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Surgical Experience: Wrist Ganglion Cyst Treatment and Outcomes

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ABSTRACT

Objective: Ganglion cysts, the most common benign soft tissue tumors, are most often located in the wrist. This study describes successful surgical outcomes of wrist ganglion cyst treatment, and provides guidance related to an adequate excision.

Materials and Methods: A total of 74 patients (46 females and 28 males, aged 18–46 years) treated operatively for a wrist ganglion cyst between January 2018 and January 2020 were included in the study. The surgical results were evaluated after a minimum 12-month follow-up period. Details of patient sex, age, affected limb, preoperative symptoms, cyst location and complications, the severity of pain, and postsurgical recurrence rate were recorded. The pain, recurrence rate, and localization data were analyzed statistically.

Results: The mean patient age was 26.15±6.61 years and the mean length of follow-up was 22.55±7.97 months. The cysts studied were located in the dorsal (n=53, 71.6%), volar (n=19, 25.7%), or ulnar aspect of the wrist (n=2, 2.7%). The 12-month postoperative follow-up visits revealed that 70 (94.6%) patients had developed no symptoms. The preoperative and postoperative mean visual analog scale score was 6.07±1.07 and 2.03±0.89, respectively.

Conclusion: Operative treatment is a widely recognized method of management for wrist ganglion cysts. The results of this study indicated that a careful and appropriate capsule excision reduced the rate of persistent symptoms and recurrence in ganglion cyst surgery.

Keywords: Adult, benign tumors, ganglion cysts, surgery, wrist

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INTRODUCTION

Ganglion cysts are the most common benign soft tissue tumors of the hand and upper extremity. They are filled with a jelly-like mucoid fluid and attached by a pedicle to the tendon sheath, joint capsule, or ligament. Most often, they develop in the wrist, and particularly in the dorsal part of the wrist (70%) and originate from the scapholunate interosseous ligament. Twenty percent of wrist ganglion cysts are volar ganglion cysts, typically originating from the scaphotrapezium or, less commonly, the radioscaphoid joint. A volar wrist ganglion is often seen on the distal radius, between the flexor carpi radialis and the radial artery (1).

Ganglion cysts are more prevalent in young women, and the etiology is unknown. The general view is that they are more common in athletes of sports involving excessive wrist kinematics. Ganglion cysts are often characterized by swelling and accompanying pain, or simply pain in the wrist. They may also be asymptomatic. Magnetic resonance imaging (MRI) and ultrasonography (USG) imaging techniques are used for diagnosis. Direct radiography is used to rule out other pathologies (2, 3).

MRI T1-weighted images most often display ganglion cysts as lesions with low signal intensity. However, these cysts may also sometimes provide high-density findings due to high levels of protein. Ganglia usually demonstrate high signal intensity on T2-weighted images (4, 5).

Ganglion cysts can lead to pressure-related pain or cosmetic concerns. Painless, non-growing, small ganglion cysts can be monitored with no intervention because they may regress spontaneously. Treatment options include observation, aspiration, and surgical excision. Volar ganglion cysts are harder to treat and more likely to recur than dorsal ganglion cysts (6, 7).

Wrist ganglion cysts are easy to treat, but the high rate of post-surgery relapse suggests that, at least in part, many surgeons may perform an excision too quickly and carelessly. The purpose of this study was to provide information on the surgical treatment of wrist ganglion cysts, the statistical effect of gender, factors causing relapse, and clinical results. Photos have been provided to demonstrate an adequate excision.

Figure 1. A dorsal wrist ganglion cyst. (a) The cyst in the intraoperative canal prior to excision. (b) The cyst and its capsule following total excision. (c) Histopathological image of a multilocular ganglion cell surrounded by a fibrotic wall without epithelium. Hematoxylin-eosin, 40x10 magnification

MATERIALS and METHODS

The records of 74 patients (46 females, 28 males) who were diagnosed with a wrist ganglion cyst and who underwent primary or revision surgery at the Erzurum Regional Training and Research Hospital Clinic of Orthopedics and Traumatology between January 2018 and January 2020 were retrospectively evaluated. Open surgery was used to remove a wrist ganglion cyst in all of the study cases. The patients were called for follow-up in the postoperative 3rd, 6th, and 12th month.

The inclusion criteria were: (1) complete bone development, (2) a mass localized in the wrist, (3) diagnosis of a ganglion cyst confirmed by USG or MRI, and (4) follow-up for at least 12 months. The exclusion criteria were: (1) a mass with pathology reports not interpreted as a ganglion cyst, (2) a mass not confirmed by imaging as a ganglion cyst, and (3) having received a corticosteroid injection.

Sex, age, the affected limb, preoperative symptoms, cyst location and complications, and post-surgical recurrence rates were recorded. Postoperative and preoperative satisfaction were evaluated using a visual analog scale (VAS) score of 1 to 10.

Surgical Technique

Regional anesthesia (block) and a tourniquet were applied as the standard procedure for all of the patients. A transverse or longitudinal insertion was made to the tissue directly over the cyst. The pedicle of the cyst was located and the entire cyst and its capsule were removed. Figure 1a, b illustrates an incision and the removal procedure. All of the excised masses were sent to pathology for examination (Fig. 1c). The wound was closed using a 4.0 or 5.0 non-absorbable suture. The patients received 1 dose of antibiotherapy in the preoperative and postoperative periods and were prescribed non-steroidal anti-inflammatory drugs for a week after surgery. The wound site was wrapped with a thick compression bandage for 1 week postoperative. Mobility was possible the following day.

Ethics Committee Approval

This study was approved by the Erzurum Regional Training and Research Hospital Clinical Research Ethics Committee on January 18, 2021 (no: Erzurum BEAH KAEK 2021/02-19). All of the patients provided informed consent.

Statistical Analysis

The statistical analysis was performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Demographic and other descriptive data were reported as frequency and percentage. The arithmetic mean±SD was calculated for numerical variables. The Kolmogorov–Smirnov test was used to assess the normal distribution of continuous variables with a sample size >50. One-sample t-tests and paired samples t-tests were used to compare parameters. Analysis of variance testing was used to compare the localization of the cyst, the recurrence rate, and revision surgery. A comparison of dominant side localization and recurrence rate was performed using the Mann-Whitney U test. The Cochran Q test was used to evaluate the change in symptoms during follow-up. $P<0.05$ was considered statistically significant.

RESULTS

The study sample consisted of 74 patients (46 women and 28 men). The participants had a mean age of 26.15±6.61 years (min–max: 18–46 years) and a mean follow-up duration of 22.55±7.97 months (min–max: 12–42 months). Forty-six (62.2%) participants had a ganglion cyst in their right upper extremity, while the cyst was located in the left upper extremity in the remainder of the group. The cyst was on the dominant side in 56 (75.7%) patients and the non-dominant side in 18 (24.3%) patients (Table 1).

The cyst was located in the dorsal (n=53, 71.6%), volar (n=19, 25.7%), or ulnar aspect of the wrist (n=2, 2.7%). In all, 66 (89.2%) patients were operated on for a primary ganglion cyst, while 8 (10.8%) underwent revision surgery. Six patients (8.1%) experienced recurrence and underwent revision surgery (Table 1). These 6 patients were originally primary surgery patients. There was no recurrence in any of the patients who were originally candidates for revision surgery.

The patients had a preoperative mean VAS value of 6.07±1.07 (min–max: 4–9). The patients had a mean VAS score of 2.03±0.89 (min–max: 1–4) at 3 months after the surgery (Table 1).

In the preoperative evaluation, 67 patients had pain and swelling. Seven (9.5%) patients presented with additional symptoms. At 12 months postoperative, 70 (94.6%) patients had developed no symptoms. Two patients (2.7%) reported pain, 1 patient (1.4%) experienced numbness, and 1 patient (1.4%) had swelling (Table 2).

Table 1. Distribution of the demographic data of the patients (n=74)

	n	%	p
Gender			0.048*
Female	46	62.2	
Male	28	37.8	
Side			0.048*
Right	46	62.2	
Left	28	37.8	
Dominance			<0.001*
Dominant	56	75.7	
Non-dominant	18	24.3	
Location			<0.001*
Dorsal	53	71.6	
Volar	19	25.7	
Ulnar	2	2.7	
Recurrence			<0.001*
No	68	91.9	
Yes	6	8.1	
Surgery			<0.001*
Primary	66	89.2	
Revision	8	10.8	
VAS			<0.001**
Preop	6.07±1.07		
Postop 3rd month	2.03±0.89		

*: One-sample t-test; **: Paired-samples t-test; VAS: Visual analog scale.

When the location of the ganglion cyst was compared with revision surgery, no statistically significant difference was found (p=0.668), and similarly, when the location of the ganglion cyst was compared with the presence of recurrence, no statistically significant difference was observed (p=0.783) (Table 3).

In this study, the ganglion cyst was on the dominant side in all 8 patients who underwent revision surgery. Five of the 6 patients who experienced recurrence had a cyst on the dominant side (Table 4).

DISCUSSION

In this study, most of the cysts were on the dominant side, which was statistically significant. The majority of revision surgery and recurrence cases were also on the dominant side, suggesting that recurrence might develop due to greater use of the dominant limb. The recurrence rate in the dorsal localization was 6.8% and 1.4% in a volar localization; this result was not statistically significant. Other researchers have reported a higher recurrence rate after volar ganglion cyst surgery (8). In our study, although it was not statistically significant, the percentage of recurrence in the dorsal was high. We attribute this to the fact that a dorsal location is the most common for a ganglion cyst, which was consistent with the distribution of location in our group.

We observed that the VAS score decreased significantly after surgery, which suggests that ganglion cyst excision can and should be performed in case of clinical necessity. While ganglion cysts may regress spontaneously over time, they may sometimes cause excessive pain and prevent the performance of everyday life activities. The cysts may result in pressure on the capsular branch or the radial nerve sensory branch of the posterior interosseous nerve (9).

Table 2. Symptoms observed in the preoperative and postoperative periods

	Preoperative		3-month follow-up		6-month follow-up		12-month follow-up		p
	n	%	n	%	n	%	n	%	
None	0	0	62	83.8	68	91.9	70	94.6	<0.001*
Pain	74	100	7	9.5	3	4.1	2	2.7	
Numbness	7	9.5	2	2.7	1	1.4	1	1.4	
Swelling	74	100	3	4.1	2	2.7	1	1.4	

*: Cochran's Q test: $X^2(3) = 187.111$; p<0.001.

Table 3. Relationship between ganglion cyst localization, revision surgery, and recurrence

	Dorsal		Volar		Ulnar		Total		p
	n	%	n	%	n	%	n	%	
Surgery									0.668
Primary	48	64.9	16	21.6	2	2.7	66	89.2	
Revision	5	6.8	3	4.1	0	0	8	10.8	
Recurrence									0.783
No	48	64.9	18	24.3	2	2.7	68	91.9	
Yes	5	6.8	1	1.4	0	0	6	8.1	

Table 4. Relationship between dominance, revision surgery, and recurrence

	Non-dominant		Dominant		Total		p
	n	%	n	%	n	%	
Surgery							0.092
Primary	18	24.3	48	64.9	66	89.2	
Revision	0	0	8	10.8	8	10.8	
Recurrence							0.651
No	17	23.0	51	68.9	68	91.9	
Yes	1	1.4	5	6.8	6	8.1	

They may even affect bones. Physicians should carefully examine the scapholunate ligament in cases of small and occult ganglion cysts that are not clinically palpable but cause dorsal wrist pain (10). The size of the incision should give surgeons sufficient visibility and examination opportunities; surgeons should avoid tiny incisions.

Volar ganglion cysts are usually located between the flexor carpi radialis and the radial artery. They are often non-palpable, but always cause pain. They can also cause carpal tunnel syndrome and trigger finger. Although rare, volar ganglion cysts can be mistaken for a pseudoaneurysm of the palmar branch of the radial artery (11). Doppler USG should be used to differentiate them and ensure accurate diagnosis and treatment (12).

Volar ganglion cysts usually cause more pain than dorsal ganglion cysts and should be removed surgically. Volar ganglion cysts are harder to treat. Aspiration is not recommended as they are too close to the radial artery. A volar ganglion cyst is much more likely to recur than a dorsal ganglion cyst in the postoperative period. Some authors have even found that volar ganglion cysts damaged the palmar cutaneous branch of the median nerve (8).

Patients with these lesions often seek reassurance. A primary objective of treatment is to communicate the benign nature of ganglion cysts. The treatment options are follow-up, aspiration, and surgical operation. Some studies that have suggested that aspiration may be an alternative to surgery have reported a success rate of 36% to 80% (13). Varley et al. (14) found that a post-aspiration corticosteroid injection did not reduce the recurrence rate.

In recent years, physicians have performed both open and arthroscopic surgery to remove a ganglion cyst. The recurrence rate has been reported to be about 20% after open surgery and 17% after arthroscopic-resection (15). We observed a lower recurrence rate than seen in the literature after open surgery, which we think is due to a difference in surgical procedure.

Surgeons should follow the pedicle of the ganglion cyst and carefully remove both the cyst and the stalk. It is necessary to perform an adequate excision from the capsule while preserving the scapholunate ligament. This surgery, which seems simple, must be performed carefully and patiently because of the limited field of vision of the operated area.

Potential postoperative complications include infection, hypertrophic scar, tenderness, pain, scapholunate instability, neovascular damage, and limited range of motion (16). In this study, no superficial infection or other complication occurred in any of the patients. Hyperemia may be seen in the wound after surgery in some cases, but this should not be evaluated as a superficial infection and antibiotics should not be used. All of the instances of wound hyperemia we saw resolved spontaneously within approximately 10 days.

In conclusion, open surgery was used to excise the cyst and the capsule in all of the patients in this study. No complications were recorded and the recurrence rate was low. Therefore, we recommend this procedure.

Ethics Committee Approval: The Erzurum Regional Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 18.01.2021, number: 2021/02-19).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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