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Comparative results of arthroscopic versus open excision of dorsal wrist synovial ganglions

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Abstract

Introduction: The purpose of this study was to compare the morbidity, functional outcomes and rates of recurrence of arthroscopic versus open excision of dorsal wrist ganglions.

Methods: Forty patients with dorsal wrist ganglions were concerned. They were divided into two groups (A and B). In group A there were 25 patients treated by open excision and 15 other patients in group B by arthroscopic excision. Both groups were followed up in average 12 months (range, 9-18 months). The functional outcomes and rates of recurrence were recorded.

Results: One recurrence (4%) was observed in group A and 2 recurrences (13.13%) in group B. Wrist active range of motion and grip strength were significantly higher in group B ($p < 0.001$). Three patients (12%) had residual pain in group A and 2 patients (13.13%) in group B. Mean time off work was 15 days in group A and 8 days in group B. All patients in group B were satisfied with cosmetic result.

Conclusion: Arthroscopic excision of dorsal wrist ganglion is increasingly performed but remains behind the historical and standard open excision. The duration of the procedure, the cost of surgical materiel, and the learning curve are the main obstacles for the development of arthroscopic excision.

Keywords: Wrist ganglion, arthroscopic excision, open excision, morbidity, function, recurrence

Introduction

The dorsal synovial cysts of the wrist are benign tumors developed on the dorsal side of the wrist communicating by a pedicle with the wrist joint most often facing the scapholunate ligament, which is usually preserved [1]. They are the most common benign tumors of the wrist [2]. They represent 55 to 70% of wrist cysts [3-6]. They often affect young people between the ages of 20 and 40 with a female predominance [5, 7]. The right wrist is affected in the same proportion as the left wrist without influence of the dominant side [8].

Apart from therapeutic abstention, non-operative treatments such as cyst rupture, puncture with or without corticosteroid injection are associated with a high recurrence rate close to 78% [5, 6]. For a long time, surgical treatment using open-surgery resection remained the standard treatment. It has significantly reduced recurrence.

Arthroscopic excision of the dorsal cysts of the wrist has been developed with the advent of arthroscopy. It is a reliable alternative to the open-surgery method which gives fewer postoperative complications and allows an early resumption of professional activities [5].

Several studies have been published evaluating the results of each of the two surgical methods (open and arthroscopy resection) for the treatment of wrist dorsal cysts. But few studies have focused on the comparison between these two techniques [5]. The goal of this study was to compare the results of these techniques.

Patients and methods

The center of hand surgery in the department of orthopedic surgery served as a study framework. It was a prospective, comparative study of 40 patients with a dorsal wrist synovial cyst, performed over a period from January 5, 2015 to September 5, 2016. The patients were divided into 2 groups: group A constituting the group of patients who underwent open resection and group B patients who underwent arthroscopic resection (Table 1). The distribution of patients into two groups was based on the choice of patients.

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During the consultation the advantages and disadvantages of each operative technique were explained to the patients; which also serve as guidance to patients to make a choice on the open or arthroscopic resection option. The surgeries of both groups (open, and arthroscopic resection) were performed by the same hand surgeon.

The inclusion criteria were any patient over 15 years of age with a diagnosed wrist dorsal cyst. We excluded from our study recurrences regardless of the type of initial treatment, the contraindications to anesthesia and the pre-existing functional sequelae of the wrist to be operated. The criteria for surgical treatment were a patient who had a wrist dorsal cyst that was either painful or bulky, associated with functional discomfort or was considered unsightly by the cyst. The data was entered and analyzed using Microsoft Excel 2007 software and imported into Microsoft Word 2007. The χ^2 test and the Student t-test were used for the statistical analysis of the data.

Results

Patient demographic and preoperative characteristics

In group A, there were 25 patients including 15 women and 10 men with an average age of 30.3 years (range, 15 to 45 years). According to the affected side there were 16 patients who had a right wrist cyst and 9 who had left wrist patients. In group B, there were 15 patients including 10 women and 5 men with a mean age of 32 years (range, 15 to 50 years). According to the affected side there were 8 patients who had a dorsal cyst on the right wrist and 7 patients who had on the left wrist. The mean preoperative pain assessed using the Visual Analogue Scale (VAS) was 3.12 (range 0 to 7) in group A, and 3.22 in group B (range, 0 and 7). The mean time to treatment (delay between cyst appearance and treatment) was 23 months (range, 1 month and 5 years) in group A and 15 months (range, 2 months and 3 years) in group B.

Postoperative morbidities

We reviewed all patients in both groups. The average follow-up was 12 months (range, 9 and 18 months). In group A, a patient (4%) presented postoperatively a neurapraxia of the sensitive branch of the radial nerve which recovered after 3 months. Two (2) patients (8%) in group A had unsightly scar. There was no postoperative hematoma, infection, iatrogenic tendinous lesion, or atrophy in both groups.

Functional results

At an average follow-up of 12 months, the functional results were satisfactory. In group A, active wrist mobilities showed an average active extension of 88% compared to the healthy contralateral side with extremes of 60 and 100%. Active flexion was 91% (range, 65 and 100%) compared to the healthy contralateral side. In group B active extension was 93% (range, 70 and 100%), active flexion was 95% (range, 80 and 100%). In group A, the average wrist force tested on Jamar's dynamometer was 90.2% compared to the healthy contralateral side with extremes of 62 and 110%. In group B, the average wrist strength was 94% (range, 71% and 115%).

Residual pain

Residual pain was assessed at the last follow-up according to VAS. In group A, the mean residual postoperative pain was 0.40 to 3.12 preoperatively, three patients (12%) who had residual postoperative pain. In group B, the residual postoperative pain was 0.26 for 3.22 preoperatively, two patients (13.3%) who had residual postoperative pain.

Time off work

The average time off work in group A was 15 days with extremes of 5 and 30 days. It was 8 days with extremes of 3 and 21 days in group B.

Patient satisfaction

In group A, 21 patients were satisfied with the results (84%), in group B, 14 patients were satisfied.

The table 2 summarizes the main results.

Discussion

The excision of dorsal synovial cysts of the wrist is one of the most commonly performed operations in hand surgery [3, 5]. Fortunately, serious postoperative complications such as tendon ruptures, nerve damage, infections, and wrist stiffness are rare [5].

The small sample size, as well as the short follow-up, was a weakness of our study. The absence of randomization was a selection bias of patients on the choice of the surgical excision technique.

One of the goals of surgical treatment of dorsal wrist cysts is to remove preoperative pain. In our study, at last follow-up, residual pain was found in 3 patients (12%) with an average score of 0.40 for 3.12 preoperatively according to the VAS in group A and in 2 patients (13.33 %) with an average score of 0.26 for 3.22 preoperatively according to the VAS in group B. These results are similar to those obtained by Kang *et al.* who had found residual pain in 4 out of 23 patients (17%) treated by open resection and 3 out of 28 (11%) treated with arthroscopic resection [8]. By contrast, our results on residual pain are better compared to those reported by Chassat *et al.* who had found a mean residual postoperative pain rated at 1.76 versus 3.37 preoperatively for patients treated with arthroscopic resection. But this seems to be explained by a high recurrence rate (29.7%) in their study [9].

Surgical treatment of the dorsal cysts of the wrist should allow a good functional recovery of the wrist. The postoperative wrist mobilities in our study were satisfactory either in the open or arthroscopic technique. Nevertheless, arthroscopic resection revealed wrist mobilities close to those of the contralateral wrist earlier than open resection [10].

In our study, the average duration of time off work in arthroscopic resection was 8 days, whereas it was 15 days in open resection. But the duration of time off work is multifactorial and the comparison must be weighted [11]. Rizzo *et al.* who immobilized their patients postoperatively for 3 to 7 days found in their study a duration of time off work of 4 to 6 weeks [11]. The absence of postoperative immobilization allows a fast functional recovery and a short duration of time off work.

Recurrence has been the leading cause of therapeutic failure of the dorsal cysts of the wrist whether it is open or arthroscopic resection [8, 12]. Studies on the removal of dorsal cysts from the wrist by open surgery have reported a recurrence rate of between 2% and 40% [8]. Incomplete resection has been reported as a major cause of recurrence in open surgery resection [13]. Regarding arthroscopic resection, a retrospective study by Chassat *et al.* showed a recurrence rate of up to 29.7%, a high recurrence rate that the authors attributed to poor arthroscopic resection technique and difficult learning curve [9]. In a prospective, comparative, randomized study by Kang *et al.*, The authors found 2 cases of recurrence over 23 patients (8.6%) treated by open resection and 3 cases of recurrence over 28 patients (10%) treated by arthroscopic excision over a 12-month follow-up

[8]. In our study, we had 1 case of recurrence in 25 patients (4%) for open resection and 2 cases of recurrence in 15 patients (13.3%) for arthroscopic resection over a mean follow-up of 12 months. The mean follow-up of 12 months (range, 9 and 18-months) appeared insufficient to detect late recurrences, since it found they could occur in 57% of cases after 18 months and sometimes up to 8 years after the first intervention [9]. We believe that the poor technique of surgical

excision alone does not explain recurrences and that joint damage (wrist osteoarthritis, trauma or repetitive strain injuries of the wrist) or underlying ligament may be responsible for recurrences. In our study, no joint or ligament lesions associated with the dorsal cyst were found. The table below shows the review of the literature on recurrence after resection of the dorsal wrist cysts (Table 3 and 4).

Table 1: Distribution of patients in two groups

	Group A (Open resection, n = 25)	Group B (Arthroscopic resection, n = 15)
Age (Range)	30,3 (15-45) y	32 (15-50) y
Male	10	5
Female	15	10
Right wrist	17	6
Left wrist	8	9
Preoperative pain	3,12 (0-7)	3,22 (0-7)

n = number, y = years

Table 2: Comparative results of open and arthroscopic resection of dorsal cysts of the wrist.

	Group A (open resection)	Group B (arthroscopic resection)	p
Preoperative pain	3,12	3,22	0,4
Postoperative pain	0,40	0,26	0,001
Wrist strength	90,2%	94%	0,2
Recurrence	1 case (4%)	2 cases (13.3%)	0,3
Unsightly scar	2 cases (8%)	0 case (0%)	0,04
Time off work	15 (5-30) days	8 (3-21) days	0,001
Satisfaction	21 patients (84%)	14 patients (93.3%)	0,02

$P < 0.001$: statistically significant difference

Table 3: Review of literature on open resection of dorsal wrist cysts [8, 14-20]

	Mean Age (years)	Follow-up (months)	Cysts	Recurrence	Complications
Jagers <i>et al.</i> (2002)	38	12	25	28% (7 cases)	NA
Gündes <i>et al.</i> (2000)	30,2	27	24	8,3% (2 cases)	12,5% (3 cases)
Dias <i>et al.</i> (2007)	36,3	70	103	39% (40 cases)	7,8% (8 cases)
Khan and Hayat (2011)	31	12	18	5,6% (1 cases)	0
Kang <i>et al.</i> (2008)	36	12	23	8,6% (2 cases)	0
Craik and Walsh (2012)	39	44	29	6,9% (2 cases)	NA
Limpaphayom and Wilairatana (2004)	31	6	11	18% (2 cases)	0
Clay and Clement (1988)	NA	28	52	3,8% (2 cases)	1,9% (1 case)
Current study	30,3	12	25	4% (1 case)	4% (1 case)

NA: not available

Table 4: Review of the literature on arthroscopic resection of dorsal wrist cysts [8-9, 11, 21-26]

	Mean Age (years)	Follow-up (months)	Cysts	Recurrence	Complications
Rizzo <i>et al.</i> (2004)	29,8	47,8	41	4,9% (2 cases)	0
Kang <i>et al.</i> (2008)	34	12	28	10,7% (3 cases)	3,5% (1 case)
Chassat <i>et al.</i> (2006)	40	28	54	29,7% (16 cases)	7,4% (4 cases)
Mathoulin <i>et al.</i> (2004)	37	34	96	4,2% (4 cases)	0
Edwards and Johansen (2009)	42	24	45	0	6,7% (3 cases)
Chen <i>et al.</i> (2010)	36	15	8	0	12,5% (1 case)
Luchetti <i>et al.</i> (2000)	29	16	34	5,9% (2 cases)	0
Shih <i>et al.</i> (2002)	24	27	32	0	NA
Yamamoto <i>et al.</i> (2012)	34	21	15	13,3% (2 cases)	0
Current study	32	12	15	13,3% (2 cases)	0
NA = not available					

Conclusion

Arthroscopic resection of the dorsal wrist cysts is increasingly practiced. However, it is still marginal compared with the conventional open surgery technique. However, arthroscopy allows simultaneous treatment of occult scapho-lunar cysts, which can lead to recurrence and residual pain. The recovery is faster after arthroscopic resection than open surgery. The installation time, the cost of the equipment, and the necessary learning curve remain in practice an obstacle in development

of arthroscopic technique.

Data availability statement

Data available on request: the data used to support the findings of this study are available from the corresponding author upon request.

Human and animal rights

No animal were used in the research, all procedures

performed involving human participants were in accordance with the Helsinki Declaration of 1975, as revised in 2008. (<https://www.wma.net/en/20activities/10ethics/10helsinki/>).

Consent for publication

Not applicable.

Conflict of interest

The authors declare no conflict of interest, financial or otherwise.

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