

Wrist Ganglion Treatment: Systematic Review and Meta-Analysis

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Purpose To review the clinical outcomes of treatment for adult wrist ganglions and to conduct a meta-analysis comparing the 2 most common options: open surgical excision and aspiration.

Methods The review methodology was registered with PROSPERO. We performed a systematic search of MEDLINE and EMBASE for articles published between 1990 and 2013. Included studies reported treatment outcomes of adult wrist ganglions. Two independent reviewers performed screening and data extraction. We evaluated the methodological quality of randomized controlled trials (RCT) and cohort studies using the *Cochrane Handbook for Systematic Reviews* and the Newcastle-Ottawa Scale, respectively; Grading of Recommendations, Assessment, Development, and Evaluation was used to evaluate the quality of evidence.

Results A total of 753 abstracts were identified and screened; 112 full-text articles were reviewed and 35 studies (including 2,239 ganglions) met inclusion criteria for data extraction and qualitative synthesis. Six studies met criteria for meta-analysis, including 2 RCTs and 4 cohort studies. In RCTs surgical excision was associated with a 76% reduction in recurrence compared with aspiration. Randomized controlled trial quality was moderate. In cohort studies surgical excision was associated with a 58% reduction in recurrence compared with aspiration. Cohort study quality was very low. In cohort studies aspiration was not associated with a significant reduction in recurrence compared with reassurance. Across all studies mean recurrence for arthroscopic surgical excision (studies, 11; ganglions, 512), open surgical excision (studies, 14; ganglions, 809), and aspiration (studies, 12; ganglions, 489) was 6%, 21%, and 59%, respectively. Mean complication rate for arthroscopic surgical excision (studies, 6; ganglions, 221), open surgical excision (studies, 6; ganglions, 341), and aspiration (studies, 3; ganglions, 134) was 4%, 14%, and 3%, respectively.

Conclusions Open surgical excision offers significantly lower chance of recurrence compared with aspiration in the treatment of wrist ganglions. Arthroscopic excision has yielded promising outcomes but data from comparative trials are limited and have not demonstrated its superiority. Further RCTs are needed to increase confidence in the estimate of effect and to compare complications and recovery. (*J Hand Surg Am.* 2015;40(3):546–553. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic I.

Key words Ganglion, meta-analysis, review, treatment, wrist.



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GANGLIONS ARE THE MOST COMMON soft tissue masses of the hand and wrist.¹ Typically measuring 1 to 2 cm in size and either single or multiloculated, a ganglion may form suddenly or develop gradually.^{2,3} Ganglions are thought to arise when repetitive microtrauma to the capsular and ligamentous structures of the joint stimulate fibroblasts at the synovial–capsule interface to produce hyaluronic acid.⁴ A high concentration of hyaluronic acid and other mucopolysaccharides forms a clear, highly viscous fluid that pools in the ganglion.⁴

Indications for treatment include pain, stiffness, weakness, and appearance. Management of ganglions has been reported for centuries; according to Heister (1743), “a ganglion may often be happily dispersed by rubbing the tumor well each morning with fasting saliva and binding a plate of lead upon it for several weeks.... Others...prefer a bullet that has killed some wild creature, especially a stag. Sometimes, indeed, a recent ganglion will speedily vanish.... If none of these means prove effectual...they may be safely removed by incision.”⁵

Currently, patients with wrist ganglions are typically educated and reassured regarding the mass and no further intervention is suggested, or they are offered either aspiration often combined with the injection of various substances, or surgical excision (either open or arthroscopic). All treatment modalities have widespread variability in reported recurrence and complication rates. The objectives of this study were to review recurrence and complication rates reported for modalities used to treat adult wrist ganglions and to generate a meta-analysis comparing the 2 most common options: open surgical excision and aspiration.

MATERIALS AND METHODS

Registration

The study protocol was registered with PROSPERO, an international prospective register of systematic reviews (CRD42014007441).

Literature search

To identify relevant publications, we searched MEDLINE and EMBASE, including studies from 1990 to December 2013. Only studies published since 1990 were included to ensure that findings reflected contemporary clinical practices, because recent studies have been unable to reproduce the low recurrence rates reported previously.⁶ All key words related to treatment and prognosis of wrist ganglions were included, such as “wrist,” “treatment,”

“ganglion,” “aspiration,” “excision,” “arthroscopic,” “recurrence,” and “prognosis.” The complete search strategy is available upon request.

A study was included if it met all of the following criteria: (1) the study population included adult patients with wrist ganglions, (2) recurrence or persistence of ganglions was a measured outcome, and (3) the study population had not previously received the treatment being investigated. Only English studies were considered and all reviews, case studies, response letters, and conference proceedings were excluded. Studies in which a portion of the study population met inclusion criteria were included if the results of the subpopulation were presented separately.

Study selection

Two independent reviewers applied the inclusion criteria to the references obtained from the literature search. Potential relevant studies were selected using the title and abstract retrieved from the literature search. We used a consensus method in cases of disagreement; a third author was not required to resolve any persistent disagreements.

Assessment of methodological quality and risk of bias

To evaluate the methodological quality of randomized controlled trials (RCT), we followed the *Cochrane Handbook for Systematic Reviews of Interventions* (domain-based evaluation).⁷ Methodological quality of cohort studies was assessed using the Newcastle–Ottawa Scale (NOS) (maximum score of 9).⁸ Risk of bias in case series was evaluated with a modified NOS (maximum score of 6).^{8,9} Two authors independently scored the quality of each study. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used to record overall quality of evidence recurrence. The GRADE system summarizes evidence quality to grade evidence quality on a 4-point scale (very low to high). The system provides a transparent approach to assessing the quality of medical evidence, which has been adopted by several international organizations.^{10–24}

Data extraction

Two reviewers independently extracted the data. Disagreements were discussed and a third review author was available for consultation if necessary. Extracted data included study characteristics (author, publication date, country, study design, and interventions), patient characteristics (number of participants, age, sex, ganglion location, and presenting symptoms), and outcomes (time to follow-up, recurrence, complications, and recovery).

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