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Systematic Review / Meta-analysis

Effectiveness of surgical interventions for treating de Quervain's disease: A systematic review and meta-analysis

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ABSTRACT

Introduction: This systematic review of randomized controlled trials was undertaken to assess whether any of the various currently used surgical interventions have better functional outcomes and less impairment or fewer surgical complications compared to the other common surgical interventions in de Quervain's disease.

Material and methods: Relevant studies related to surgical interventions in de Quervain's disease based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines were identified from PubMed, Embase, Web of Science, and the Cochrane Central Register of Controlled Trials for randomized controlled trials comparing surgical interventions in de Quervain's disease published from January 2000 to December 2020. Functional outcome and impairment were the primary outcomes assessed.

Results: Three trials met the eligibility criteria which were following randomized controlled trial or quasi-experimental trial enrolling adults ≥18 years of age diagnosed with de Quervain's disease, comparing clinical outcomes between different surgical interventions, and including functional outcomes, impairment, pain and complications data. The Cochrane Risk of Bias Assessment Tool and GRADE approach were used to ascertain methodological quality. Statistical heterogeneity was tested with I-square and chi-square tests. The longitudinal skin incision probably slightly reduced superficial radial nerve injury, vein injury, scar hypertrophy, and total complications compared with the transverse skin incision with relative risk: 0.14, very low certainty by GRADE; 0.10, very low certainty by GRADE; 0.57, very low certainty by GRADE; and 0.23, very low certainty by GRADE, respectively.

Conclusion: Concerning the analysis of functional and pain scores, no significant results were able to be concluded. This study's findings must be considered in the light of quality and sample size limitations, and further high quality prospective randomized controlled clinical trials are needed to draw more firm conclusions.

1. Introduction

de Quervain's disease or radial styloid tenosynovitis is tenosynovitis of the first dorsal compartment. It seems to be more common in women, with prevalences of 0.36% in women and 0.13% in men in a Taiwan population-based study [1], and 1.3% in women and 0.5% in males in a study by Stahl S et al. [2]. Patients generally present with severe tenderness at the radial side of the wrist, referring to the thumb or the lateral forearm, with detrimental effects on the patient's quality of life [3].

There are two standard treatment methods, conservative and operative. Conservative treatment includes immobilization and steroid injections [4], while operative treatment involves open release of the first extensor retinaculum if conservative treatment fails. Fritz de Quervain first described surgical treatment of this disease, and various other surgical approaches have been reported since that time [5]. Surgical release of the first compartment is effective, but may lead to complications, especially abductor pollicis longus and extensor pollicis brevis tendon subluxation [5], superficial radial nerve injury, vein injury and/or hypertrophic scar [6]. One recent retrospective study with a mean follow-up of 9.5 years concluded that the transverse skin incision gives reliable, lasting results without complications or recurrence [7]. In contrast, other studies have favored the longitudinal skin incision [8,9]. The other options are the lazy "S" incision, specific angle incision [10] and endoscopic release [11]. This relatively high number of surgical techniques examined in many studies is indicative of the lack of consensus on the best surgical approach for treating this condition. Generally, however, any surgical approach for the treatment of de

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Quervain's disease is associated with low postoperative morbidity or pain and a high postoperative quality of life [12]. Currently, there is no widespread agreement as to which surgical technique is the best for dealing with de Quervain's disease, and this study was undertaken to perform a systematic review of current surgical practices for this disease which would be useful in establishing or at least moving closer to an optimal approach. The review included prospective and randomized (or quasirandomized) controlled trials to see whether any of the several surgical interventions in de Quervain's disease had overall better functional outcomes and lower impairment or lower surgical complications, particularly in terms of nerve damage, vein damage, hypertrophic scarring, and/or palmar tendon subluxation.

2. Materials and methods

2.1. Literature search

The studies for the analysis were chosen using an adapted Preferred Reporting Items for a Systematic Reviews and Meta-Analyses (PRISMA) as shown in the flow diagram in Fig. 1 [13,14]. A preliminary protocol was carried out to guide the literature search. Studies were screened based on the following criteria:

- P (Population): patients with radial styloid tenosynovitis (de Quervain's disease);
- I (Intervention): any surgical intervention for this disease;
- C (Comparison): other surgical interventions;
- O (Outcomes): functional outcomes, complications, return to work and pain score

2.2. Data search and extraction

Both review authors (SS,CC) independently screened each abstract, title, or both, of the records retrieved and investigated the full text of all potentially relevant records, mapped the records to studies, and classified the studies as included studies, excluded studies, studies awaiting classification, or ongoing using the following search terms: ('De Quervian tenosynovitis'/de OR Quervian* OR De Quervian*) OR ((tendinopathy OR tenovaginitis OR tendovaginitis/de OR tendinitis* OR tendonitis OR tendinitis/de OR tenosynovitis/de OR tendinos* OR bursitis/de)) AND ((abductor AND pollicis AND (long OR longus))) OR (extensor AND pollicis AND brevis))) AND (surgical*) OR (surgical intervention) OR (open*) OR (endoscopic*). Cochrane Central Register of Controlled Trials (CENTRAL; December 2019), MEDLINE (via PubMed; January 2000 to December 2019), Web of Science (via webofknowledge; January 2000 to December 2019), EMBASE (January 2000 to December 2019) were searched. The article quality was assessed by evaluating the components of the study design including randomization, blinding, population, intervention, and outcomes. Discrepancies were resolved through consensus between the authors. The same

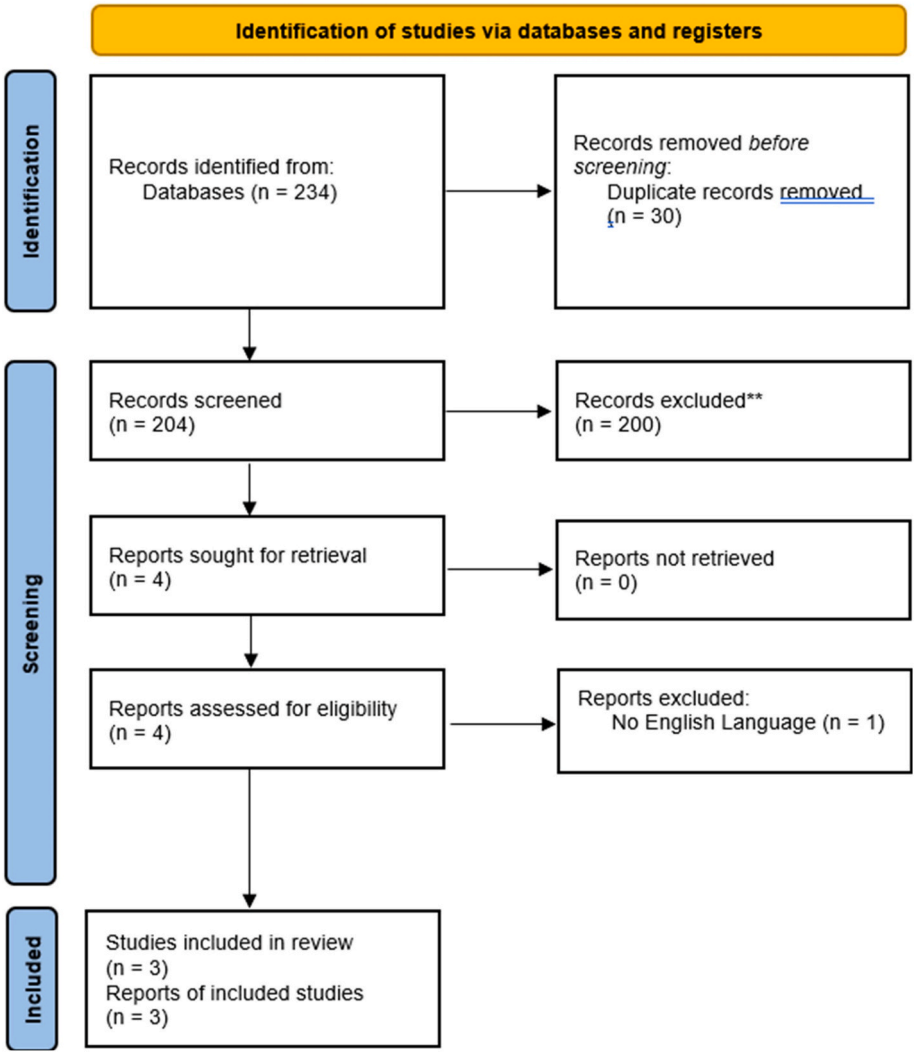

Fig. 1. The PRISMA 2020 flow diagram show 3 studies were analyzed.

authors, independently, analyzed the articles resulting from the initial search. If titles and abstracts matched the topic, the full texts were accessed. The bibliographies of the included studies were also screened for inclusion criteria. For studies that fulfilled the inclusion criteria, both review authors independently extracted key participant and intervention characteristics using a data extraction form based on the recommendations of the Cochrane Handbook for Systematic Reviews of interventions [14], checked the data entries, and resolved disagreements by consensus.

2.3. Eligibility criteria

Articles were included if they met the following criteria: a randomized controlled trial or quasi-experimental trial enrolling adults ≥18 years of age diagnosed with de Quervain's disease, comparing clinical outcomes between different surgical interventions, and including functional outcome, impairment, pain and complications data. Abstracts or unpublished data were included only if sufficient information on the above 4 factors was included.

2.4. Outcomes of interest

A systematic literature review for randomized controlled trials or quasi-experimental trials comparing clinical outcomes between different surgical interventions used for de Quervain's disease patients was performed, specifically identifying studies that documented: (1) functional outcome and impairment as assessed by various functional assessment instruments such as the Short Form-36 (SF-36), the Disability of the Arm, Shoulder, and Hand questionnaire (DASH) and the Patient-Rated Wrist Evaluation (PRWE); (2) pain which was defined as persistent local tenderness at the radial styloid after surgery and assessed using a pain tool such a VAS score or VNRS at least 3 months after the surgery; and (3) complications after surgery including superficial radial nerve, vein injury, scar pain and/or scar hypertrophy. These outcomes were included because they reflect non-success of operation and post-operation quality of life of the patients [12].

2.5. Statistical analysis

The statistical analysis was performed by both authors (SS, CC). Statistical heterogeneity was tested with I-square [15], with an I-square value higher than 50% deemed as substantial heterogeneity [16]. A fixed-effects (inverse variance) model was used when the effects were assumed to be homogenous ($p > 0.05$). Statistical heterogeneity is implied when $p < 0.05$, and a random-effects model was used in those circumstances. For the meta-analysis methodology, the ReviewManager 5.3 program [17] was used to analyze the heterogeneity and combine the outcomes among trials in accordance with the guidelines contained in the Cochrane Handbook for Systematic Reviews of Interventions [18]. For dichotomous outcomes, the Mantel-Haenszel method was used and the findings documented using relative risk and 95% confidence intervals. For continuous outcomes, the inverse variance method was used and the findings were documented in weighted mean differences if the outcomes were measured by the same scale or tool, otherwise by standardized mean difference. A meta-analysis we carried out only when meaningful, that is, only when the treatments, participants, and clinical questions were similar enough for pooling to be appropriate. When multiple trial arms were reported in a single study, only the relevant arms were included.

3. Results

3.1. Identification of eligible studies

The process was documented through an adapted Preferred Reporting Items for a Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Fig. 1) showing the process of study selection [12,13]. The literature search resulted in 234 citations, 30 of which were duplicates and removed. 200 of the 204 articles upon completion of abstract screening were excluded. Of the 4 remaining full texts, all four met the inclusion criteria, but one study was excluded as it was not published in English, and it also had a small study population of just 20 patients. A hand search of reference lists in the three-remaining full-text reports yielded no additional relevant reports. The last literature search update was done in December 2020. A funnel plot to determine possible publication bias was not created as the number of studies was insufficient (i.e., fewer than 10). Therefore, a total of 3 studies [8,9,11] met the inclusion criteria for the quantitative synthesis in Fig. 1, and were included in the study, two of which compared longitudinal and transverse skin incisions [8,9], and the third comparing endoscopic release and transverse skin incision [11].

3.2. Methodological quality assessment

Following the Cochrane Risk of Bias Assessment Tool [11], randomized studies (Level I evidence) were selected. Key domains evaluated the RCTs composed of adequate sequence generation, allocation concealment, blinding, incomplete outcome data, free of selective reporting and free of other bias, no support by funding, and valid sample size estimation. The Cochrane 'Risk of Bias' tool [19] for reporting RCTs was used to ascertain the overall methodological quality of the included studies [19]. This review study assessed the following domains: random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and personnel, and blinding of outcome assessment (detection bias). Incomplete outcome data (attrition bias) and selective reporting (reporting bias) are shown in Fig. 2. The GRADE approach [20] was selected in order to assess the certainty or quality of a body of evidence using the five GRADE considerations (risk of bias, consistency of effect, imprecision, indirectness and publication bias). The overall functional score was downgraded owing to potential detection bias (lack of blinding of participants on self-reported outcome measures) and imprecision (few studies, limited numbers of participants and wide confidence intervals).

3.3. Patient demographics

The patient sex and age data from the studies were recorded (Table 1). The patient ages ranged from 20 to 75 years and were comparable between the different surgical interventions in each study. There were more females than males in all of the studies. The reason for excluding patients in each study were well documented and consistent with common methodology. Anesthetic use for each study varied among general and regional anesthetic. Pain was measured using VAS scores. The 3 RCTs included 228 patients, but only 2 were reviewed included postoperative complications. Overall, the studies included 114 patients in the longitudinal group, 84 patients in the transverse group and 30 patients in the endoscopic group. All of the studies reported complication. 2 of the 3 studies reported pre- and post-operative VAS scores of 100 patients. However, two of the studies lacked data on functional outcome and impairment analyses. For surgery-related complications, all 3 RCTs, with a total of 228 patients had documented post-operative complications and so were included in the analysis.

3.4. Intervention characteristics

Two of the studies [8,9] compared open longitudinal skin incision with transverse skin incision while the third [11] investigated endoscopic surgical release vs longitudinal skin incision. In two of the studies a single surgeon had performed the surgical interventions while the third study did not provide information on the number of participating surgeons. Tourniquets were used in all studies but none of the studies gave the specific tourniquet pressure. For the open longitudinal and

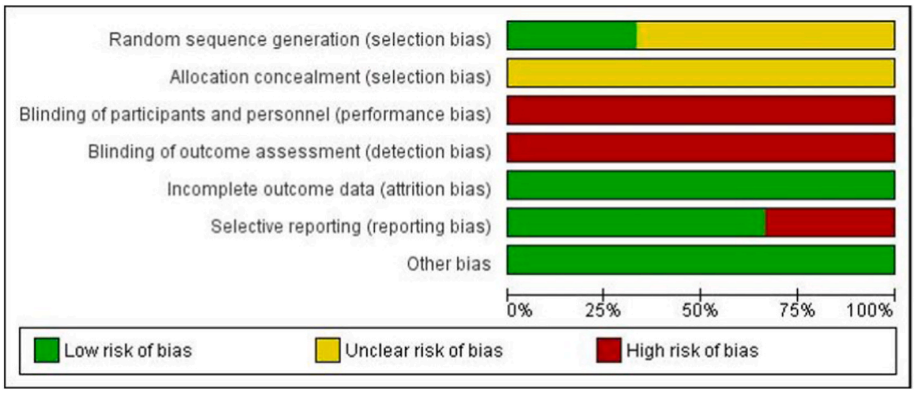

Fig. 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Table 1
Baseline demographic data of the patients included in the randomized controlled trial studies assessed for the current study.

Author(s)	Year	Country	Follow up (months)	Type of interventions	Number of patients	Female gender (%)	Mean age (years)
Abrisham et al. [9]	2011	Iran	3 months	L, T	96	80%	44 in L group 46.5 in T group
Kumar et al [8]	2016	India	6 months	L, T	48	87.5%	37.9 in L group 36.3 in T group
Kang et al. [11]	2013	Korea	6 months	E, L	52	92.3%	48.7 in E group 52.4 in L group

L = Longitudinal Skin Incision.
T = Transverse Skin Incision.
E = Endoscopic Release.

transverse skin incisions, the length of the skin incision varied from 1.5 cm to 2 cm over the prominent thickening of the first dorsal compartment. In the endoscopic group, two portals were used, one 1 cm distal to and one 3 cm proximal to the radial styloid along the course of the first extensor compartment. A 2 mm transverse incision was made at the distal portal. Postoperative compressive dressings were applied, which were removed 1–3 days after surgery, and movements of the wrist and thumb were encouraged. Only one study [11] reported mean DASH score at 12 and 24 weeks.

3.5. Outcomes of interest

The outcomes of interest from the studies were demonstrated as Table 2. In terms of comparing the effects of surgical interventions between longitudinal skin incision and transverse skin incision in de Quervain's disease, none of the studies included functional scores comparing the different surgical interventions. One study [8] assessed pain and provided pre-treatment and post-treatment data on 48 participants (Figs. 3 and 4), finding that the effect of a longitudinal skin incision for de Quervain patients was uncertain in terms of reducing pain (SMD -0.05, 95% CI: 0.94 to 0.84), as the level of evidence was very low. Two studies [8,9] assessed complications after surgical intervention data on 148 participants. The pooled results of these two studies indicated that the longitudinal skin incision probably slightly reduced superficial radial nerve injury (Fig. 5), vein injury (Fig. 6), scar hypertrophy (Fig. 7), and total complications (Fig. 8) compared with the transverse skin incision with RR 0.14, 95% CI: 0.02 to 1.11; RR 0.10, 95% CI: 0.01 to 0.81; RR 0.57, 95% CI: 0.22 to 1.48; and, RR 0.23, 95% CI:0.10 to 0.52 respectively. However, again the certainty of the evidence was very low. Comparing post-surgical effects between endoscopic release and longitudinal skin incision, Kang [9] reported DASH scores (Figs. 11 and 12) of post-surgical interventions at 12 and 24 weeks for 60 participants.

Table 2
Outcomes of interest included in the randomized controlled trial studies assessed for the current study.

Author(s)	DASH Score (Mean ± SD)		Pain score (Mean ± SD)		Complication			
	12 weeks	24 weeks	12 weeks	24 weeks	Superficial Radial Nerve Injury	Vein injury	Scar Hyper trophy	Total Complication
Abrisham et al. [9]	–	–	–	–	L group 0/54 T group 3/52	L group 0/54 T group 5/52	L group 5/54 T group 5/52	L group 5/54 T group 13/52
Kumar et al [8]	–	–	L group 4.1 ± 3.0 T group 4.4 ± 3.5	–	L group 0/22 T group 3/22	L group 0/22 T group 3/20	L group 1/22 T group 5/20	L group 1/22 T group 12/20
Kang et al. [11]	E group 16.9 ± 10.8 L group 27.1 ± 10.8	E group 3.8 ± 1.8 L group 7.3 ± 6.1	E group 2.7 ± 2.1 L group 3.8 ± 1.3	E group 1.5 ± 1.6 L group 1.6 ± 2.1	E group 3/11 L group 9/36	–	–	–

L = Longitudinal Skin Incision.
T = Transverse Skin Incision.
E = Endoscopic Release.

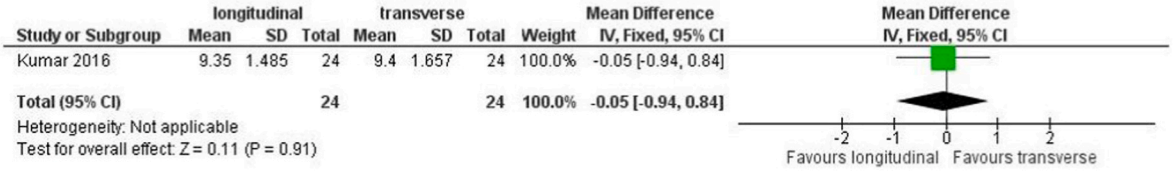

Fig. 3. Forest plot comparison: Pre-operative treatment of longitudinal skin incision versus transverse skin incision.

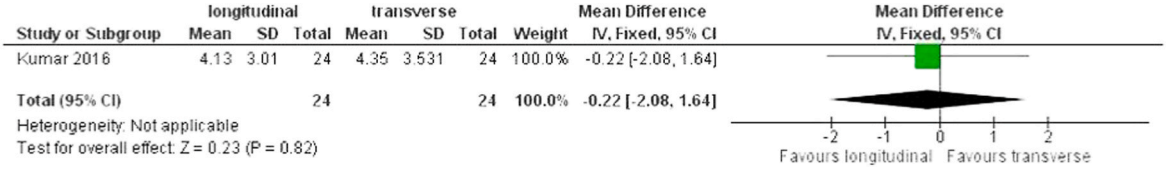

Fig. 4. Forest plot comparison: Post-operative treatment of longitudinal skin incision versus transverse skin incision.

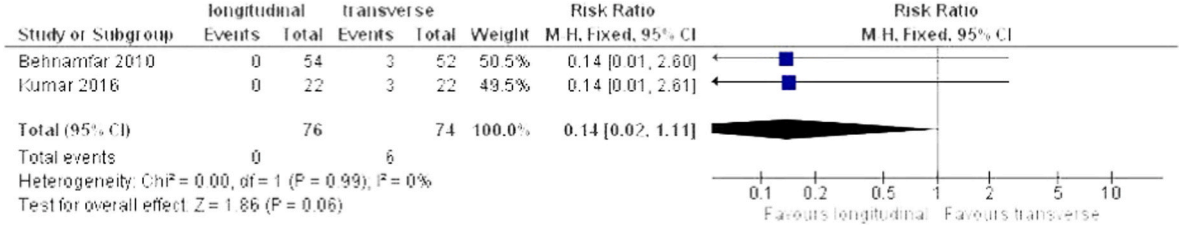

Fig. 5. Meta-analysis of superficial radial nerve injury comparing longitudinal skin incision versus transverse skin incision (Forest plot).

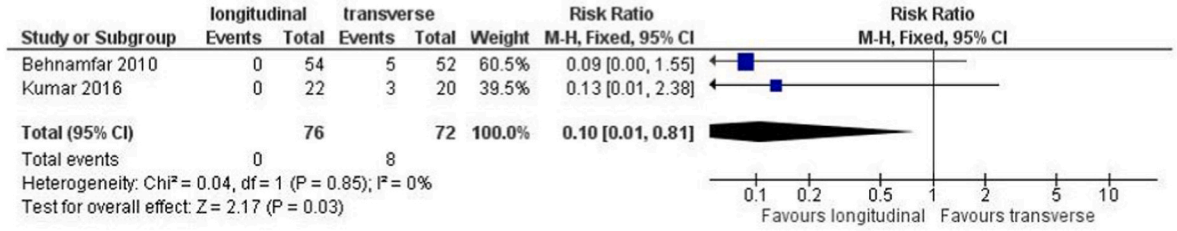

Fig. 6. Meta-analysis of vein injury comparing longitudinal skin incision versus transverse skin incision (Forest plot).

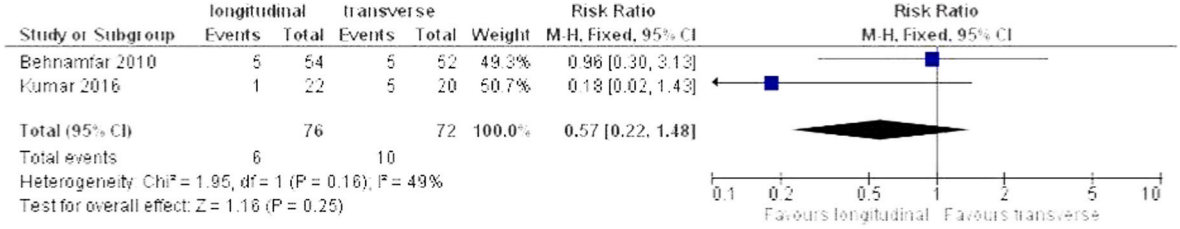

Fig. 7. Meta-analysis of scar hypertrophy comparing longitudinal skin incision versus transverse skin incision (Forest plot).

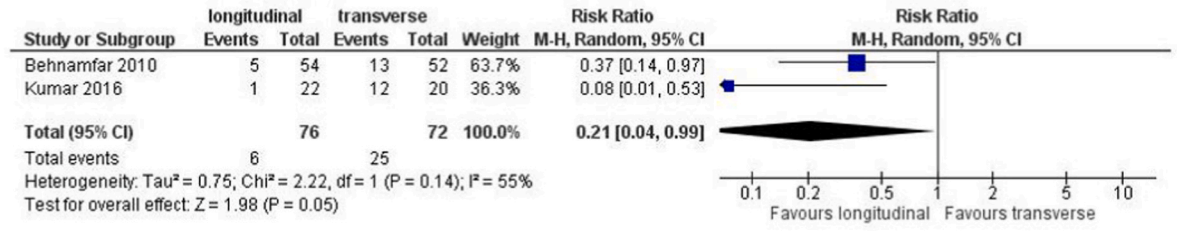

Fig. 8. Meta-analysis of total complication comparing longitudinal skin incision versus transverse skin incision (Forest plot).

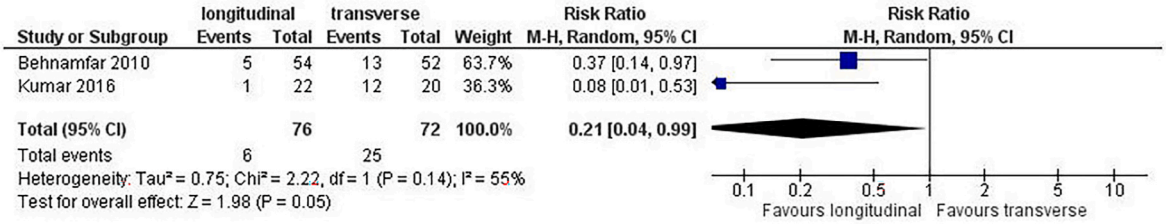

Fig. 9. Forest plot comparison: Mean VAS score at 12 weeks of Endoscopic skin incision versus longitudinal skin incision.

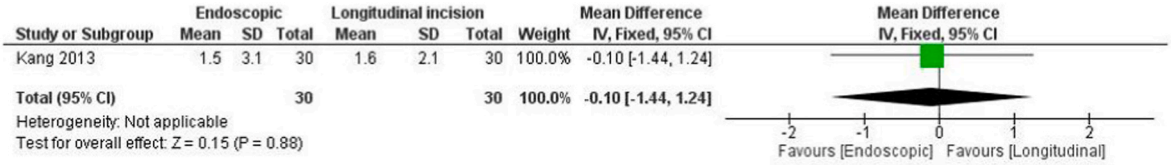

Fig. 10. Forest plot comparison: Mean VAS score at 24 weeks of Endoscopic skin incision versus longitudinal skin incision.

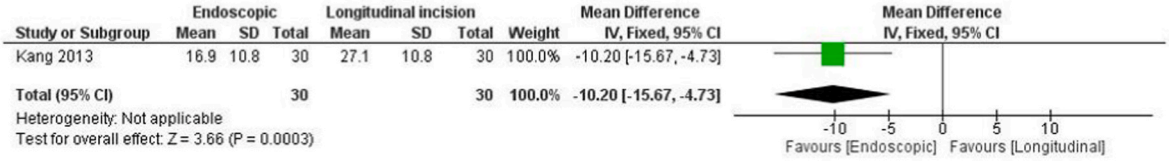

Fig. 11. Forest plot comparison: Mean DASH score at 12 weeks of Endoscopic skin incision versus longitudinal skin incision.

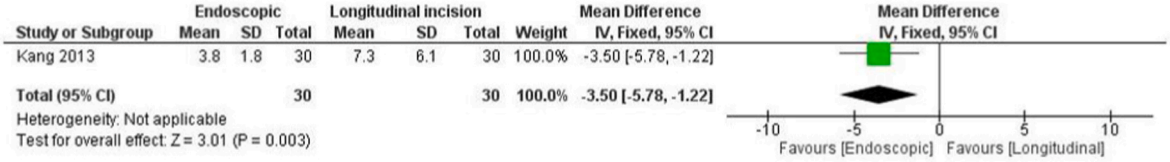

Fig. 12. Forest plot comparison: Mean DASH score at 24 weeks of Endoscopic skin incision versus longitudinal skin incision.

Endoscopic release resulted in improved DASH scores at 12 weeks (SMD -10.20, 95% CI -15.67 to −4.73) and slightly improved (SMD -3.50, 95% CI -5.78 to −1.22) at 24 weeks. However, the certainty of this evidence was also very low. The pain scores (Figs. 9 and 10) of post-surgical interventions at 12 and 24 weeks for 60 participants were evaluated using VAS scores. Endoscopic release resulted in lower VAS scores at 12 weeks compared with longitudinal skin incisions (SMD -1.10, 95% CI: 1.98 to −0.22), but with no difference at 24 weeks (SMD -0.10, 95% CI: 1.44 to 1.24). It was uncertain whether endoscopic release resulted in improved VAS scores at 12 weeks and there was no difference between the methods at 24 weeks because the certainty of this evidence was again very low. Kang [11] assessed superficial radial nerve injury after surgical intervention data on 60 participants (Fig. 13) and found that endoscopic release resulted in little or no superficial radial nerve injury compared with longitudinal skin incision with RR 1.09, 95% CI 0.36 to 3.34. Based on the findings of these studies, it is uncertain whether endoscopic release had any effect on superficial radial nerve injury compared with longitudinal skin incision (low certainty evidence).

4. Discussion

This systematic review and meta-analysis of three different surgical techniques for de Quervain's disease, longitudinal skin incision, transverse skin incision and endoscopic release, were based on three studies found from an extensive search of the literature. Most studies examined in the literature search were unsuitable for our review as they were prospective studies which lacked randomization or comparisons between surgical interventions. The primary outcomes this study evaluated were functional assessment pre- and post-surgical intervention and pain scores pre- and post-surgical intervention, while the secondary

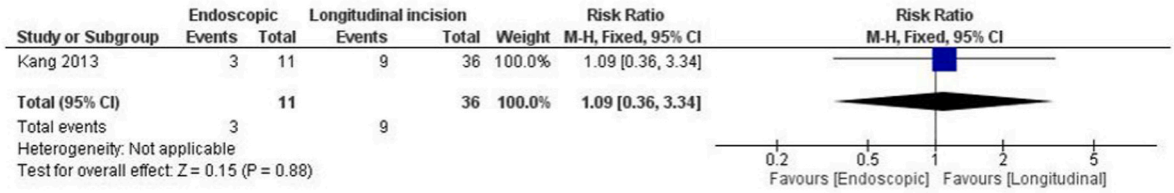

Fig. 13. Forest plot comparison: Superficial radial nerve injury of Endoscopic skin incision versus longitudinal skin incision.

outcomes evaluated were total complications, superficial radial nerve injury, vein injury and scar hypertrophy. All studies agreed that the surgical approach chosen noticeably affected the functional outcomes, pain scores and surgery-related complications. Four major open incision types have been used for surgical treatment of de Quervain's disease, the transverse, longitudinal, lazy "s" and specific angle techniques, all of which have their proponents and advantages and disadvantages. The transverse incision is created following the lines of Langer, and generally results in a superior cosmetic result [21,22]. The longitudinal incision has been promoted as being the safest incision in terms of superficial radial nerve injury [5,23]. The "lazy S" incision and specific angle techniques have been introduced as possible surgical approaches to de Quervain's [24,25], however, these are not to date widely used in actual clinical practice.

The results of this systematic review confirmed some strengths of the longitudinal skin incision compared with the transverse skin incision for de Quervain's disease. There were no differences in the reports in post-operative pain in terms of VAS scores between the two techniques [8,9]. These studies did not use functional outcome scores such as the DASH score or patient-related wrist evaluation (PRWE), and therefore could not draw any firm conclusions concerning this issue. Comparing endoscopic release with longitudinal open release of the first extensor compartment for De Quervain disease, significant differences were found in favor of endoscopic release concerning pain (VAS score) and quick-DASH at 3 months after surgery. However, there was no significant difference in terms of mean time for return to work. These studies thus provide limited evidence favoring endoscopic release versus longitudinal open release for De Quervain's disease in the short term, but no evidence for the midterm [11], which was similar to the results of a previous systematic review [26]. No other studies were found which compared endoscopic release and open release, and more research on the effect of surgery is needed to get more info on which is the safest overall.

For secondary outcomes, the superficial branch of the radial nerve (SBRN) and lateral antebrachial cutaneous nerve (LABCN) are at risk of injury during surgical treatment for de Quervain's disease. Superficial radial nerve injuries have been reported 0.5%–30% of surgical treatments for de Quervain's disease [27–31]. According to an earlier study [32], iatrogenic nerve damage to these nerves can lead to debilitating neuropathic pain symptoms [33]. The most significant finding in this review was the overall rate of complications. In previous studies, the longitudinal skin incision had a significantly lower complication rate. The analysis of specific complications showed a statistically significant difference between the two groups for vein injury but no significant differences between the groups in terms of superficial radial nerve injury or hypertrophic scarring. The findings of this review suggest that the longitudinal skin incision for de Quervain's disease results in less iatrogenic superficial radial nerve injury or vein injury with consequently better functional outcomes. These results are contrary to previous theories reported by some surgeons that the transverse skin incision is preferable to the longitudinal skin incision in terms of reduced hypertrophic scar. The results from this review cannot add evidence to this disagreement due to the high level of heterogeneity of the three studies included. Comparing the endoscopic release and the longitudinal skin incision, there was no difference in the complication rates, but this is probably due to the fact that the endoscopic incision is specifically designed to avoid the proximal and distal superficial radial nerves.

The present review was limited by the quality and sample sizes of the available studies. There are a number of methodological biases as the surgical treatment was carried out by many different surgeons, data on any concomitant pathologies are lacking, the age range of the patients is very wide (20–75 years), and also the study criteria of the included studies were very broad, all of which can cause unreliability of the data collected. There were also limitations in the studies involved in terms of blinding of the participants and personnel (performance bias) as well as blinding of outcome assessment (detection bias), although of course we should note that blinding was not possible due to the appearance of the surgical incisions. Although it is difficult, or perhaps impossible, to blind participants and personnel to treatment allocation in studies comparing different surgical interventions, such lack of blinding on self-reported outcomes may have led to inflated effect sizes. Two studies had low dropout rates and were considered to have low risk of attrition bias. This review conducted an extensive literature search by handsearching of registered databases and congress proceedings. But the search may still have missed relevant publications or ongoing trials. In order to minimize extracting and reporting bias, this review was performed by two independent authors, and the data were all re-analyzed from the three studies to correct for any possible errors.

5. Conclusions

5.1. Implications for practice

The studies examined in this review tend to indicate that the longitudinal skin incision for de Quervain's disease may have better functional outcome scores and reduced surgical complications, however the small number of studies and patients result in only a low level of confidence in any conclusions, and further research is needed to strengthen these conclusions.

5.2. Implications for research

The findings suggest that further high quality prospective randomized controlled clinical trials are needed in this subject. In particular, there are to date a lack of any randomized controlled trials examining the various surgical treatment options for de Quervain's disease. Ideal studies would be well-designed, randomized, double-blind trials with appropriate procedures followed to minimize the risk of bias in comparing the effects of different interventions such as different types of surgeries, with assessment of outcomes at a follow-up of at least six months to ensure that any reported improvements are long-term. The outcomes of interest are those used in this review, primarily pain (measured on a visual analogue scale or similar) and functional and impairment outcomes (DASH score or similar), and secondary occurrence of adverse events.

Conflicts of interest

No conflicts of interest.

Sources of funding

No funding was involved regarding this review.

Ethical approval

The present study was approved by the Prince of Songkla University Institutional Review Board, Faculty of Medicine, Songklanagarind Hospital, Prince of Songkla University (IRB number REC 63-301-11-1).

Consent

No consent is needed in this review.

Author contribution

Sitthiphong Suwannaphisit – literature search, wrote the manuscript. Chaiwat Chuaychoosakoon - literature search, wrote the manuscript.

Registration of research studies

None.

Guarantor

Chaiwat Chuayhoosakoon, MD.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.103620.

References

[1] P.-C. Shen, P.-C. Chang, I.-M. Jou, C.-H. Chen, F.-H. Lee, J.-L. Hsieh, Hand tendinopathy risk factors in Taiwan: a population-based cohort study, Medicine (Baltim.) 98 (1) (2019 Jan), e13795.
[2] S. Stahl, D. Vida, C. Meisner, O. Lotter, J. Rothenberger, et al., Systematic review and meta -analysis on the work-related cause of de Quervain tenosynovitis: a critical appraisal of its recognition as an occupational disease, Plast. Reconstr. Surg. 132 (6) (2013) 1479–1491.
[3] D. Perno Ioanna, M. Papaloizos, A comprehensive approach including a new enlargement technique to prevent complications after De Quervain tendinopathy surgery, J Hand Surg Rehabil 35 (3) (2016) 183–189.
[4] B.M.A. Huisstede, J.H. Coert, J. Fridén, P. Hoogvliet, for the European Handguide Group, Consensus on a multidisciplinary treatment guideline for de Quervain disease: results from the European HANDGUIDE study, Phys. Ther. 94 (8) (2014 Aug 1) 1095–1110.
[5] H. Gundes, B. Tosun, Longitudinal incision in surgical release of de quervain disease, Tech. Hand Up. Extrem. Surg. 9 (3) (2005 Sep) 149–152.
[6] H.J. Mangukiya, A. Kale, N.P. Mahajan, U. Ramteke, J. Manna, Functional outcome of De Quervain's tenosynovitis with longitudinal incision in surgically treated patients, Musculoskelet Surg 103 (3) (2019 Dec) 269–273.
[7] J.J. Garçon, B. Charruau, E. Marteau, J. Laulan, G. Bacle, Results of surgical treatment of De Quervain's tenosynovitis: 80 cases with a mean follow-up of 9.5 years, Orthop Traumatol Surg Res 104 (6) (2018 Oct) 893–896.
[8] K. Kumar, Outcome of longitudinal versus transverse incision in de Quervain's disease and its implications in Indian population, Musculoskelet Surg 100 (1) (2016 Apr) 49–52.
[9] S.J. Abrisham, M.H.A. Karbasi, J. Zare, Z. Behnamfar, A.D. Tafti, B. Shishesaz, De qeurvian tenosynovitis: clinical outcomes of surgical treatment with longitudinal and transverse incision, Oman Med. J. 26 (2) (2011 Mar) 91–93.
[10] A.R. Poublon, G.-J. Kleinrensink, A.L. Kerver, J.H. Coert, E.T. Walbeehm, Optimal surgical approach for the treatment of Quervains disease: a surgical-anatomical study, World J. Orthoped. 9 (2) (2018 Feb 18) 7–13.
[11] H.J. Kang, I.H. Koh, J.W. Jang, Y.R. Choi, Endoscopic *versus* open release in patients with de Quervain's tenosynovitis: a randomised trial, Bone Jt J 95-B (7) (2013 Jul) 947–951.
[12] H. Sorg, R. Kraemer, Julia M. Reinke, Ludwik K. Branski, Retrospective patient-reported assessment of quality of life after surgical release for de Quervain tenosynovitis, GMS German Plastic Reconstr. Aesthetic Surg. 5 (2015).
[13] M.J. Page, J.E. McKenzie, P.M. Bossuyt, I. Boutron, T.C. Hoffmann, C.D. Mulrow, et al., | the PRISMA 2020 statement: an updated guideline for reporting systematic reviews, Int. J. Surg. 88 (2021) 105906.
[14] D. Moher, A. Liberati, J. Tetzlaff, D.G. Altman, Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement, PLoS Med. 6 (7) (2009).
[15] J.P.T. Higgins, S. Green, Cochrane Handbook for Systematic Reviews of Interventions, The Cochrane Collaboration, 2011, Version 5.1.0.
[16] J.P.T. Higgins, S.G. Thompson, J.J. Deeks, D.G. Altman, Measuring inconsistency in meta- analyses, BMJ 327 (2003) 557–560.
[17] The Nordic Cochrane Centre, The Cochrane Collaboration, Review Manager (RevMan). Version 5.3, The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, 2014.
[18] J.P.T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M.J. Page, V.A. Welch (Eds.), Cochrane Handbook for Systematic Reviews of Interventions, second ed., John Wiley & Sons, Chichester (UK), 2019.
[19] J.P.T. Higgins, D.G. Altman, P.C. Gøtzsche, P. Jüni, D. Moher, A.D. Oxman, J. Savović, K.F. Schulz, L. Weeks, J.A.C. Sterne, Cochrane Bias Methods Group, Cochrane Statistical Methods Group, The Cochrane Collaboration's tool for assessing risk of bias in randomised trials, BMJ Br. Med. J. (Clin. Res. Ed.) 343 (7829) (2011) 1–9.
[20] H. Schünemann, J. Brożek, G. Guyatt, A. Oxman (Eds.), GRADE Handbook for Grading Quality of Evidence and Strength of Recommendations, The GRADE Working Group, 2013. Updated October 2013.
[21] M.A. Altay, C. Erturk, U.E. Isikan, De Quervain's disease treatment using partial resection of the extensor retinaculum : a short-term results survey, Orthop Traumatol Surg Res 97 (2011) 489–493.
[22] S.S. Suresh, H. Zaki, De quervain disease: ibri technique to avoid superficial radial nerve injury, Tech. Hand Up. Extrem. Surg. 13 (2009) 113–115.
[23] J.M. Bruner, Optimum skin incisions for the surgical relief of stenosing tenosynovitis in the hand, Plast. Reconstr. Surg. 38 (1966) 197–201.
[24] Y. Bouras, Y. El Andaloussi, T. Zaouari, N. Touil, S. Fnini, N. Chikhaoui, A. Largab, Surgical treatment in De Quervain 's tenosynovitis. About 20 cases, Ann. Chir. Plast. Esthet. 55 (2010) 42–45.
[25] S.A. Ostric, W.J. Martin, G.H. Derman, Intersecting the intersection: a reliable incision for the treatment of de Quervain's and second dorsal compartment tenosynovitis, Plast. Reconstr. Surg. 119 (2007) 2341–2342.
[26] B.M. Huisstede, S. Gladdines, M.S. Randsdorp, B.W. Koes, Effectiveness of conservative, surgical, and postsurgical interventions for trigger finger, dupuytren disease, and de quervain disease: a systematic review, Arch. Phys. Med. Rehabil. 99 (8) (2018 Aug) 1635–1649, e21. doi: 10.1016/j.apmr.2017.07.014. Epub 2017 Aug 30. PMID: 28860097.
[27] S.J. Mellor, B.D. Ferris, Complications of a simple procedure: de Quervain's disease revisited, Int. J. Clin. Pract. 54 (2000) 76–77.
[28] A. Scheller, R. Schuh, W. Hönle, A. Schuh, Long-term results of surgical release of de Quervain 's stenosing tenosynovitis, Int. Orthop. 33 (2009) 1301–1303.
[29] M.S. Arons, de Quervain's release in working women: a report of failures, complications, and associated diagnoses, J. Hand Surg. Am. 12 (1987) 540–544.
[30] M.R. Rask, Superficial radial neuritis and De Quervain's disease. Report of three cases, Clin. Orthop. Relat. Res. 131 (1978) 176–182.
[31] A.S. Braidwood, Superficial radial neuropathy, J. Bone Joint Surg. Br. 57 (1975) 380–383.
[32] A.R. Poublon, E.T. Walbeehm, L.S. Duraku, P.H. Eilers, A.L. Kerver, G. J. Kleinrensink, J.H. Coert, The anatomical relationship of the superficial radial nerve and the lateral antebrachial cutaneous nerve : a possible factor in persistent neuropathic pain, J. Plast. Reconstr. Aesthetic Surg. 68 (2015) 237–242.
[33] A. Stokvis, D.J. van der Avoort, J.W. van Neck, S.E. Hovius, J.H. Coert, Surgical management of neuroma pain : a prospective follow-up study, Pain 151 (2010) 862–869.