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Current Concepts in the Management of Dorsal Cyst Ganglion A Systematic Review and Meta-Analysis

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Abstract

➢ ***Purpose:***

The purpose of this research is to compare the recurrence rates of open surgery vs arthroscopic therapy for the dorsal wrist ganglia

➢ ***Methods:***

Reporting Systems for Systematic Reviews and Meta-analysis flow diagram (PRISMA) were followed in this review. Using relevant keywords, a computerized literature search was done in Cochrane Central, Web of Science, and PubMed. Utilizing Review Manager Version 5.4.1 for Windows, data was retrieved and synthesized from the records after they had been checked for admissible studies. We include all randomized control trials (RCT) and non-randomized control trials (NRCT) in patients over 18 years old, who have the disease for the first time. Studies after 2010 only included in this study. We exclude studies that were not available in English and with population aged less than eleven.

➢ ***Results:***

The results showed no significant difference between open surgery and Arthroscopic surgery with regard recurrence rate.

➢ ***Conclusion:***

This systematic review and meta-analysis shows that open surgical excision carries the risk of material complications. But there is no difference between recurrence rates between the two methods.

Keywords:- *Ganglion Cyst, Dorsal Ganglion, Arthroscopy, Wrist, Open Excision*

I. INTRODUCTION

The most frequent benign tumors of the hand are dorsal wrist ganglia, which account for sixty to seventy percent of all ganglion cysts [1,2]. They may afflict people at any age, but people in their twenties to forties tend to experience them more frequently [3]. The cause of ganglia has not yet been determined, however several theories on the pathogenesis have been posted [4, 5]. They are more common in women [6]. The development of wrist ganglia has been associated to synovial herniation, primary tumor development, myxoid or mucoid degeneration of periarticular connective tissue, and wrist trauma [7, 8]. In particular, SL ligament abnormalities are frequently indicated by a painful dorsal wrist ganglion.[9] Therefore, it has frequently been discovered that conventional treatment approaches, such as simple aspiration, aspiration combined with steroid injection, forceful rupture or controlled rupture with numerous needle punctures, and surgical excision, often provide insufficient evaluation of the associated intraarticular pathology.[10.11]

Although successful arthroscopic resection or decompression surgery for articular ganglion cysts has recently been reported, questions remain about how well the pathologic tissues, such as the capsule, synovium, and ganglion stalk, were identified and managed. [12]

The purpose of this research is to compare the recurrence rates of open surgery vs arthroscopic therapy for the dorsal wrist ganglia. [13]

II. METHODS

Reporting Systems for Systematic Reviews and Meta-analysis flow diagram (PRISMA) were followed in this review.” Fig 1”

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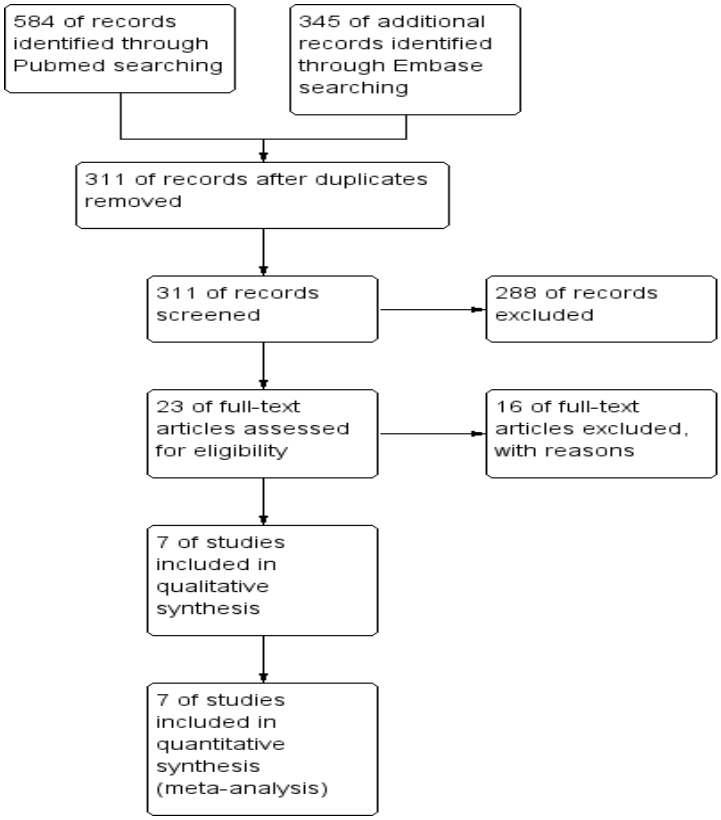

Fig 1:- PRISMA Flow Diagram

A. Inclusion and Exclusion Criteria

We include all randomized control trials (RCT) and non-randomized control trials (NRCT) in patients over 11 years old, who have the disease for the first time. Studies after 2010 only included in this study. We exclude studies that were not available in English and with population aged less than eleven. (See "Table 1" summary of included studies. And "Table 2" for base line characteristics of included studies).

Study	Design	Intervention	Population	Result
Matthew W. 2021	Retrospective Cohort	Arthroscopic excision Vs Surgical excision	Dorsal wrist ganglion	This study suggests that open excision of dorsal wrist ganglia leads to a lower recurrence rate than arthroscopic excision.
Carlos H 2017	Retrospective Cohort	Arthroscopic excision	Dorsal wrist ganglion	there was 1 case with recurrence
Balazs 2014	Retrospective Cohort	Surgical excision	Dorsal wrist ganglion	The overall recurrence incidence was 9%
Kim 2013	Retrospective Cohort	Arthroscopic excision	Dorsal wrist ganglion	The overall recurrence incidence was 11%
Khan 2011	RCT	Surgical excision	Dorsal wrist ganglion	surgery was the most successful form of treatment when considering the cure rate of dorsal wrist ganglion
Gallego 2010	Retrospective Cohort	Arthroscopic excision	Dorsal wrist ganglion	The results of this study support the use of arthroscopy as primary treatment for DWG resection.
Chen 2010	Retrospective Cohort	Arthroscopic excision	Dorsal wrist ganglion	The overall recurrence incidence was 7%

Table 1:- Summary of the included studies

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B. Search strategy

To identify relevant publications, we searched PubMed and EMBASE, including studies from 2010 to 2022. All key words related to treatment and prognosis of wrist ganglions were included, such as "wrist," "treatment,""ganglion","surgery" and "arthroscopic.

Double blinded eligibility screening were done by independent authors in two stages: first stage is title and abstract screening using Rayan website then full text screening.

C. Quality assessment

We used the Cochrane Handbook for Systematic Reviews of Interventions to assess the methodological quality of randomized controlled trials (RCT) (domain-based evaluation). Cohort study methodological quality was evaluated using the Newcastle Ottawa Scale (NOS). The quality of each study was evaluated independently by two authors. This method ensure transparent approach to assess the quality of included studies." Table 3"

Study	*Selection*	*Comparability*	*Exposure*	*Score*
Matthew W. 2021	***	*	***	***7***
Carlos H 2017	***	**	**	***7***
Balazs 2014	***	*	***	***7***
Kim 2013	***	**	***	***8***
Gallego 2010	***	**	*	***6***
Chen 2010	***	***	**	***8***

Table 2:- Risk of bias according to Newcastle Ottawa Scale

D. Data extraction and analysis

The data was collected independently by reviewers. Disagreements were resolved, and a third reviewer was available for judgment. Study characteristics (author, publication date, nation, study design, and interventions) were extracted, as well as patient variables (number of participants, age, and sex) and results (recurrence rate and complications).

III. RESULTS

A. Search results

Nine hundred and twenty nine articles were identified in literature search. After duplicate removal, three hundred and eleven articles identified for abstract screening. Twenty three articles were qualified for full text screening. In final, seven articles were eligible for the final analysis. (PRISMA flow diagram; "Fig. 1"). Table 1 shows summary of included studies. Table 2 shows the characteristics of included studies.

B. Quality of included studies

One randomized control trial (RCT) included in this study and according to the Cochrane risk of bias assessment criteria, it's of moderate quality.

Six Non-randomized control trials were assessed using Newcastle Ottawa Scale (NOS), four of them scores seven, two scored eight and one scored six. Table 3 demonstrate risk of bias assessment using Newcastle Ottawa Scale.

C. Recurrence rate analysis

The results showed no significant difference between open surgery and Arthroscopic surgery with regard recurrence rate
(Standardized main difference 0.63, 95% CI [0.35 to 1.14], P=0.13).

Pooled studies were homogenous (Chi-square P=0.21, I-square=38%). "*Fig. 2"*. Figure 3 for Funnel plot.

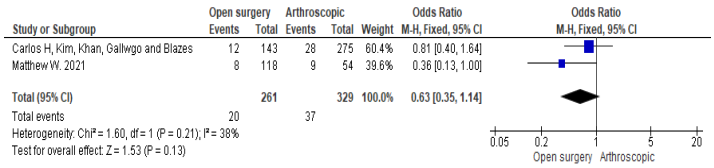

Fig 2:- Forest Plot of standardized mean difference (SMD)

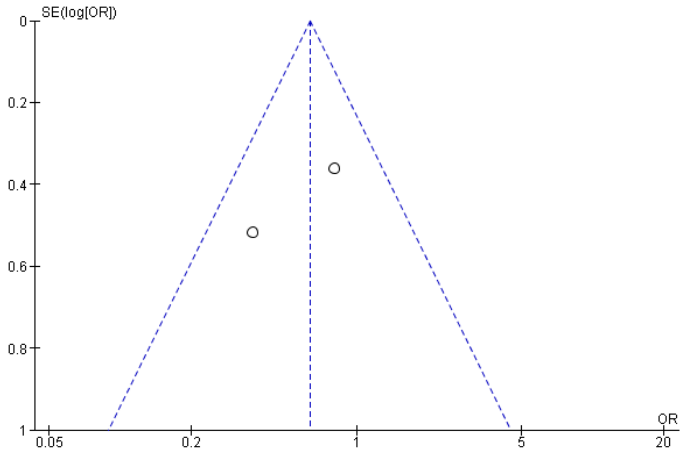

Fig 3:- Funnel Plot

IV. DISCUSSION

Treatments for wrist ganglions, the most frequent soft tissue mass of the hand and wrist, have been described for decades. There are three main types of treatment: Conservative, aspiration, and excision. Surgery can be performed openly or arthroscopically. [14, 15] There is significant variation in results reported in the literature even for the most common treatment regimens. [16]

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In order to create a meta-analysis for the recurrence rate and to carefully examine open and arthroscopic treatment for adult wrist ganglions, we set out to do both. RCTs and NRCT studies were two distinct categories of studies included in the meta-analysis. [17, 18] In terms of recurrence rate, the overall combined effect revealed no distinction between open and arthroscopic excision. [19, 20] According to one RCT investigation, surgery had the highest cure rate for dorsal wrist ganglion and had a recurrence rate of between 5 and 10 %.[21, 22] According to the Cochrane Collaboration's Handbook for Systematic Reviews, this study had a low risk of bias. [23, 24]

According to the NRCT trials, open excision of the dorsal wrist ganglia results in a lower rate of recurrence than arthroscopic excision or aspiration. This finding was in contrast with the findings of Gallelo 2010 the results of this study support the use of arthroscopy as primary treatment for DWG resection [25].

The considerable degree of heterogeneity in these cohort studies was a limitation. The probability of cohort bias was minimal (NOS) [26]. The results of open and arthroscopic excision did not differ in terms of recurrence outcomes, according to pooled risk ratios. With a recurrence rate of 6% across all studies, arthroscopic excision had the lowest rate. At the 12-month follow-up in an RCT by Kang et al., there was no difference in results between arthroscopic and open excision [27, 28].

Open surgical excision had the highest incidence of complications (14%), which was followed by arthroscopic excision (4%). The few trials produced CIs that were similar across treatments. Radial artery injury and neuropraxia were among the more serious complications associated with surgical removal [20].

This review's limitations and recommendations are listed below. Firstly, because this was a systematic review and meta-analysis, the caliber of the research included determined how strong the conclusions were. The studies included in the meta-analysis had a low risk of bias and had their methodological quality thoroughly examined using validated instruments; nonetheless, there were few RCTs and the cohort studies had a large amount of heterogeneity. Second, only studies released after 2010 were included in the search. Third, the differentiation of ganglions according to anatomical location may have created a confusing component. Finally, recurrent ganglions treated more than once with the same method were not included in this study because it only included ganglions treated for the first time with a particular modality.

This systematic review and meta-analysis shows that open surgical excision carries the risk of material complications. But there is no difference between recurrence rates between the two methods.

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