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Review Article

Outcome Comparison of Open Surgery and Arthroscopic Surgery In Treating Lateral Epicondylitis: A Systematic Review

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Abstract

Background:
Lateral epicondylitis or tennis elbow is an inflammatory disease that affects the extensor carpi radialis brevis (ECRB) origin at the lateral epicondyl. The surgical technique that can be performed for lateral epicondylitis is open surgery or arthroscopic surgery. This study aims to compare functional outcomes between open surgery and arthroscopic surgery in the treatment of lateral epicondylitis.
Methods:
Systematic review uses Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Multiple databases were searched for studies that compared functional outcomes of open surgery versus arthroscopic surgery for lateral epicondylitis with a minimum 1-year follow-up.
Result:
We analyzed six studies that were included in the systematic review. The total sample was around 558 patients and male patients were higher than female. There was no significant difference in the VAS scores of the two groups (P>0.05). QuickDASH score, there is only one study reported that there was a significant difference showing that arthroscopic surgery 11.6 (SD, 15.6) was better than open surgery 17.8 (SD, 19.4) with P=0.004. Return to work was found to be better in arthroscopic surgery (7 ± 1,254) from open surgery (13,933 ± 1,624) with P<0.01. Meanwhile, three studies reported that the time of surgery score was better in open surgery than in arthroscopic surgery (P<0.01).
Conclusion:
This study concluded that arthroscopic surgery had a better QuickDASH score and return to work but had a longer time of surgery than open surgery for the treatment of lateral epicondylitis.

Introduction

Lateral Epicondylitis (LE) also known as "tennis elbow" is a disease characterized by pain that most often involves the extensor carpi radialis brevis (ECRB) in the lateral epicondyl.[1,2] Tennis elbow is usually experienced by novice tennis players who play backhands with one hand, but this disease can also be found without a previous history of playing tennis.[2,3,4]

Based on epidemiological data, lateral epicondylitis occurs around 3.4 per 1000. Lateral epicondylitis occurs equally in women and men with an age range of 40 to 55 years.[1,5,6] The incidence of lateral epicondylitis is often related to overuse injury and strain due to activities involving repetitive gripping movements or extension of the wrist, radial deviation, and/or supination of the forearm.[7]

Lateral epicondylitis is characterized by pain in the lateral part of the elbow and is usually spread to the forearm. The quality of the pain can increase when lifting an object or shaking hands and morning stiffness in the elbows.[1,8,9] Tenderness can also be elicited by palpation over the front of the lateral epicondyle and

performing provocative maneuvers such as Maudsley's test and Mill's sign. An ultrasound or MRI may be performed to confirm the diagnosis.[1]

One of the treatments for lateral epicondylitis is through the open surgery technique which has been carried out since 1979 with an improvement rate of 97% and only 2 failures among 88 procedures. The emergence of minimally invasive surgical techniques, namely arthroscopic surgery, in 1990 and continues to develop today.[10] There are several advantages of the arthroscopic technique, including restoring functional quality more quickly and reducing pain more effectively.[11] Apart from that, arthroscopic surgery also has disadvantages such as a longer operating time.[12,13] This study aims to compare the outcomes between open surgery and arthroscopic surgery in the treatment of lateral epicondylitis by looking at several indicators such as Visual Analog Scale (VAS), Quick Disabilities Arm, Shoulder, and Hand (QuickDASH), time of surgery and return to work.

Methods

Search Strategy

This study was designed with a systematic review. We evaluated and interpreted the qualified studies using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). The literature search was performed comprehensively to gather a full-length, peer-reviewed paper in English on the evaluation of Open Surgery vs Arthroscopic Surgery for Lateral Epicondylitis. The literature was searched through PubMed, Google Scholar, Science Direct, and Cochrane Library using Boolean operators with the following keywords "Lateral Epicondylitis," "Open Surgery" "Open Release," and "Arthroscopic Surgery." We used PRISMA guidelines in this review. The formula diagram of PRISMA is shown in Figure 1 below. We found six journals for this review on inclusion criteria.

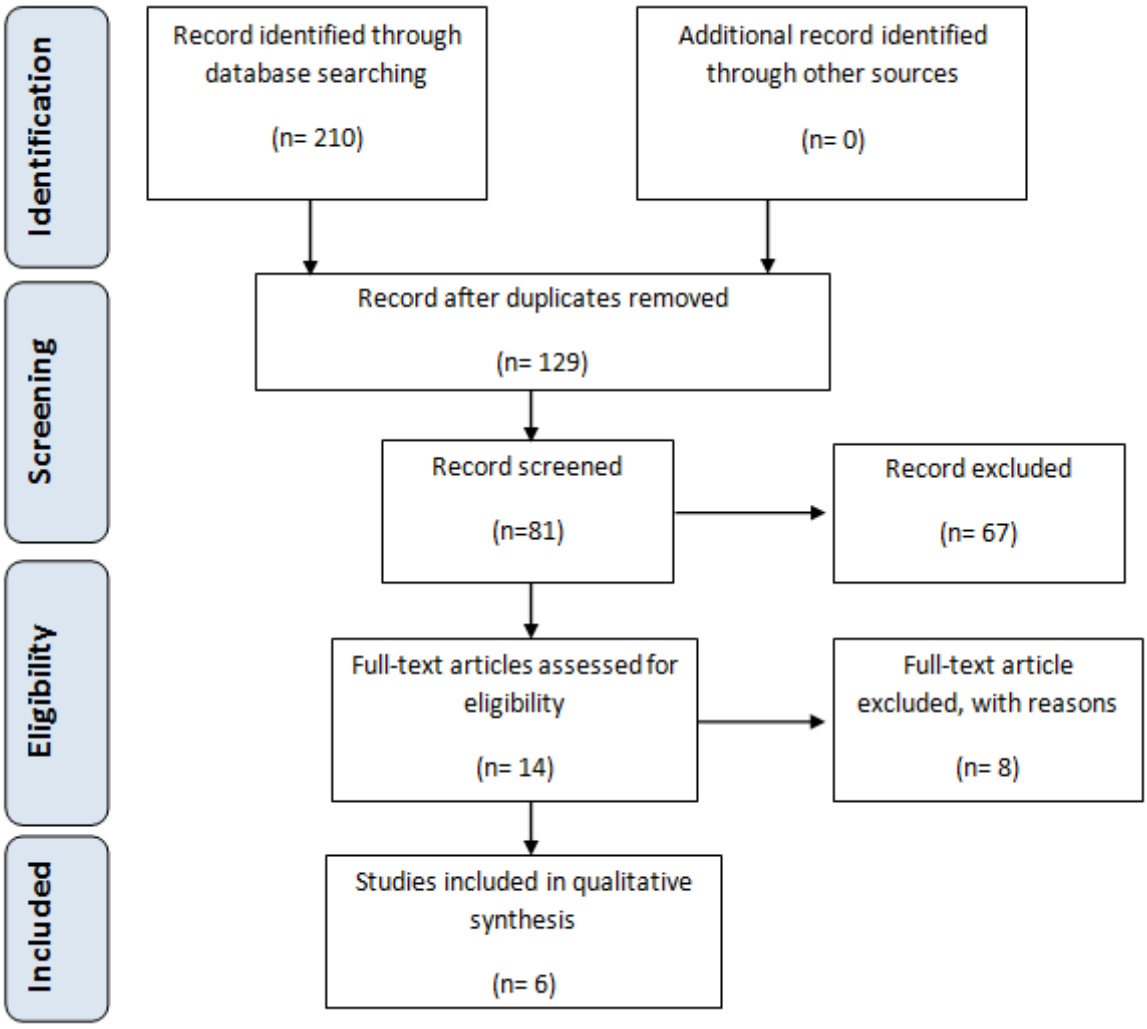

Figure 1. Flow diagram based on PRISMA

Inclusion Criteria

The author uses a logic grid method with the PICO approach to search for suitable keywords. Any studies that evaluated Open Surgery vs Arthroscopic Surgery for Lateral Epicondylitis published in English were included in this review. The clinical outcomes were assessed by the subjective Visual Analog Scale (VAS), Quick Disabilities Arm Shoulder and Hand (QuickDASH), Time of Surgery, and Return to work with a minimum 1 year follow-up. Due to a limited number of research comparing both procedures, there was no limitation in patient demographics. Studies that failed to meet inclusion criteria such as (1) studies that were not written in English, (2) studies that not reported either of these clinical outcomes scores such as Visual Analog Scale (VAS), Quick Disabilities Arm Shoulder and Hand (QuickDASH), Time of Surgery and Return to work (3) Studies that had a follow-up of less than 1 year.

Quality Evaluation

The class of evidence in each study was categorized into classes I, II, III and IV, each for good quality RCT, moderate to poor quality RCT and cohort study, moderate to poor quality cohorts and case-control studies and case series, respectively. The Oxford Center for Evidence-based Medicine produced criteria for assessing research quality and bias risk, the GRADE Working Group defined perspicacity, and the Agency for Healthcare Research and Quality sanctioned the study (AHRQ).

Result

We screened the literature to report relevant results based on inclusion and exclusion criteria which were downloaded full articles that met the criteria to be evaluated for quality assessment and underwent data extraction. A total of 210 studies were obtained upon executing the search strategy, 129 were excluded based on duplication and 48 were excluded based on title screening. Further, 67 articles were excluded after reading the abstract. The full text of the remaining 14 articles was reviewed. Out of these, 8 articles were excluded upon full-text review. The included research's key characteristics and evidence level are depicted in Tables 1 and 2. As seen in Table 3, there were 558 patients from four research, 207 of whom had open surgery, while the remaining 351 underwent arthroscopic surgery. A summary of the outcomes evaluated and the results from each study are reported in Tables 3 and 4, respectively.

Discussion

VAS scores were obtained in 5 studies conducted by Lee J., et al, Kundu B., et al, Clark T., et al, Kwon B., et al, and Alameda., et al. In five of these studies, it was

Table 1. List of included studies

No.	Reference	Year	Country	Journal	Study design	Level of evidence
1.	Lee J., et al	2017	Republic of Korea	The Journal of Arthroscopic and Related Surgery	Prospective Randomized Trial	I
2.	Kundu B., et al	2022	India	International Surgery Journal	Prospective Cohort	II
3.	Solheim E., et al	2013	Norway	The Journal of Arthroscopic and Related Surgery	Case-Control Study	III
4.	Clark T., et al	2018	Canada	The Journal of Arthroscopic and Related Surgery	Lower Quality RCT	II
5.	Kwon B., et al	2017	Republic of Korea	Journal of Elbow and Shoulder Surgery	Retrospective Cohort	III
6.	Alameda S., et al	2021	Spain	Journal of Elbow and Shoulder Surgery	Retrospective Cohort	III

Table 2. Characteristic Patient of included studies

No	Reference	Total Sample	Mean age (Age range in year)	Male	Female
1.	Lee J., et al, 2017	46 OS: 22 AS: 24	 OS: 51.59 ± 5.75 AS: 51.25 ± 8.57	19	27
2.	Kundu B., et al, 2022	30 OS: 15 AS: 15	 OS: 41.267 ± 5.934 AS: 41.533 ± 7.070	15	15
3.	Solheim E., et al, 2013	305 OS: 80 AS: 225	 OS: 46 (SD, 8) AS: 46 (SD, 8)	153	152
4.	Clark T., et al, 2018	75 OS: 37 AS: 38	 OS: N/A AS: N/A	N/A	N/A
5.	Kwon B., et al, 2017	55 OS: 26 AS: 29	 OS: 51.8 (41-75) AS: 49.3 (36-74)	40	15
6.	Alameda S., et al, 2021	47 OS: 27 AS: 20	 OS: 46.05 (SD, 8 years) AS: 47.44 (SD, 8 years)	22	25

Table 3. Summary of outcome

No	Reference	Study Comparison	Follow-up duration (Month)	Outcome
1.	Lee J., et al, 2017	Open Surgery versus Arthroscopic Surgery	24 months	VAS, Time of Surgery
2.	Kundu B., et al, 2022	Open Surgery versus Arthroscopic Surgery	16 months	VAS, Time of Surgery, Return to work
3.	Solheim E., et al, 2013	Open Surgery versus Arthroscopic Surgery	36 months	QuickDASH
4.	Clark T., et al, 2018	Open Surgery versus Arthroscopic Surgery	12 months	VAS, Time of Surgery
5.	Kwon B., et al, 2017	Open Surgery versus Arthroscopic Surgery	24 months	VAS, QuickDASH
6.	Alameda S., et al, 2021	Arthroscopic Surgery versus Open Surgery	12 months	VAS, QuickDASH

Table 4. Characteristics of Outcome of Studies

No	References	VAS	Outcome Measure		
			QuickDASH	Time of Surgery (minutes)	Return to work
1.	Lee J et al., 2017	OS: 1.50 ± 1.29 AS: 1.41 ± 1.14	N/A	OS: 15.6 ± 3.6 AS: 41.4 ± 5.2	N/A
2.	Kundu B et al., 2022	OS: 0.8 ± 1.082 AS: 1.067 ± 0.884	N/A	OS: 25.133 ± 2.356 AS: 34.867 ± 4.257	OS: 13.933 ± 1.624 AS: 7 ± 1.254
3.	Solheim et al., 2013	N/A	OS: 17.8 (SD, 19.4) AS: 11.6 (SD, 15.6)	N/A	N/A
4.	Clark T et al., 2018	OS: 30.6 ± 4.9 AS: 26.9 ± 4.2	N/A	OS: 22.5 (SEM, 1.3) AS: 34.0 (SEM, 2.9)	N/A
5.	Kwon B et al., 2017	OS: 1.1 ± 1.0 AS: 1.1 ± 1.8	OS: 9.4 ± 7 AS: 12.6 ± 18.3	N/A	N/A
6.	Alameda S et al., 2021	OS: 5.2 AS: 5.7	OS: 19.4 AS: 19	N/A	N/A

stated that there was a significant change in VAS scores during post-operative compared with pre-operative in open surgery and arthroscopic surgery with P<0.05, but in five of these studies there was no significant difference after comparing the post-operative VAS scores of the two groups with a P value>0.05.[10,11,12,13,14] Clark T., et al stated that there was a significant change in the VAS value in open surgery with a mean of 30.6 ± 4.9 in the post-operative with P<0.001 and the VAS value in postoperative arthroscopic surgery with a mean of 26.9 ± 4.2 with a P<0.001 but there was no significant difference in post-operative VAS score between the two surgical groups (P=0.56).[10]

The QuickDASH score was carried out by 3 studies, namely Solheim., et al, Kwon B., et al, and Alameda., et al.[11,14,15] Of the three studies, the only significant difference was obtained by Solheim., et al with a mean value of arthroscopic surgery of 11.6 (SD, 15.6) which was better than open surgery of 17.8 (SD, 19.4) with P=0.004. In the study, Solheim E et al also explained that several other studies didn't show any significant differences in the QuickDASH score results because the small number of patients involved in their study resulted in a lack of statistical power to show differences in results. Meanwhile, the study conducted by Solheim et al involved many patients, namely 305 patients, so the detection probability was 98% to detect a significant difference between the two surgical techniques.[15]

Three studies report the results of the time of surgery, namely Lee J., et al, Kundu B., et al and Clark T., et al.[10,12,13] In these three studies, significant differences were found (P<0.01), indicating that arthroscopic surgery required a longer operating time than open surgery. Kundu B., et al showed that the open surgery group took an average of 25.13 minutes (SD ± 2,356) and the arthroscopic surgery group 34.87 minutes (SD ± 4,257) with P<0.01.[13] This statement is also supported by the study of Clark T., et al which shows that there is an average difference in operating time between the two groups of around 11.45 minutes.[10] Lee J., et al also stated that the operation duration is shorter in open surgery because it is a relatively simple procedure, while the arthroscopic procedure is quite a long procedure even though the surgeon already has sufficient operating experience using the arthroscopic method.[12]

Kundu B. et al is the only study that reports postoperative return to work. This study showed that there were significant differences between the two surgical methods, the mean post-operative for open surgery was 13,933 ± 1,624 and astroscopic surgery was 7 ± 1,254 with a P<0.01. Kundu B et al also explained that this was because open surgery was closely related to long incisions, so it was also related to the level of pain and scarring. Therefore, the arthroscopic surgery group was more likely to return to work more quickly as usual than the open surgery group.[13]

Conclusion

Lateral Epicondylitis or Tennis Elbow is a disease that affects the extensor carpi radialis brevis (ECRB) origin at the lateral epicondyle. The surgical technique for lateral epicondylitis can be done using open surgery or arthroscopic surgery. In this systematic review, we reviewed several studies that discuss the functional outcomes of these two surgical techniques. There were no significant differences in VAS scores between the two groups. Arthroscopic surgery has better QuickDASH and return to work scores than open surgery. Meanwhile, open surgery has a shorter time of surgery than arthroscopic surgery. Further research with a larger population and better research design can be carried out to find satisfactory results.

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