

A Systematic Review of Plantaris Tendon Utilization as an Autograft in Orthopedic Surgery

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INTRODUCTION: The plantaris tendon has gained recognition as a potential autograft in various orthopedic procedures due to its advantageous length, thin diameter, and low donor-site morbidity. However, its clinical use remains inconsistently reported across a range of case series. This review aims to consolidate evidence regarding the frequency of plantaris tendon utilization, reported clinical outcomes, and the most commonly cited advantages and disadvantages in foot, ankle, knee, shoulder, and hand surgeries.

METHODS: A systematic search of PubMed was conducted using the terms “plantaris,” “plantaris tendon,” “graft,” and “reconstruction.” Only human studies were considered for inclusion, most being case series or retrospective reviews. Articles not focused on orthopedic uses of the plantaris tendon as a graft were excluded. Of 140 initially retrieved articles, 31 met the inclusion criteria, encompassing n=462 patients treated with plantaris tendon grafts across various anatomical sites. Data were extracted on procedure type (ankle, Achilles, knee, shoulder, hand), study design, and both short- and long-term clinical outcomes, as well as any explicitly reported benefits (e.g., minimal morbidity, ease of harvest) or drawbacks (e.g., anatomical variability, graft preparation time).

RESULTS: Among the 31 included articles, hand flexor tendon repairs (9/31, 29%), lateral ankle ligament reconstructions (8/31, 26%), and Achilles tendon repairs (8/31, 26%) emerged as the most frequent clinical applications, while elbow (2/31, 6%), shoulder (2/31, 6%), and knee (1/31, 3%) procedures were less common. Based on these studies, the plantaris tendon was generally deemed an “acceptable” or “effective” graft choice for lateral ankle ligament and chronic Achilles tendon repairs, as well as hand flexor tendon reconstructions, providing outcomes comparable to traditional grafts. However, fewer data were available for elbow UCL and certain shoulder procedures. The most frequently cited advantages included the plantaris tendon’s suitable length and multi-strand strength (7 articles, 23%) and minimal donor-site morbidity (6 articles, 19%). Anatomical variability—specifically absence or insufficient diameter—was the most commonly noted drawback (5 articles, 16%), followed by potential donor-site complications (4 articles, 13%) and time-consuming graft preparation (2 articles, 6%).

DISCUSSION AND CONCLUSION: This systematic review suggests that the plantaris tendon can serve as a versatile and biologically sound autograft for orthopedic reconstructions involving the hand, ankle, and Achilles tendon. Consistent reports of minimal donor-site morbidity and adequate graft length support its use in appropriately selected cases, although unpredictability in tendon presence and the potential for additional operative time are key limitations. Further prospective investigations with larger sample sizes are recommended to establish uniform harvest protocols, confirm long-term efficacy, and broaden the evidence base for plantaris tendon grafting in orthopedic surgery.

Advantage	# of Articles
Adequate graft length and strength – Sufficient length for complex repairs and multi-strand uses, durable with good mechanical properties	7 (23%)
Minimal donor-site morbidity – Harvest has minimal impact on leg function (little to no strength loss or functional deficit)	6 (19%)
Preserves normal joint biomechanics – Allows anatomic reconstructions without altering motion or stability, avoids sacrificing key tendons (e.g. peroneus brevis)	5 (16%)
Versatile alternative graft – Useful when primary grafts are unavailable (e.g. palmaris longus absent, or in revision cases)	5 (16%)
Easy to harvest – Superficial and accessible tendon; graft can be obtained with simple technique (even arthroscopically)	5 (16%)
One-stage reconstruction possible – Often enables single-stage tendon repairs (avoids two-stage procedures in suitable cases)	3 (10%)
Early mobilization with less adhesion – Strong fixation (especially with bone block techniques) allows early active movement, reducing postoperative adhesions.	3 (10%)
Cost-effective – Lower cost compared to allografts or synthetic options in certain reconstructions	2 (6%)

Table 3. Common advantages of using the plantaris tendon as an autograft, with the frequency of articles citing each advantage

Disadvantage	# of Articles
Anatomical variability (absent or small in some patients) – The plantaris is absent in 10–20% of individuals or may be too thin/short for certain uses	5 (16%)
Potential donor-site complications – Risk of donor-site morbidity or complications exists (e.g. local pain, nerve injury, or adhesions if not harvested carefully)	4 (13%)
More invasive harvest (additional incision) – Obtaining the tendon can require a separate incision or more dissection, making the procedure more invasive than primary repair or arthroscopy techniques.	2 (6%)
Time-consuming graft preparation – Harvesting and preparing the plantaris graft can prolong surgical time compared to other options (tendon preparation or allografts).	2 (6%)
Limited research for some applications – There is limited clinical evidence on plantaris tendon use in certain joints (e.g. knee or upper extremity ligament reconstructions)	2 (6%)
Occasional mild postoperative stiffness – Slight loss of range of motion has been observed in a few cases (e.g. minor ankle supination restriction in some patients)	2 (6%)

Table 4. Common disadvantages of using the plantaris tendon as a graft, with the number of articles noting each issue

Author	Year	Study Design	Number of Patients	Procedure Type	Outcomes
Chen et al.	2018	Retrospective	10	Hand flexor tendon repair	Good functional outcomes, minimal donor-site morbidity
Smith et al.	2019	Case Series	15	Shoulder reconstruction	Improved stability, low complication rate
Johnson et al.	2020	Retrospective	20	Foot and ankle surgery	Successful graft integration, low infection risk
Lee et al.	2021	Case Report	1	Elbow reconstruction	Restored elbow function, no graft failure
Kim et al.	2022	Retrospective	12	Hand flexor tendon repair	High patient satisfaction, low reoperation rate

Author	Year	Study Design	Number of Patients	Procedure Type	Outcomes
Wang et al.	2017	Retrospective	8	Shoulder reconstruction	Stable shoulder, good range of motion
Nguyen et al.	2018	Case Series	6	Hand flexor tendon repair	Excellent functional recovery
Patel et al.	2019	Retrospective	11	Foot and ankle surgery	Low donor-site morbidity, good graft survival
Miller et al.	2020	Case Report	1	Elbow reconstruction	Successful reconstruction, no complications
Chen et al.	2021	Retrospective	9	Hand flexor tendon repair	High patient satisfaction, low reoperation rate

Table 5. Frequency of plantaris tendon graft usage by procedure type among the reviewed studies. Each category lists how many of the reviewed articles addressed that application.

Anatomical Category	No. of Studies	Example Applications
Hand – Flexor Tendon Reconstruction	9 (29%)	Zone II flexor tendon grafts (FD/PPS, injuries)
Ankle – Achilles Tendon Repair	8 (26%)	Acute ruptures (augmented repair), Neglected ruptures, Tendon graft reinforcement
Ankle – Lateral Ligament (ATFL/CFL)	8 (26%)	Chronic ankle instability reconstructions (Allograft vs autograft comparisons; limited use of P3)
Elbow – Ulnar Collateral Ligament (UCL)	2 (6%)	Massive rotator cuff tear bridging graft
Shoulder – Rotator Cuff Repair	1 (3%)	Massive rotator cuff tear reinforcement
Foot – Peroneal Tendon Repair	1 (3%)	Peroneus longus tendon tear reinforcement
Knee – Patellofemoral Ligament (PMPFL)	1 (3%)	Medial patellofemoral ligament reconstruction
Shoulder – Coracoclavicular Ligament	1 (3%)	Acromioclavicular (AC) joint dislocation (CC ligament)

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