

Supplementary material 1

Appraisal and study selection process

Table 1. Assessment of included studies using Joanna Briggs Institute Critical Appraisal Checklist for Case Reports

Authors	C1	C2	C3	C4	C5	C6	C7	C8
Yamazaki T, Matsuura Y, Takahashi H, Ohtori S ¹	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Pirola E, Hébert-Blouin MN, Amador N, Amrami KK, Spinner RJ ²	Yes	No	No	Unclear	Yes	Yes	N/A	Yes
Tiengo C, Macchi V, Stecco C, Bassetto F, De Caro R ³	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Ortiz A, Aranda E, Sanudo JR, Aragonés P ⁴	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Browne KM, Fauzi Z, O'Shaughnessy M ⁵	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Lytziz C, Christos L, Natsis K, Konstantinos N, Pantazis E, Evagelos P ⁶	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flores T, Sabitzer H, Bergmeister KD, et al ⁷	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
McClelland WB, Means KR ⁸	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Riml S, Kompatscher P ⁹	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Pezas TP, Jose R ¹⁰	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bauer JM, Trusell JJ ¹¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cesmebasi A, Spinner RJ, Smith J, Martinoli C ¹²	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Poelaert F, Van Geluwe F, Van Holder C ¹³	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Van Demark RE, Anderson MC, List JT, Hayes M, Hayes M, Woodard D ¹⁴	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Kostoris F, Bassini S, Longo E, Murena L ¹⁵	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Sgouros S, Ali MS ¹⁶	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Afshar A ¹⁷	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Fatah MF ¹⁸	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes

C1 = Were the patient's demographic characteristics clearly described? C2 = Was the patient's history clearly described and presented as a timeline? C3 = Was the current clinical condition of the patient on presentation clearly described? C4 = Were diagnostic tests of assessment methods and the results clearly described? C5 = Was the intervention(s) or treatment procedure(s) clearly described? C6 = Was the post-intervention clinical condition clearly described? C7 = Were adverse events (harms) or unanticipated events identified and described? C8 = Does the case report provide takeaway lessons? N/A = not applicable

Table 2. PRISMA checklist 2020

Section and topic	Item #	Checklist item	Location where item is reported
Title			
Title	1	Identify the report as a systematic review	Title page (1)
Abstract			
Abstract	2	See the PRISMA 2020 for Abstracts checklist	Abstract
Introduction			
Rationale	3	Describe the rationale for the review in the context of existing knowledge	Under Introduction section
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses	Last paragraph of Introduction
Methods			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses	Second paragraph under Method section
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted	First paragraph Method section
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used	First paragraph Method section, Supplementary material 1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process	Second and third paragraph under Method section, Supplementary material 1
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process	Second and third paragraph under Method section, Supplementary material 1
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (eg for all measures, time points, analyses), and if not, the methods used to decide which results to collect	Third and fourth paragraph under Method section, Supplementary material 1
	10b	List and define all other variables for which data were sought (eg participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information	Second and third paragraph under Method section, Supplementary material 1
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process	Supplementary material 1
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (eg tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Supplementary material 1
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions	See Method
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses	See Method
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used	See Method
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (eg subgroup analysis, meta-regression)	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results	N/A

Section and topic	Item #	Checklist item	Location where item is reported
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases)	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome	N/A
Results			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded	Figure 1, Supplementary material 1
Study characteristics	17	Cite each included study and present its characteristics	Table 2
Risk of bias in studies	18	Present assessments of risk of bias for each included study	Supplementary material 1, Table 1
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots	Table 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies	N/A
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect	N/A
	20c	Present results of all investigations of possible causes of heterogeneity among study results	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed	N/A
Discussion			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence	See Discussion
	23b	Discuss any limitations of the evidence included in the review	See Discussion
	23c	Discuss any limitations of the review processes used	See Discussion
	23d	Discuss implications of the results for practice, policy, and future research	See Discussion
Other information			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered	See Method section
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared	See Method section
	24c	Describe and explain any amendments to information provided at registration or in the protocol	See Method section
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review	None noted, documented in manuscript
Competing interests	26	Declare any competing interests of review authors	None noted, documented in manuscript
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review	N/A

From: Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:71. <https://doi.org/10.1136/bmj.n71>

Search strategies

Table 3. Pubmed (183 studies)

#1	("Carpal Tunnel Syndrome"[Mesh] OR "carpal tunnel syndrome" OR "carpal tunnel" OR "median nerve compression" OR "median nerve entrapment" OR "median neuropath*")
#2	("Palmaris Longus" OR "reversed palmaris longus" OR "anomalous palmaris longus" OR "accessory palmaris longus" OR "palmaris profundus" OR musculus comitans nervi mediani OR palmaris bitendinous)
#3	#1 AND #2

Table 4. Embase (193 studies)

#1	exp carpal tunnel syndrome/ OR (carpal tunnel syndrome OR median nerve entrapment OR median nerve compression OR median neuropath*)
#2	exp palmaris longus muscle/ OR (palmaris longus OR palmaris profundus OR reversed palmaris longus OR anomalous palmaris longus OR musculus comitans nervi mediani OR palmaris bitendinous)
#3	#1 AND #2

Table 5. MedLine (160 studies)

#1	exp Carpal Tunnel Syndrome/ OR (carpal tunnel syndrome OR median nerve entrapment OR median nerve compression OR median neuropath\$)
#2	Exp palmaris longus muscle/ OR (palmaris longus OR palmaris profundus OR reversed palmaris longus OR anomalous palmaris longus OR musculus comitans nervi mediani OR palmaris bitendinous)
#3	#1 AND #2

Table 6. Cochrane (22 studies)

#1	MeSH descriptor [Carpal Tunnel Syndrome] explode all trees
#2	(carpal tunnel syndrome OR median nerve entrapment OR median neuropath*) :ti,ab,kw
#3	#1 OR #2
#4	(palmaris longus OR palmaris profundus OR reversed palmaris longus OR anomalous palmaris longus OR musculus comitans nervi mediani OR palmaris bitendinous) :ti,ab,kw
#5	#3 AND #4

Studies included at full-text review

- 1 Yamazaki T, Matsuura Y, Takahashi H, Ohtori S. A rare case of carpal tunnel syndrome with bifid median nerve and palmaris profundus muscle. *Plast Reconstr Surg Glob Open*. 2024;12(10):e6228. <https://doi.org/10.1097/GOX.00000000000006228> PMID:39399799 PMCID:PMC11469878
- 2 Pirola E, Hébert-Blouin MN, Amador N, Amrami KK, Spinner RJ. Palmaris profundus: one name, several subtypes, and a shared potential for nerve compression. *Clin Anat*. 2009;22(6):643–648. <https://doi.org/10.1002/ca.20848> PMID:19644968
- 3 Tiengo C, Macchi V, Stecco C, Bassetto F, De Caro R. Epifascial accessory palmaris longus muscle. *Clin Anat*. 2006;19(6):554–557. <https://doi.org/10.1002/ca.20322> PMID:16917822
- 4 Ortiz A, Aranda E, Sanudo JR, Aragonés P. Palmaris profundus and carpal tunnel syndrome: is it really a palmaris muscle? *Eur J Anat*. 2022;26(3):347–353. <https://doi.org/10.52083/KYEN4006>
- 5 Browne KM, Fauzi Z, O’Shaughnessy M. The palmaris profundus, a rare sight during carpal tunnel release. *Hand*. 2015;10(3):559–561. <https://doi.org/10.1007/s11552-014-9691-1> PMID:26330796 PMCID:PMC4551639
- 6 Lyrtzis C, Christos L, Natsis K, Konstantinos N, Pantazis E, Evagelos P. Revision of carpal tunnel release due to palmaris longus profundus. *Case Rep Orthop*. 2015;2015:616051. <https://doi.org/10.1155/2015/616051> PMID:26075127 PMCID:PMC4446466
- 7 Flores T, Sabitzer H, Bergmeister KD, et al. Median nerve traction caused by palmaris profundus muscle: a case report. *Plast Reconstr Surg Glob Open*. 2022;10(2):e4118. <https://doi.org/10.1097/GOX.00000000000004118> PMID:35198349 PMCID:PMC8856128
- 8 McClelland WB, Means KR. palmaris profundus tendon prohibiting endoscopic carpal tunnel release: case report. *J Hand Surg Am*. 2012;37(4):695–698. <https://doi.org/10.1016/j.jhsa.2012.01.006> PMID:22397841
- 9 Riml S, Kompatscher P. Palmaris profundus tendon as possible cause for median nerve compression. *J Hand Surg Am*. 2012;37(10):2198–2199. <https://doi.org/10.1016/j.jhsa.2012.06.042> PMID:23021181
- 10 Pezas TP, Jose R. Palmaris profundus in the carpal tunnel 1. *BMJ Case Rep*. 2021;14(8):e241328. <https://doi.org/10.1136/bcr-2020-241328> PMID:34400418 PMCID:PMC8370560

- 11 Bauer JM, Trusell JJ. Palmaris profundus causing carpal tunnel syndrome. *Orthopedics*. 1992;15(11):1348–1349; discussion 1349–1350. <https://doi.org/10.3928/0147-7447-19921101-16> PMID:1461818
- 12 Cesmebasi A, Spinner RJ, Smith J, Martinoli C. Dynamic ultrasonography can demonstrate the mechanism of the palmaris profundus in carpal tunnel syndrome 1. *Clin Anat*. 2015;28(4):428–430. <https://doi.org/10.1002/ca.22507> PMID:25691145
- 13 Poelaert F, Van Geluwe F, Van Holder C. Persisting complaints after carpal tunnel release: nerve compression by the palmaris profundus muscle. *J Hand Surg Asian Pac Vol*. 2018;23(4):593–595. <https://doi.org/10.1142/S2424835518720372> PMID:30428792
- 14 Van Demark RE, Anderson MC, List JT, Hayes M, Hayes M, Woodard D. Discovering an anatomic variant of the palmaris profundus during open carpal tunnel release. *Plast Reconstr Surg Glob Open*. 2018;6(8):e1867. <https://doi.org/10.1097/GOX.0000000000001867> PMID:30324055 PMCid:PMC6181504
- 15 Kostoris F, Bassini S, Longo E, Murena L. Carpal tunnel syndrome associated with bifid median nerve and palmaris profundus—case report and literature review. *J Hand Surg Asian Pac Vol*. 2019;24(2):238–242. <https://doi.org/10.1142/S2424835519720123> PMID:31035882
- 16 Sgouros S, Ali MS. An unusual cause of carpal tunnel syndrome. Case report. *Scand J Plast Reconstr Surg Hand Surg*. 1992;26(3):335–337. <https://doi.org/10.3109/02844319209015281> PMID:1470884
- 17 Afshar A. Palmaris profundus as the cause of carpal tunnel syndrome. *Arch Iran Med*. 2009;12(4):415–416.
- 18 Fatah MF. Palmaris profundus of Frohse and Fränkel in association with carpal tunnel syndrome. *J Hand Surg*. 1984;9(2):142–144. [https://doi.org/10.1016/S0266-7681\(84\)80013-3](https://doi.org/10.1016/S0266-7681(84)80013-3)
- 4 Brones MF, Wilgis EF. Anatomical variations of the palmaris longus, causing carpal tunnel syndrome: case reports. *Plast Reconstr Surg*. 1978;62(5):798–800. doi:10.1097/00006534-197811000-00037. PMID:715034.
- 5 De Derrari G. Syndrome of involvement of the median nerve at the wrist caused by anomaly of the palmaris longus muscle Article in Italian. *Minerva Ortop*. 1961;12:386–388. PMID:13720489.
- 6 Giunta R, Brunner U, Wilhelm K. Bilateral reversed palmaris longus muscle—a rare cause of median nerve compression syndrome. *Unfallchirurg*. 1993;96(10):538–540. PMID: 8235674.
- 7 Afshar A, Nasiri B, Mousavi SA, Hesarikia H, Navaeifar N, Taleb H. Anatomic anomalies encountered in 467 open carpal tunnel surgeries. *Arch Iran Med*. 2016;19(4):285–287. PMID:27041525.
- 8 Börekci A, Selahi Ö, Tanriverdi N, Osama M, Batirel HA, Kontaytekin KB, et al. Accessory hand muscles over the transverse carpal ligament: an obstacle in carpal tunnel surgery. *World Neurosurg*. 2023;170:e402–415. doi:10.1016/j.wneu.2022.11.045. PMID:36379360.
- 9 Shah HR, Hiremath A, Thatte MR. Anomalous palmaris longus tendon causing carpal tunnel syndrome. *Indian J Plast Surg*. 2019;52(3):360–361. doi:10.1055/s-0039-3400671. PMID:31908377.
- 10 George SC, Hassan Z. A bifid reversed palmaris longus muscle causing median nerve compression in a child. *J Hand Surg Eur Vol*. 2018;43(6):665–666. doi:10.1177/1753193417751717. PMID:29320906.
- 11 Markeson D, Basu I, Kulkarni MK. The dual tendon palmaris longus variant causing dynamic median nerve compression in the forearm. *J Plast Reconstr Aesthet Surg*. 2012;65(8):e220–222. doi:10.1016/j.bjps.2012.03.023. PMID:22472053.
- 12 Park MJ, Namdari S, Yao J. Anatomic variations of the palmaris longus muscle. *Am J Orthop (Belle Mead NJ)*. 2010;39(2):89–94. PMID:20396682.
- 13 Güler MM, Celiköz B. Anomalous palmaris longus muscle causing carpal tunnel-like syndrome. *Arch Orthop Trauma Surg*. 1998;117(4–5):296–297. doi:10.1007/s004020050252. PMID:9581267.
- 14 Depuydt KH, Schuurman AH, Kon M. Reversed palmaris longus muscle causing effort-related median nerve compression. *J Hand Surg Br*. 1998;23(1):117–119. doi:10.1016/S0266-7681(98)80241-6. PMID:9571503.
- 15 Zeiss J, Jakob E. MR demonstration of an anomalous muscle in a patient with coexistent carpal and ulnar tunnel syndrome. *Clin Imaging*. 1995;19(2):102–105. doi:10.1016/0899-7071(94)00036-C. PMID:7773871.
- 16 Saraf SK, Tuli SM. Anomalous m. palmaris longus producing carpal tunnel-like syndrome. *Arch Orthop Trauma Surg*. 1991;110(3):173–174. doi:10.1007/BF00395804. PMID:2059545.
- 17 Schuhl JF. [Compression of the median nerve in the carpal tunnel due to an intra-canal palmar muscle]. *Ann Chir Main Memb Super*. 1991;10(2):171–174. doi:10.1016/S0753-9053(05)80205-4. PMID:1716133.

Studies excluded at full-text review

Wrong study design

- 1 Zitek H, Humhej I, Kunc V, Kachlik D. Scoping review of the palmaris profundus muscle: anatomy of a rare variant and its role in carpal tunnel syndrome. *Neurosurg Rev*. 2023;46(1):279. doi:10.1007/s10143-023-02185-z. PMID:37875706.

Wrong patient population

- 1 Boltuch AD, Marcotte MA, Treat CM, Marcotte AL. The palmaris longus and its association with carpal tunnel syndrome. *J Wrist Surg*. 2020;9(6):493–497. doi:10.1055/s-0040-1714251. PMID:33282535.
- 2 Guclu D, Arican M, Unlu EN. Median nerve entrapment due to accessory palmaris longus muscle: MRI and sonography findings. *BMJ Case Rep*. 2018;2018:bcr-2018-224852. doi:10.1136/bcr-2018-224852. PMID:29724876.
- 3 Dorin D, Mann RJ. Carpal tunnel syndrome associated with abnormal palmaris longus muscle. *South Med J*. 1984;77(9):1210–1211. doi:10.1097/00007611-198409000-00047. PMID:6484701.

- 18 Kacik W, Wienzek K. [A case of carpal tunnel syndrome caused by an abnormality of the palmaris longus muscle]. *Chir Narzadow Ruchu Ortop Pol.* 1991;56(1-3):66-67. PMID:1369890.
- 19 Bang H, Kojima T, Tsuchida Y. A case of carpal tunnel syndrome caused by accessory palmaris longus muscle. *Handchir Mikrochir Plast Chir.* 1988;20(3):141-143. PMID:3402840.
- 20 Schlafly B, Lister G. Median nerve compression secondary to bifid reversed palmaris longus. *J Hand Surg Am.* 1987;12(3):371-373. doi:10.1016/S0363-5023(87)80007-2. PMID:3584884.
- 21 Backhouse KM, Churchill-Davidson D. Anomalous palmaris longus muscle producing carpal tunnel-like compression. *Hand.* 1975;7(1):22-24. doi:10.1016/0072-968X(75)90029-7. PMID:1116777.
- 22 Garcia Lopez JM, Lopez DC, Merino Sanchez MC. Median nerve compression by a reversed palmaris longus in the distal forearm: a case report. *Curr Orthop Pract.* 2023;34(6):277-279. doi:10.1097/BCO.0000000000001236. PMID:2028566867.
- 23 Telang M, Landzhov B, Olewnik L, Tubbs RS, Georgiev GP. Median nerve entrapment by variant anatomical structures. *Eur J Anat.* 2022;26(2):251-262. doi:10.52083/ZBDM6965. PMID:2017232953.
- 24 Rapp E. Anomalous muscles in nerve compression syndromes of the upper limb. *Chir Main.* 2004;23 Suppl 1:S188-98. doi:10.1016/j.main.2004.10.011. PMID:40148621.
- 25 Mayer E. Anomalies of the palmaris longus muscle. *Handchirurgie.* 1981;13(3-4):263-265. PMID:7346365.