

# Title: Return to Sport Following Operative and Non-Operative Treatment of Proximal Hamstring Tears: A Systematic Review and Meta-Analysis

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**Introduction:** Proximal hamstring tears can cause significant functional impairment in athletes and highly active individuals, diminish mobility and strength, and may limit return to activity. While previous systematic reviews have reported on outcomes of proximal hamstring repair, none have been able to form definitive conclusions regarding how treatment options affect return to sport (RTS). This review aims to explore the differences in RTS metrics and patient-reported outcome measures (PROMs) between operative and nonoperative management of proximal hamstring tears.

**Methods:** PubMed, Embase, Web of Science, and Cochrane Library systematically searched for Level II-IV studies published between January 1, 2003, and December 31, 2024. Eligible studies included reports of patients who underwent conservative or surgical treatment for complete (3 tendon) or incomplete ( $\leq 2$  tendon) proximal hamstring tears. Eligible studies included postoperative/post-treatment PROMs, clinical outcomes, and time to RTS. Studies were excluded if they were non-English, systematic reviews, database analyses, single case reports, or technique articles. Rates of RTS at pre-injury level were also calculated for each group. PROMs were collected from eligible studies, and the weighted means of PROM values at final follow-up for the three most commonly reported PROMs were calculated.

**Results:** A total of twenty-six studies containing 1652 patients met inclusion criteria (52.8% female); the majority of studies (96%) were level III or IV (Figure 1). Of the included patients, 1398 underwent operative management and 254 received non-operative care. The average follow-up was 2.73 years for the operative group and 3.49 years for the non-operative group. The average time to RTS for patients who underwent operative management was 8.47 months, while time to RTS was not reported for patients who were treated non-operatively. The overall rate of RTS at pre-injury level was significantly higher in the operative group (73.22%) compared to the non-operative group (62.37%;  $p=0.0266$ ). For tears that were managed operatively, acute tears ( $< 8$  weeks from injury) and chronic tears ( $> 8$  weeks from injury) had similar rates of successful RTS (acute 78.5% to 100%; chronic 72.3% to 100%).

Within the twenty-six included studies, twenty-one different PROMs were reported. The three most commonly reported PROMs were Lower Extremity Functional Scale (LEFS, 11 studies), Visual Analog Scale for Pain (VAS pain, 9 studies), and University of California, Los Angeles Activity Score (UCLA, 4 studies). As compared to non-operative management, patients who underwent operative management demonstrated significantly better mean LEFS scores (72.70 vs. 75.46;  $p=0.046$ ), VAS pain scores (2.08 vs 1.39;  $p=0.017$ ), and UCLA scores (5.70 vs 7.65;  $p<0.0001$ ) at final follow-up.

**Discussion and Conclusion:** This systematic review evaluating 1652 patients with proximal hamstring tears demonstrated that patients who underwent operative management had higher RTS rates and improved PROMs as compared to patients treated non-operatively. Rates of RTS after operative management were similar between acute and chronic tears. These findings highlight the potential RTS advantages of surgical management, which have not been previously reported. However, the overall low level of evidence and relative lack of studies reporting outcomes of non-operative management preclude definitive conclusions on this topic. There is a need for high-level studies that compare RTS rates after operative and non-operative management of proximal hamstring tears.

**Significance and Clinical Relevance:** Surgical treatment of proximal hamstring tears results in significantly higher return-to-sport and improved patient-reported outcome measures in comparison to non-operative treatment.

	Operative	Non-Operative	P-value
Return to Sport	73.22 %	62.4 %	<b>0.0266*</b>
PROM	Mean $\pm$ SD	Mean $\pm$ SD	P-value
LEFS	75.46 $\pm$ 2.19	72.70 $\pm$ 11.81	<b>0.0461*</b>
UCLA	7.65 $\pm$ 2.19	5.70 $\pm$ 2.00	<b>&lt;0.0001*</b>
VAS Pain	1.39 $\pm$ 2.28	2.08 $\pm$ 2.51	<b>0.0173*</b>

Notes: \* indicates statistical significance at  $p < 0.05$ . LEFS = Lower Extremity Functional Scale; PROM = Patient-Reported Outcome Measure; SD = Standard Deviation; UCLA = UCLA Activity Score; VAS = Visual Analog Scale.

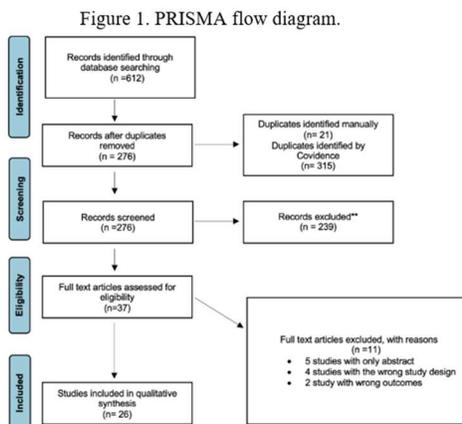


Table 1: Clinical Outcomes at Final Follow-Up for Proximal Hamstring Tear Treatments Operative vs. Non-Operative			
	Operative	Non-Operative	P-value
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PROM	Mean ± SD	Mean ± SD	P-value
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Figure 1. PRISMA flow diagram.

