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Outcomes of arthroscopic dorsal wrist ganglion excision: a 44-month retrospective comparative study

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Background: This study retrospectively compares the clinical outcomes of excision of dorsal cysts of the wrist by open and arthroscopic approaches, considering three variables: recurrence rates, residual pain, and the time required for patients to return to their work activities.
Methods: All patients who submitted to open or arthroscopic surgical excision of wrist ganglions between January 2012 and December 2017 were evaluated with a mean follow-up period of 44 months. Preoperative and postoperative pains were evaluated using a visual analogue scale, and functional outcomes were evaluated using the Disabilities of the Arm, Shoulder and Hand (Quick-DASH) questionnaire. Recurrences were confirmed by clinical examination, ultrasound, or magnetic resonance imaging.
Results: Our study showed that there are no statistically significant differences between the two surgical techniques regarding the recurrence rate or residual pain.
Conclusion: Patients who underwent arthroscopic surgery had a statistically significant early return to work.

Keywords: Arthroscopic excision; Open excision; Return to work; Wrist ganglion

INTRODUCTION

Dorsal wrist ganglion is a fairly common condition and is the most frequent benign soft tissue tumor in the hand, with an incidence of 25/100,000 in males and 43/100,000 in females [1-3].

The dorsum of the wrist is the most common location of ganglion formation, accounting for 60% to 70% of all hand and wrist ganglia. Volar wrist ganglion accounts for 18% to 20% of all ganglia of the hand and wrist [4,5].

The etiology of wrist ganglia remains obscure. Trauma, synovial herniation, a valvular mechanism, and mucoid degeneration of periarticular connective tissue have been pointed to contribute to the development of wrist ganglia. In addition, an association of the dorsal wrist ganglion with the scapholunate ligament is a common operative finding [4,6].

Povlsen and Peckett [7] concluded that a painful dorsal wrist ganglion is often related to an underlying joint abnormality, particularly of the scapholunate ligament. The hypothesis of its origin is a mucoid dysplasia associated with the dorsal capsuloligamentous scapholunate septum. A scapholunate instability can be associated with a dorsal wrist ganglion and should not be missed [8-10].

Most ganglia present as painless, firm, and immovable masses that vary in size, although some patients complain of pain and limitation of movement. Dellon and Seif [11] reported that pain may be due to the compression of the terminal branches of the posterior interosseous nerve as it passes through the fourth extensor compartment.

According to Westbrook et al. [12], patients seek medical advice for esthetic reasons (38%), to relieve pain (26%), or worried about malignancy (28%).

Historically, nonsurgical treatment consisted of a blow

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to the ganglion cyst usually with a Bible. Fifty percent of ganglia spontaneously disappear with time, and some may recur [13-15].

Aspiration was often recommended as a first-line treatment; however, it is associated with recurrence rates as high as 78%. Surgical excision has been shown to be a successful treatment alternative with a significantly lower chance of recurrence than aspiration. Surgical resection is the most successful treatment with recurrence rates ranging from 1% to 40% [14,16].

Arthroscopic excision has gained supporters as an alternative approach to open excision. Recent studies have reported the use of arthroscopic resection of wrist ganglia with good outcomes regarding recurrence rates (0%–20%), esthetic and functional outcomes, and morbidity [17-21]. Arthroscopic ganglion cyst resection provides several theoretical advantages over open techniques, including faster recovery, fewer complications, lower recurrence rates, and more satisfying cosmetic results, and possesses the advantage of recognizing intra-articular pathology. For these reasons, the arthroscopic approach has become an increasingly acceptable surgical option for wrist ganglion excision [22-26].

Despite becoming a well-accepted practice, arthroscopic ganglion resection remains poorly understood, with most of the current literature presenting mainly retrospective case studies with small cohorts. In the current literature, few studies have compared open with arthroscopic ganglion excision; therefore, significant scientific support for these claims of superior outcomes are lacking [14,16].

This study retrospectively assesses the clinical results of open and arthroscopic excision of dorsal wrist ganglion based on three variables: recurrence rates, residual pain, and time required for the patients to return to their regular work activities.

METHODS

We report a retrospective study of 85 patients who underwent open or arthroscopic surgical excision of dorsal wrist ganglia between January 2012 and December 2017 at the same center by the same three hand surgeons. The option between open and arthroscopic excision was based on the surgeons' surgical skills and expertise of the latter technique.

As the skills with this technique were developed, more patients were submitted to the arthroscopic approach.

Patients with a confirmed clinical or radiological diagnosis of dorsal ganglion originating from the radiocarpal joint were included in the study; whereas, those with ganglia originating from other sites other than the previously mentioned location were excluded. In addition, patients with bony pathology or degenerative joint disease were excluded.

The preoperative data were obtained directly from the patients' hospital files. Initially, the patients were informed about the study in a telephone call and were questioned about recurrences, satisfaction, and time to return to work after surgery. Preoperative and postoperative pain were evaluated with a visual analogue scale (VSA) from 0 (no pain) to 10 (worst pain ever felt). Functional outcomes were evaluated using the Disabilities of the Arm, Shoulder and Hand (Quick-DASH) questionnaire. The patients were then invited to come to our hospital for clinical evaluation where they were examined for the presence or absence of recurrences. Patients with clinically suspected recurrences were asked to take an magnetic resonance imaging (MRI) or ultrasound.

We were unable to contact five patients, four of whom underwent arthroscopic approach and one had an open procedure. Twenty-nine patients with volar wrist ganglia were also excluded. Verbal informed consent was obtained from all patients. Fifty-one patients with dorsal wrist ganglia were interviewed, 32 underwent arthroscopic excision, and 19 underwent open excision.

Statistical analysis

Categorical variables are presented as frequencies and percentages, and continuous variables as means and standard deviations or medians and interquartile ranges for variables with skewed distributions. Normal distribution was checked using the Shapiro–Wilk test or skewness and kurtosis. Categorical variables were compared using Fisher's exact test or the chi-square test, as appropriate. For the average comparison, Student's t-test was implemented to compare quantitative variables. If test conditions were not met, a nonparametric test was used. All reported P-values were two-tailed, with a P-value of 0.05 indicating statistical significance. The analyses were performed using the IBM SPSS Statistics software (ver. 26.0; IBM Corp., Armonk, NY, USA).

Surgical technique

Surgery was performed in an outpatient setting by 1 of 3 senior hand surgeons. Patients received either general

anesthesia or brachial plexus block. A tourniquet and Esmarch bandage were used to exsanguinate the hand and forearm.

The open technique consisted of a transverse skin incision approximately 2 to 3 cm in length. The ganglion was amputated at the base of the stalk with preservation of the scapholunate ligament, but 1 cm of the dorsal wrist capsule was resected.

The arthroscopic technique consisted of two stab incisions at the standard 2 to 3 and 6R portal sites. An arthroscopic shaver was used to debride the ganglion down to the level of the scapholunate ligament including the stalk and its attachment to the capsule. External palpation was used to confirm the complete decompression of the ganglion. Mid-carpal articulation was routinely inspected.

After surgery, the patients were encouraged to exercise hand mobility, but no postoperative rehabilitation program was prescribed.

RESULTS

A total of 56 patients with dorsal wrist ganglion met the inclusion criteria. Thirty-six patients had arthroscopic excision, and 20 had open excision. Forty-four ganglia were primary, and eight were recurrent ganglia. Of these patients with recurrent ganglia, four had a previous open excision (two in the arthroscopic group and two in the open group), and four had undergone previous aspiration; all of these patients were from the arthroscopic group. Nine patients underwent MRI before surgery. The mean follow-up was 44 ± 19 months (mean ± standard deviation).

There were no statistically significant differences between the groups in terms of age, sex, laterality of the procedure, time of follow-up, and the preoperative VAS score. The mean age was 32 ± 12 years in the arthroscopic group and 42 ± 20 years in the open group (P = 0.084). A predominance of women in both groups (77% in the arthroscopic group and 60% in the open group; P = 0.158) was observed. The mean follow-up was 47 ± 18 months in the open group and 38 ± 18 months in the arthroscopic group (P = 0.119).

We found that 28% of the patients in the arthroscopic group had recurrences and 32% in the open group, with no statistically significant differences between the two groups (P = 0.980). All recurrences were diagnosed by clinical examination, and 77% of them were confirmed by MRI or ultrasound. Half (50%) of the recurrences occurred during the first year after surgery; the remaining 50% were found after the first year of follow-up.

Good pain relief (1.43 ± 2.4 vs 0.65 ± 1.2, P = 0.366), satisfaction (86% vs 70%, P = 0.692), and functional score (4.11 ± 3.8 vs 4.81 ± 3.6, P = 0.701) were found in both groups, with no statistically significant differences between them.

However, regarding days off work, we have a statistically significant difference of 25 ± 20 days for the arthroscopy group and 45 ± 30 days for the open excision group (P < 0.001). In addition, the recorded surgical time was 45 ± 14 minutes for the arthroscopic group compared to the 37 ± 15 minutes for the open group, also with a statistically significant difference (P = 0.012).

DISCUSSION

The recurrence of the ganglia is the most frequently reported failure of any form of treatment and is due to inadequate excision of the stalk [4,27,28]. Complications universal to wrist arthroscopy include infection, articular cartilage damage, and equipment failure. The portals, incisions, and introduction of instruments require knowledge and awareness of the regional anatomy and appropriate technical skills of the surgeon. Poor positioning of the portals and forceful insertion of the instruments may damage the articular surface, tendons, nerves, and vascular structures. After open surgery on wrist ganglia, Dias et al. [18] reported sensitive scars and keloid. Analogously, Lidder et al. [29] described scar sensitivity in 32% of patients and unsightly scar in 3% of the cases. Rocchi et al. [3] found painful or scar hypertrophy in 25 patients operated using the open approach. No complications related to the scar have been described in the literature during ganglion surgery done arthroscopically [19,25]. Serious complications of surgical treatment are rare, and the incidence of wrist arthroscopy complications is approximately 2% [30,31]. Besides the recurrences, there were no other complications in our study.

According to reports, recurrence rates in the arthroscopy and open groups are similar and had no statistically significant differences, with α range of 8% to 29% in the arthroscopic group and 7% to 10% in the open group [16,19,32,33].

Few studies have reported a large case series with long-term follow-up and patient satisfaction after open procedure. In two retrospective reviews, the recurrence rates 4 and 6 years after open surgical excision were 33%

(13 of 40) and 39% (40 of 103), respectively [18,29]. In this study, we found similar results in both groups with a recurrence rate of 28% in the arthroscopic group and 32% in the open group (P = 0.980). We believe that short-term follow-up periods in these studies may explain the different recurrence rates reported in the literature. As shown in this study, 50% of recurrences occurred after the first year of follow-up.

Some studies have used recurrence as an exclusion criterion. In two studies, 15% and 20% of the patients, respectively, underwent arthroscopic resection after their ganglia recurred following open excision. Their outcomes were comparable to primary ganglion resections [22,34]. As stated in these recent findings, recurrent cysts should not contraindicate arthroscopic resection.

Most dorsal wrist ganglia originate from the scapholunate interval, but this interval is only partially visualized using radiocarpal joint arthroscopy. Edwards and Johansen [34] observed that ganglia were associated with the mid-carpal joint in 31 of 42 (74%) cases, which suggests that routine evaluation of the mid-carpal joint is vital for successful excision. In this study, all patients were submitted to radiocarpal and mid-carpal joint arthroscopy.

The Quick-DASH and full DASH outcome measures are valid and reliable measures of functional impairment. Edwards and Johansen [34] reported improvements in functional evaluation using the DASH questionnaire from 14 points in the preoperative period to 1.6 points over a 24-month follow-up. In our study, there was no statistically significant difference between the two groups (4.11 vs 4.81, P = 0.701).

The VAS is easy and simple to use, requires no reading skills, and is widely used in research. The mean postoperative VAS scores in our patients during the follow-up period were 1.43 in the arthroscopic group and 0.65 in the open group (P = 0.366). Chung and Tay [35] also reported similar results in the preoperative and postoperative VAS scores from 0.8 to 0.3. In addition, Aslani et al. [36] reported no postoperative pain in 35 of 37 patients who reported preoperative pain.

According to Gallego and Mathoulin [19], the mean time off work of patients who underwent arthroscopic excision was 11 days, and 37% returned to work immediately after surgery. Only four of 114 patients had more than 45 days off work. In another study, Luchetti et al. [37] reported a mean recovery time of 16 days after arthroscopic surgery. In addition, Rocchi et al. [3] reported a mean time off work of 23 days after open excision and 10 days after arthroscopic excision of volar wrist ganglia. The most important finding of this study is that the arthroscopy group had a lower mean time off work. The arthroscopic group had a mean time off work of 20 days in comparison to the 45 days in the open group, which had a statistically significant difference (P < 0.001).

We acknowledge several limitations in this study. Our population size was small because we only included symptomatic patients with daily activity impairments. It was a retrospective study, and we may have underestimated the recurrence rate. Some cysts may not have been identified during the physical examination, and we only have screened patients who presented with clinical recurrences by ultrasound or MRI. The surgeon's learning curve and the inclusion of relapses may also influence the results. Future prospective studies will be needed to address all remaining questions and confirm our results.

In conclusion, our study showed that there are no statistically significant differences between the two surgical techniques regarding the recurrence rate of dorsal wrist ganglia and residual pain (P = 0.980). There was a statistically significant early return to work in the group of patients who underwent arthroscopic surgery (20 days vs 45 days, P < 0.001).

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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