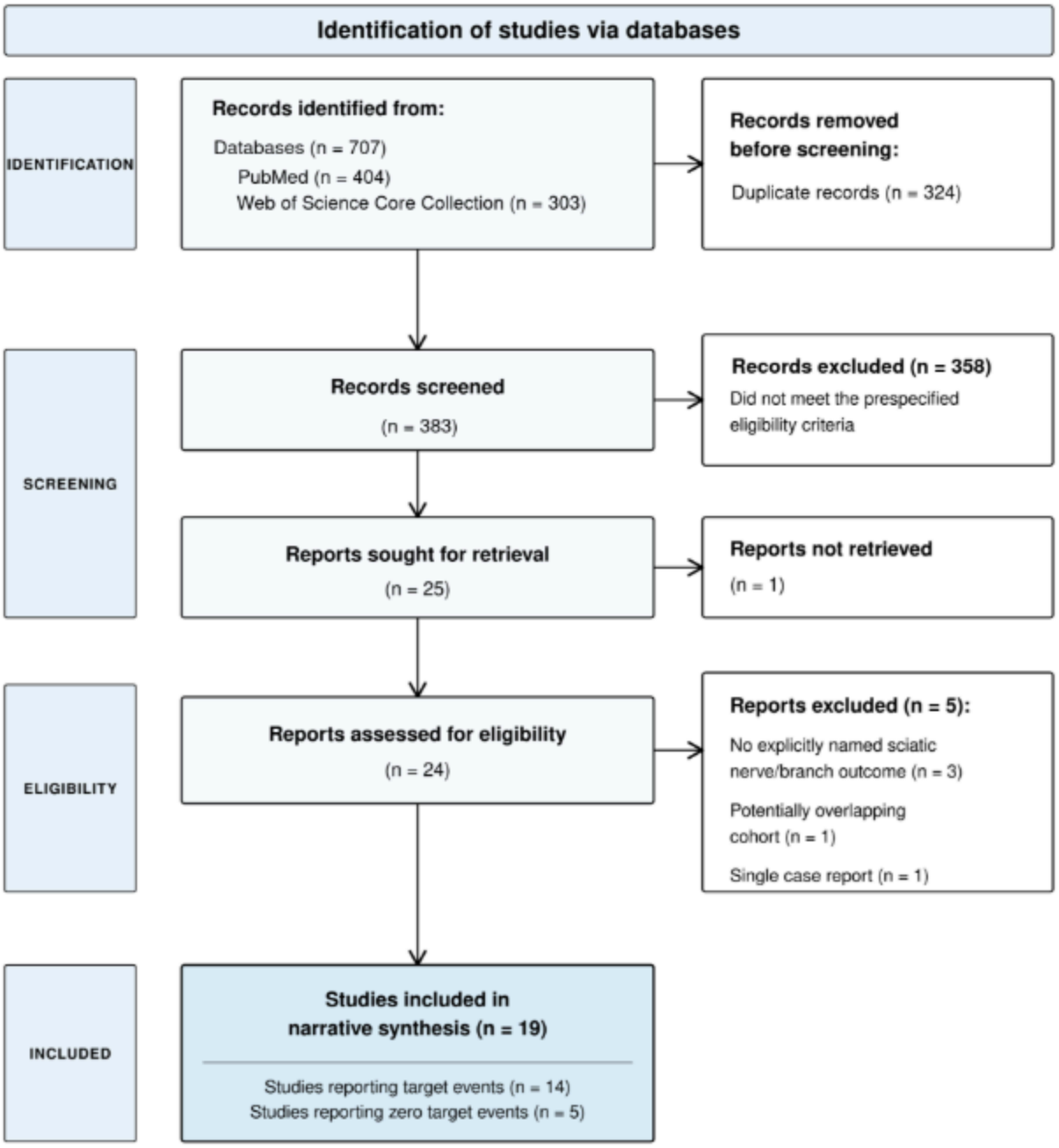


Figure 3

Literature selection showing 707 records identified, 324 duplicates removed, 383 records screened, 25 reports sought, 24 full texts assessed, and 19 studies included.

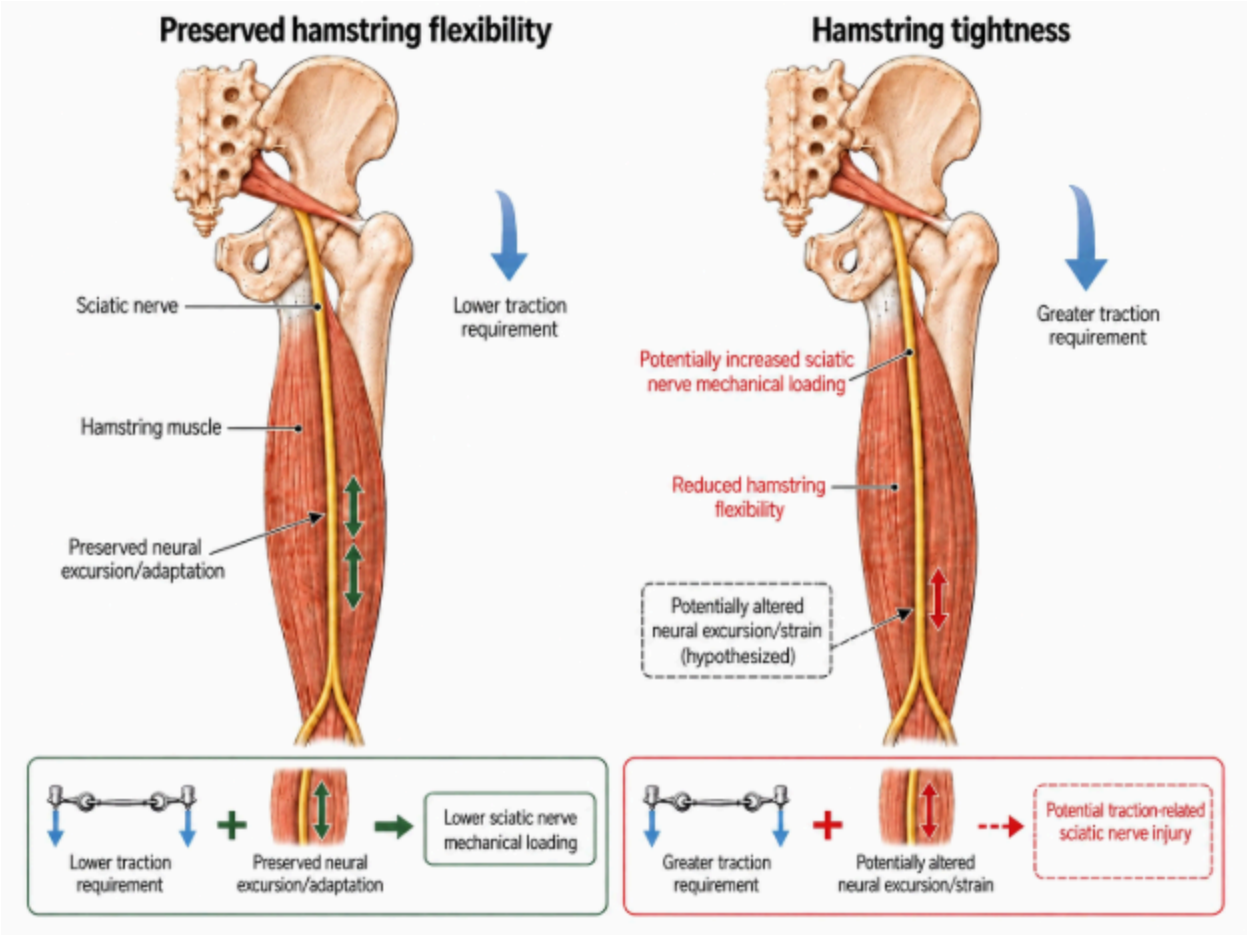


Figure 4

Proposed relationships between hamstring tightness, hip distraction resistance, and sciatic nerve loading.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryAppendix1SearchStrategies.pdf