REVIEW

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Surgical treatment for medial epicondyle tendinopathy: a systematic literature review

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Medial epicondyle tendinopathy is a pathology of the common flexor-pronator elbow tendon. Surgical intervention is indicated if conservative management modalities fail. This review aimed to determine if surgical intervention is an effective treatment for medial epicondyle tendinopathy in general population adults. Studies measuring pain, using the Visual Analogue Scale; grip strength, using a hand-held dynamometer; and/or function, using a validated quantitative tool, following surgical management of medial epicondyle tendinopathy in patients aged ≥18 years were searched for. Databases searched included Cochrane Library, MEDLINE, OpenGrey and PubMed. Study quality was assessed using the NICE quality appraisal checklist for quantitative studies reporting correlations and associations, and findings were presented in accordance with PRISMA guidelines. Four case series including a total of 105 (11 treated arthroscopically, 34 percutaneous and 60 open) patients with mean ages of 45-52.5 years met the inclusion criteria. All 4 studies measured validated quantitative outcomes, including MEPI (n=2), DASH (n=2) and VAS (n=2). One study observed significant improvements in VAS (P=0.006) and DASH (P=0.04), while another observed a significant improvement in MEPI (P<.0001). Post-operative complication rates for each approach were 18.18% (2/11) for arthroscopic, 0% (0/60) for open and 0% (0/34) for percutaneous. Study quality ranged from low (n=1) to medium (n=3) for internal validity, and medium (n=1) to high (n=3) for external validity. In conclusion, there is a small-sized (n=4) and weak recommendation for using surgical management of medial epicondyle tendinopathy in general population adults, owning to the limited and generally low-quality of evidence.

Keywords: Medial epicondyle tendinopathy, Surgery, Systematic review.

INTRODUCTION

Medial epicondyle tendinopathy, colloquially referred to as "golfer's elbow", is a musculoskeletal disorder affecting the tendinous origins of the pronator teres, flexor carpi radialis, flexor carpi ulnaris, flexor digitorum superficialis and palmaris longus[1]. Accordingly, common symptoms include the insidious onset of localised pain at the medial epicondyle of the distal humerus; strength deficiencies in forearm pronation, wrist flexion and finger flexion; and reduced wrist extension range of motion[1]. Within the literature, it is generally accepted that these symptoms are the result of collagen degeneration and disorientation caused by repeated tendon loading and compression at a level which exceeds tendon remodelling rates[1]. Supporting this, activities involving high hand grip forces for >1 hours per day, repetitive movements of the hand or wrist for >2 hours per day and use of vibrating tools >2 hours per day have been associated with significantly increased incidence of medial epicondyle tendinopathy, in addition to intrinsic factors, such as high body mass index, diabetes, hypercholesterolemia and smoking[2,3]. Moreover, it has been estimated that medial epicondyle tendinopathy affects up to 16% of Plastic Surgeons[4] and 13.1% of Climbers[5] despite a prevalence of only 0.6% and 1.1% in general population men and women respectively[6]. While medial epicondyle tendinopathy usually resolves within 6 to 8 weeks, 26% of suffers experience a recurrence of symptoms and 40% have residual minor discomfort following typical conservative management modalities, including but not limited to, load modification, cryotherapy, nonsteroidal anti-inflammatory drugs (NSAIDs), cross friction massage, orthoses, resistance training,

stretching, shockwave therapy and corticosteroid injections[7]. Consequently, medial epicondyle tendinopathy may present a significant socioeconomic burden with up to 5% of sufferers undertaking sickness absence from work for an average of 29 days per year[8] at an estimated cost of up to £27 million per year in the United Kingdom alone[9].

Surgical intervention for medial epicondyle tendinopathy is generally indicated if pain persists beyond 6-12 months of conservative management[10]. The operative approach may be arthroscopic, percutaneous or open to allow detachment of the common flexor origin from the medial epicondyle without causing disturbance to the medial collateral ligament and other surrounding structures[10-14] .Then, debridement of the common flexor tendon is typically performed, with or without reattachment, to reduce pain, via excision of pain inducing intratendinous lesions, and encourage activation of regenerative processes, via vascular disruption and tendon scarification[10-12,14]. While two prior systematic reviews have aimed to assess the efficacy of operative treatment for medial epicondyle tendinopathy, findings may have been confounded via the inclusion of patient populations with concomitant preoperative diagnoses, such as ulnar nerve involvement, and who underwent additional operative treatment at the time of medial epicondyle tendinopathy surgery[15,16]. Accordingly, by conducting a comprehensive systematic review of the available literature, this review proposes to determine the efficacy of surgical intervention for medial epicondyle tendinopathy, without anatomically relevant concomitant preoperative diagnoses or additional surgical intervention, on pain, strength and functional deficiencies in general population adults.

METHODS

The protocol of this review followed Conducting Systematic Reviews and Meta-Analyses of Observational Studies of Etiology (COSMOS-E) guidance due to being the only publication, to the authors' knowledge, specific to the conduct of systematic reviews of observational studies of etiology[17]. Said guidance was required in this instance owning to an absence of a comparative group in all identified studies, rendering guidance on systematic reviews of randomised controlled trials inappropriate for assessment for information bias, selection bias and confounding. Additionally, to aid quality assurance, the protocol for this review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the ID CRD420251006944.

Types of Studies

Quantitative studies were searched for including, but not limited to, randomized controlled trials, clinical trials, cohort, case-control, cross-sectional, case series, before-after and quasi-experimental. Human studies were exclusively considered. Primary studies published in English or Portuguese and before March 2025 were included. Studies that solely reported qualitative data, were duplicates of previously included studies or utilised the same data set as a previously included study were excluded.

Participants

Studies were included if participants were aged ≥18 years and possessed a diagnosis of medial epicondyle tendinopathy, or one of its synonyms. Studies including participants with concomitant preoperative ulnar nerve involvement, underwent an additional operative treatment at the time of medial epicondyle tendinopathy surgery, or underwent reconstructive surgery were excluded from this review to reduce confounding.

Exposure

This review implemented the American Medical Association's definition of a surgical procedure, in which a medical intervention involving an incision with instrument(s) was undertaken with the purpose of treating medial epicondyle tendinopathy[18]. Study exposure was broadly pre-defined to capture a breadth of surgical approaches. In keeping with the terminology used in a systematic review of surgical treatments for lateral epicondyle tendinopathy by Burn et al., an open approach was defined as a single incision >3cm in length, an arthroscopic approach was defined as involving arthroscopes for intra-articular visualisation, and a percutaneous approach was defined as a single incision ≤3cm in length[19]. Additionally, potential influences on surgery effects, such as participant occupation, attributed cause of medial epicondyle tendinopathy, duration of symptoms, prior treatment, concomitant pathologies and post-operative care were reported on.

Comparators

Studies with and without a comparator were included.

Primary outcomes

Primary outcomes included quantitative measures of pain, using the Visual Analogue Scale (VAS);

grip strength, using a hand-held dynamometer; and function, using a relevant validated tool such as Disabilities of the Arm, Shoulder and Hand (DASH), QuickDASH, Mayo Elbow Performance Index (MEPI) and Oxford Elbow Score (OES). To reduce information bias, studies not implementing a validated outcome measure to assess treatment efficacy were excluded from this review.

Search strategy

Two reviewers (J.T.P and J.M) systematically searched for published, unpublished and grey literature available up to March 2025 using the terms (medial epicondyle tendinopathy OR medial epicondyle tendinitis OR medial epicondylopathy OR medial epicondylitis OR medial epicondylalgia OR golfer's elbow) AND (operation OR surgery) on the databases Cochrane Library, MEDLINE, OpenGrey, and PubMed. The reference lists of all included publications were also screened for potentially eligible literature.

Data selection and extraction

Two reviewers (J.T.P and J.M) independently evaluated the titles and abstracts of the identified publications before applying the eligibility criteria to the full text reports. Any disagreements between the independent reviewers were settled by the third co-author (A.K). Data on study design, duration, exposures, participant characteristics, outcome measures, results and post-operative complications was extracted using a standardised extraction form adapted from the Cochrane Collaboration to reduce information bias[20].

Quality assessment and Risk of Bias

All included studies were fully assessed for quality by two independent reviewers (J.T.P and J.M) using the National Institute for Health and Care Excellence (NICE) quality appraisal checklist for quantitative studies reporting correlations and associations[21]. In accordance with the checklist's scoring system, and to succinctly summarise findings for the reader, all studies were awarded overall internal validity and external validity grades for quality as follows:

++ Most, if not all, of the marking criteria has been met, where it has not been met the conclusions are highly unlikely to change.
+ Some of the marking criteria has been met, where it has not been met or sufficiently described, the conclusions are unlikely to change.
– Little or none of the marking criteria has been met and the conclusions are likely or very likely to change.

Data Synthesis

The findings of the included studies were presented in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[22]. Although considered, the heterogeneity of included study's surgical procedures and quality of reporting precluded a meta-analysis. Nevertheless, as advised by COSMOS-E[17], Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) guidance was followed to determine the overall strength of the body of evidence[23]. The GRADE approach was selected due to the tool's inclusion of explicit marking criteria for observational studies and specific purpose of determining the overall quality and strength of recommendations in healthcare, based on the below criteria.
Overall GRADE quality ranking:

- High (Very confident that the body of evidence's effect represents the actual effect)
- Moderate (Quite confident that the body of evidence's effect is close to the actual effect, although it is also conceivable that it is significantly different)
- Low (The body of evidence's true effect may significantly differ from the actual effect)
- Very low (The body of evidence's true effect likely substantially differs from the actual effect)

Overall GRADE strength of recommendation ranking, considering factors such as balance between undesirable and desirable effects, patient preference and cost-effectiveness:

- Strong for using
- Weak for using
- Strong against using
- Weak against using

RESULTS

Study Selection

The overall search yielded 100 records with 4 studies on pain and/or function associations after surgical treatment of medial epicondyle tendinopathy meeting the inclusion criteria[11-14]. During the search, 16 studies appeared to meet the inclusion criteria but were later excluded due to the presence of concomitant preoperative ulnar nerve involvement, an additional operative treatment at the time of medial epicondyle tendinopathy surgery and/or a lack of validated outcome measures for pain, grip strength and/or

function. The PRISMA flow diagram used for study identification is represented in Fig. 1.

Study Methodological Characteristics and Risk of Bias

All 4 of the included studies implemented a retrospective case series methodology via review of medical records. The combined duration of all included studies amounted to 11 years with one study failing to report study duration[11]. None of the included studies discussed participant or outcome assessor blinding and all authors denied any conflicts of interest, financial or otherwise. The quality of included studies was found to range from low (n=1) to medium (n=3) for internal validity, and ranged from medium (n=1) to high (n=3) for external validity. The methodological characteristics of all included studies is represented in Table I.

Participant Characteristics of Studies

The total number of participants when study data was combined was 105 (61 male and 44 female) with mean ages of 45-52.5 years. Countries of study were USA (n=1), Brazil (n=1), Japan (n=1), and India (n=1) in outpatient settings. Mean duration of pre-surgery symptoms was reported on in 2 studies and ranged from 2-2.77 years[11,14]. One study reported dominant arm involvement in 85% of cases,[11] while one study simply reported exclusively unilateral symptoms[13] and another reported 1 instance of bilateral involvement[12]. Of the 60 participants in one study, the mechanism of injury was attributed to golf (n=20), tennis (n=10), weightlifting (n=9), construction work (n=8), attrition (n=5), rock climbing (n=1), bowling (n=1) and other (n=6)[14]. One study detailed patients' occupations, office work (n=2), furniture making (n=1), and car service technician (n=1),[12] while one study simply reported 28% of participant's occupations included repetitive movements[11]. One study reported that all participants underwent conservative treatment prior to surgery, including 1-3 corticosteroid injections[14]. Another study stated all patients were provided with nonoperative management, including NSAIDs,

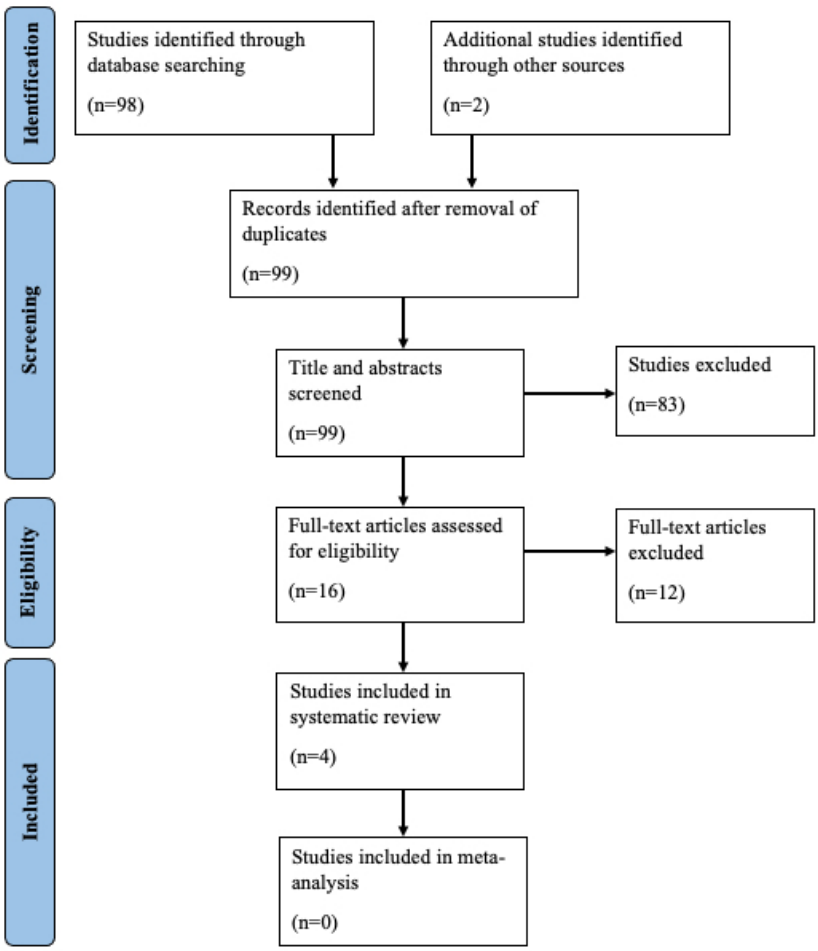

Fig. 1 — Flow diagram of the screening and selection of studies in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology. Source: Elaborated by the authors (2025).

Table I. — Methodological characteristics of included studies.

Study	Aim	Design	Duration	Quality
do Nascimento and Claudio	Efficacy via association	Retrospective case series	Unclear	IV + EV ++
Oda et al.	Efficacy via association	Retrospective case series	3 years	IV + EV ++
Sahu	Efficacy via association	Retrospective case series	3 years	IV - EV +
Vinod and Ross	Efficacy via association	Retrospective case series	5 years	IV + EV ++

Internal Validity (IV), External Validity (EV); Source: Elaborated by the authors (2025).

corticosteroid injections, and stretching, for >6 months prior to surgery[12]. The surgical approaches of the 4 included studies included arthroscopic,[11,12] percutaneous[13] and open[14]. All 4 of the included studies implemented different operative procedures, including common flexor tendon detachment,[13] detachment and debridement of the common flexor tendon,[11] partial release +/- debridement,[12] and common flexor tendon resection and debridement with repair[14]. Additionally, all 4 of the included studies implemented a different after care protocol. However, 3 studies initially implemented the use of an elbow sling post-surgery[11,13,14] and all 4 studies employed a rehabilitative exercise programme before return to normal activities. Table II represents the participant characteristics of included studies.

Results of Studies

All 4 studies measured validated quantitative outcomes, including MEPI,[13,14] VAS[11,12] and DASH,[11,12] although none assessed handgrip dynamometer strength. Of the 4 studies, 3 assessed outcome measures before and after surgical intervention, whereas 1 study only assessed outcome measures post-surgery[13]. One study utilising an arthroscopic surgical approach observed a significant reduction in VAS and DASH scores, P=0.006 and P=0.04 respectively, between pre-surgery and follow-up measures (mean follow-up duration 17 months, range 6-48 months)[11]. Similarly, another study utilising an arthroscopic approach reported mean presurgical to postsurgical improvements in VAS score of 5.8±4.4 to 0.3±0.6 and DASH scores of 59.1±24.3 to 7.5±10.3 respectively, but failed to assess statistical significance[12]. Another study employing an open surgical approach observed a significant reduction in MEPI score (P<.0001) between patients' first visit and 1-year post-surgery[14]. Another study utilising a percutaneous surgical approach simply reported the post-surgery MEPI scores were excellent in 30 patients and good in 4 patients[13]. Of the 4 studies, 2 reported no post-operative complications,[13,14] 1 reported a case of a spontaneously resolving haematoma with the use of an arthroscopic approach,[11] and another utilising an arthroscopic approach reported 1 instance of spontaneously resolving medial antebrachial nerve irritation[12]. The outcomes of all included studies are represented in Table III.

Certainty of evidence

Overall, there is a small-sized (n=4) and weak recommendation for using surgical intervention as a treatment for medial epicondyle tendinopathy pain and function in general population adults, although the evidence is of generally low quality.

DISCUSSION

This review is the first, to the authors' knowledge, that has sought to determine the efficacy of surgical intervention for medial epicondyle tendinopathy without anatomically relevant concomitant preoperative diagnoses, or additional surgical intervention, in general population adults. Consequently, the finding that surgical intervention for medial epicondyle tendinopathy significantly improved VAS and functional outcomes in 2 of the 4 included studies cannot be interpreted in the context of other directly comparable reviews[11-14]. However, a prior systematic review of clinical outcomes following surgical intervention for medial epicondyle tendinopathy by Aljayban and Al-Dhafer reported a success rate of 82.5-94.8%[15]. Likewise, a similar review by Arevalo et al. identified surgical success rates of 63-100%[16]. Although, as previously stated, such findings may have been confounded by the inclusion of studies with patient populations possessing concomitant ulnar nerve involvement and who underwent additional surgical interventions for lateral epicondyle tendinopathy at the time of medial epicondyle tendinopathy surgery. Consequently, true effects may be difficult to determine.

Table II. — Participant characteristics of included studies.

Study	N (Male:Female)	Age (years)	Country	Population description	Symptom duration (Years)	Surgery type	Postoperative care
do Nascimento and Claudio	7 (5:2)	50 (range 36-67)	Brazil	85% had dominant arm involvement, 28% described an occupation requiring “repetitive movements”	2 (range, 6 months to 4 years)	Arthroscopic detachment and debridement without reinsertion	Elbow sling for 3-5 days, physiotherapy after 2 weeks, return to sports and work permitted after 10-12 weeks
Oda	4 (2:2)	48.3 (range, 44-52)	Japan	Occupation; office worker (n=2), furniture craftsman (n=1), and car service technician (n=1). 1 case was bilateral. All reived nonoperative treatment (NSAIDs, corticosteroid injection(s), and stretching)	>0.5	Arthroscopic partial release +/- debridement	No splint was applied, a gentle active range of motion exercise was started 1 day post post-surgery and resumption of unrestricted activity was permitted after 6-8 weeks
Sahu	34 (10:24)	45 (range, 30–60)	India	All had unilateral symptoms	NR	Percutaneous detachment without debridement	Bandage removed after 7 days to allow commencement of an exercise programme
Vinod and Ross	60 (44:16)	52.5±8.8	USA	Mechanism of injury; golf (n=20), tennis (n=10), weightlifting (n=9), construction/work (n=8), attrition (n=5), rock climbing (n=1), bowling (n=1), other (n=6) All underwent conservative treatment (most received 1-3 corticosteroid injections)	2.76±4.26	Open resection, debridement and repair	Simple sling, active range of motion exercises after 48 hours, sutures removed after 2 weeks and light activities of daily living permitted, strengthening initiated after 6-8 weeks, return to sports and repetitive activities permitted after 3-4 months

Number of patients (N), Not reported (NR), Nonsteroidal Anti-inflammatory Drugs (NSAIDs); Source: Elaborated by the authors (2025).

Table III. — Outcomes of included studies.

Study	Outcome Measure	Time Points Measured	Results	Statistical Significance	Complications
do Nascimento and Claudio	VAS	Pre-surgery and follow-up. Mean follow-up duration was 17 months (6-48 months)	Pre-surgery 7.8±1.8 (3-10) Post-surgery 1.9±2.3 (0-6)	P=0.006	One patient experienced a major post-operative hematoma which resolved spontaneously after approximately 10 days
	DASH		Pre-surgery 38.3±16.8 (18.7-63.3) Post-surgery 6.3±1.3 (5-8)	P=0.04	
Oda et al.	VAS	Pre-surgery and follow-up. Mean follow-up duration was 16.2 months (range, 6 to 28)	Pre-surgery 5.8±4.4 (0-10) Post-surgery 0.3±0.6 (0-1.4)	NR	One patient experienced medial antebrachial nerve irritation which spontaneously resolved
	DASH		Pre-surgery 59.1±24.3 (21-67.5) Post-surgery 7.5±10.3 (1.7-25.8)	NR	
Sahu	MEPI	Post-surgery (Time frame unclear)	Excellent in 30 patients and good in 4 patients (Scores not provided)	NR	No wound related complications were encountered
Vinod and Ross	MEPI	Patient's first visit and 1-year post-surgery	First visit 58±7.7 Post-surgery 88±7.8	P<.0001	No significant complications arose, including infections, ulnar nerve injuries, or elbow stiffness

Visual analogue scale (VAS), Disabilities of the Arm, Shoulder and Hand (DASH), Mayo Elbow Performance Index (MEPI), Not Reported (NR); Source: Elaborated by the authors (2025).

Nonetheless, through evaluation of this reviews included studies' changes in pre-surgery and post-surgery outcome measure scores in the context of available research on minimal clinically important difference (MCID) scores, it may be possible to determine if the findings of this review are clinically significant. For example, Myles et al. determined the MCID for the VAS to be 10mm, or a 1 point change[24]. Subsequently, the statistically significant change in VAS from 7.8±1.8 to 1.9±2.3 (P=0.006) in one study and change from 5.8±4.4 to 0.3±0.6 in another study, both utilising an arthroscopic approach, may be clinically significant. Likewise, Franchignoni et al. determined the MCID for the DASH to be 10.83 points, meaning the statistically significant change in DASH from 38.3±16.8 to 6.3±1.3 (P=0.04) in one study and 59.1±24.3 to 7.5±10.3 in another study, both utilising an arthroscopic approach, may also be clinically significant[25]. Similarly, research by Sun et al. revealed a 12.2 point change in MEPI constitutes an MCID, meaning the statistically significant change in MEPI from 58±7.7 to 88±7.8 (P<.0001) in the study employing an open approach[14] may indeed be clinically significant too[26]. However, it is important to consider the patients recruited in the aforementioned studies to determine VAS, DASH and MEPI MCIDs were from populations recovering from a variety of surgeries,[24] upper-limb musculoskeletal disorders[25] and open elbow arthrolysis[26] respectively. Consequently, the results from these studies may not necessarily be representative of a clinically significant change in a medial epicondyle tendinopathy population. Accordingly, until MCID research for VAS, DASH and MEPI scores in a medial epicondyle population is available, the clinical significance of the reviewed studies' results cannot be definitively determined.

Furthermore, although not directly comparable, the present review's finding that surgical intervention for medial epicondyle tendinopathy significantly improved VAS and functional outcomes in 2 of the 4 included studies[11-14] is partially reflected in a systematic review of surgical treatments for lateral epicondyle tendinopathy by Burn et al., which highlighted significant improvements in DASH, VAS and patient satisfaction scores 1-year post-operatively[19]. Similarities between the findings of the present review and Burn et al. may be partially explained by the shared implementation of valid and reliable outcome measures, such as DASH,[27] to limit the risk of detection bias in the included studies. Additionally, the rigour of both review articles' exclusion criteria, such as exclusion of novel

experimental surgical approaches and reconstructive surgery, may have aided attenuation of confounding in the included studies and allowed similarly unbiased review conclusions to be drawn[28].

Nevertheless, it is notable Burn et al. found no clinically significant differences in post-operative complication risk between open, arthroscopic and percutaneous approaches[19]. Conversely, the present review observed a 18.18% (2/11) associated risk with an arthroscopic approach,[11,12] 0% (0/60) associated risk with an open approach[14] and 0% associated risk (0/34) with a percutaneous approach[13]. A possible explanation for this discrepancy between review findings may simply lie in the difference in anatomical location of the pathological tendon and resultant surgical site, one being medial to the elbow and the other lateral. Nonetheless, comparison between different surgical approaches and associated complication rates could not be made with the aforementioned reviews on medial epicondyle tendinopathy, owning to complication rates across differing surgical approaches being pooled to produce a single figure in both reviews[15,16]. Additionally, the present review's finding that an arthroscopic approach carried the highest associated risk of post-operative complications may be, in part, due to the steep learning curve of elbow arthroscopy, whereas percutaneous and open approaches are generally believed to require comparatively less technical ability to perform proficiently[29]. Furthermore, since none of the included studies reported the chronicity of medial epicondyle tendinopathy, it is conceivable that the patients who underwent an arthroscopic procedure could have suffered from more advanced stages of tendon degeneration, perhaps leading the surgeon to select an arthroscopic approach to enhance intra-articular visualisation for exhaustive tendon debridement in the first instance[30]. Subsequently, as proposed by Lohrer et al., surgical treatment of more advanced tendinopathies may theoretically result in worse outcomes, such as the higher rates of post-arthroscopy complications seen in this review, due to larger and more numerous intratendinous lesions requiring greater surgical intervention and longer healing times[31]. Moreover, compliance bias, arising from the failure of included studies to record participant adherence to post-operative care programmes, and performance bias, arising from the absence of participant and outcome assessor blinding, may have systematically affected outcomes, although this was the case with all of the studies included in this review[11-14]. In addition, outcome reporting bias may have been present in the 2 studies that did not record any post-operative complications through the choices of phrasing 'No wound related complications were encountered'[13] and 'No significant complications arose'[14]. Perhaps more pressingly, however, the small sample sizes (n=7 and n=4) in the two studies utilising an arthroscopic approach[11,12] could have led to the chance finding of a false-positive association, since arthroscopic surgical approaches are generally believed to carry the lowest risk of post-operative complications due to less total trauma and resultant area for infection[32].

Furthermore, it is important to consider the case series study design of all included studies in this review may have exposed results to confounding, owning to the absence of randomisation or a comparative group[11-14]. Congruently, due to an absence of randomised control trials available for inclusion, only associative conclusions may be drawn from the results of this review as causation for specific outcomes, such as differences between arthroscopic, percutaneous or open approaches and post-operative complications, cannot be determined. Likewise, although considered, the large heterogeneity of included study's surgical procedures, outcome measures and quality of reporting precluded a meta-analysis of differences between surgical approaches and outcomes over time, with 1 study even failing to assess MEPI before surgical intervention or report their full results[13]. Consequently, the quality of studies included in this review was found to range from low[13] to medium[11,12,14] for internal validity, meaning caution may be advised when attempting to interpret the results of this review. Conversely, Burn et al. exclusively included levels of evidence I to II,[19] as classified by the Journal of Bone & Joint Surgery guidelines,[33] with all but one study utilising randomisation, meaning their findings may be more representative of actual effects.

Finally, the decision to exclude literature unavailable in the English or Portuguese language may have biased findings by limiting the pool of data on which conclusions could be drawn[34]. Subsequently, future systematic reviews should strive to include literature written in languages other than English and Portuguese with the aim of identifying larger studies of higher methodological quality than those included in the present review. Moreover, meta-analyses of randomised, and preferably sham/placebo controlled, comparisons between surgical approaches may be required to definitively determine if a particular surgical technique elicits more favourable outcomes over another. Consequently, until said

findings are available to inform international policy and guidelines, it may be acceptable to grant decision making on which surgical approach to undertake to the individual surgeon performing the operation, based on their personal competence and the unique presentation of their patients.

CONCLUSION

Surgical intervention appears to be a viable treatment option for medial epicondyle tendinopathy pain and functional deficiencies in general population adults when conservative molarities fail. Although the available evidence is of generally low quality, there is a small-sized (n=4) and weak recommendation for use, especially with an arthroscopic or open approach owning to statistically, and seemingly clinically, significant improvements in VAS, DASH and MEPI scores with minor severity of post-operative complications.

Ethics approval and consent to participate: This is a systematic review of published studies meaning ethical approval and informed consent to participate is not applicable.

Abbreviations: COSMOS-E: Conducting Systematic Reviews and Meta-Analyses of Observational Studies of Etiology, VAS: Visual Analogue Scale, DASH: Disabilities of the Arm, Shoulder and Hand, MEPI: Mayo Elbow Performance Index, OES: Oxford Elbow Score, NICE: National Institute for Health and Care Excellence, NSAIDs: Nonsteroidal anti-inflammatory drugs, PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses, GRADE: Grading of Recommendations, Assessment, Development, and Evaluation, IV; Internal Validity, EV: External Validity, MCID: Minimal Clinically Important Difference Score.

Availability of data and materials: All of the data which supports the findings of this systematic review is contained within the manuscript.

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