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A study to determine recurrence rates and patient satisfaction after ultrasound-guided aspiration of wrist ganglions

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Abstract

Objectives: To determine the recurrence rates and patient satisfaction after US-guided aspiration of wrist ganglion cysts during the follow-up of one year.

Material and Methods: A prospective interventional study was conducted over a period of 18 months during which all patients presenting with ganglions in the wrist and above the age of 18 years were included. US-guided aspiration was done for all of them after which they were followed for one year to determine the recurrence rate and patient satisfaction.

Results: Out of 56 patients enrolled in the study, 50 responded to the follow-up and were included in the study for final analysis. Recurrence occurred in 10 cases out of 50 cases with a recurrence rate of 20%. Compared to the non-recurred cases, cases with recurrence had significantly more size (2.2 +/- 0.4 vs 1.2 +/- 0.3 cm, $p=0.02$) but comparable morphology and location ($p>0.05$). The patient satisfaction score was significantly better ($p<0.0001$) in patients experiencing no recurrence in the follow-up.

Conclusion: US-guided aspiration is a novel, effective and safe modality of treatment for wrist ganglion cysts with low recurrence rates and adequate patient satisfaction. The recurrence rates with US-guided aspiration were less in the young population and smaller ganglion cysts making those patients good candidates for US-guided aspiration to spare surgical removal or cyst excision.

Keywords: Aspiration, ganglion cyst, ultrasound, wrist

Introduction

Ganglion cysts (GC) are commonly occurring wrist masses ^[1]. Ganglions are mainly filled with mucin with location primarily on the joints and tendons. They are found to be more common in females than males ^[2]. The age distribution remains varied but the patients are usually seen in their twenties up to their forties ^[3]. The diagnosis of GC rests on fine needle aspiration (FNAC) which may be blind or ultrasound (US) guided ^[4].

The diagnosis and management are usually required because the ganglions may become problematic in terms of causing pain, increasing in size and interfering with daily activities ^[5]. Some patients may also find it cosmetically bad and thus they want to get it operated. The treatment options include aspiration and surgical removal of the cyst ^[6].

However, the problem with the treatment is there can be recurrence which ranges from 30 to 80% ^[7-9]. The recurrence rates are reported to be more with the blind technique as compared to imaging aspiration ^[10]. The use of ultrasound has been validated and has been practically used to localize and aspirate GC. Although it is a noninvasive technique, the ultrasound machine may not be available at all centers ^[9].

However, not many studies have been done with regards to recurrence after the use of ultrasound aspiration. The present study was conducted with the primary objective of assessing the recurrence rates and comparing patient satisfaction between those who were completely cured and those who recurred after the follow-up of one year.

Materials and Methods

A prospective interventional study was conducted over a period of 18 months (January 2019 to June 2020), during which all patients presenting with ganglions in the wrist and above the age of 18 years were included. Any patients below 18 years or with the presence of Ganglion cysts at locations other than the wrist were excluded.

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The sample size for the present study was based on recurrence rates of 20.51% with US-guided aspiration of GC in the wrists in the study by Zeidenberg *et al* [1]. Taking this value as a reference, the minimum required sample size with a 10% margin of error and a 5% level of significance is 49 patients. To reduce the margin of error, the total sample size taken is 56.

A written informed consent was obtained from the patients before beginning and enrolling them into their study. The study was approved by the institutional ethical committee. Baseline demographics of the study population such as age and gender were recorded. The ganglions were analyzed in terms of their morphology, location at the wrist and size of the cyst.

US-guided aspiration of wrist ganglion cysts was performed by a single radiologist with over five years of US experience. An initial US assessment of the wrist was performed using a “12.5 megahertz (MHz) linear transducer on an IU 22 scanner (Philips Medical Systems, Bothell, WA, USA)”.

While the diagnostic US was performed with a “wide footprint linear 12.5 MHz transducer”, the procedure was performed with a “small footprint 15MHz transducer to allow for a wider picture and improved lateral resolution”.

The US aspiration was performed by a “20-gauge 1.5-inch hypodermic needle fixed to a 5-mL syringe filled with 1% xylocaine without epinephrine” under direct sonographic visualization. The long axis of the needle was situated with the US scanning plane (in-plane needle placement), which allowed for the entire needle to be visualized sonographically during insertion. The needle tip was maintained away from adjacent tendons, nerves, arteries, veins, tendon sheaths, and joints. After complete aspiration, the needle was removed and hemostasis was achieved with the use of a compression dressing. An ice pack was also applied. Patients were advised not to remove the compression dressing for 48h.

The patients were followed up telephonically for one year during which any recurrence was noted as “yes” or “no”, and patient satisfaction was adjudged on a scale of 0 to 10 with 0 weighted as “not satisfied” and 10 weighted as “completely satisfied”.

Statistical analysis

The final data was compiled and represented in the form of a number (n) and percentage (%) for categorical variables and the form of mean with standard deviation (mean \pm SD) and median with interquartile range (25th to 75th percentiles) for quantitative variables. The Kolmogorov-Smirnov test was used to determine the data normality and the nonparametric test when employed forever the data was found not to be normally distributed. The chi-square test was used for determining the association.

The values were considered to be significantly associated if the P value was less than 0.05. The complete statistical analysis was done using “Statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, ver 21.0”.

Results

Out of 56 patients enrolled in the study, 50 responded to the follow-up and were included in the study for final analysis. The mean age of the total study population was 51.3 years with a gender distribution showing female predominance of (Male: Female = 1:3.2).

Recurrence occurred in 10 cases out of 50 cases with a recurrence rate of 20% while the rest of the 40 cases showed no recurrence in the follow-up period of one year.

Compared to the non-recurred cases, cases with recurrence had significantly higher age (51.3 \pm 5.9 vs 36.2 \pm 5.7, $p=0.03$) but comparable gender distribution ($p>0.05$) (Table 1).

Table 1: Comparison of patient demographics in relation to cyst recurrence

Parameters	No recurrence (n=40)	Recurrence (n=10)	Total (n=50)	P value
Age	36.2 \pm 5.7	51.3 \pm 5.9	47.5 \pm 5.8	0.03
Gender				
Males	10 (25%)	2 (20%)	12 (24%)	0.25
Females	30 (75%)	8 (80%)	38 (76%)	

Mean \pm SD, N (%), Chi-square test

Morphologically, the ganglion was 36% simple and 64% complex with a volar location in 56% of cases and a dorsal location in 44% of cases. The mean size of the ganglion was 1.8 cm with sizes ranging from <1 cm up to 3 cm.

Compared to the non-recurred cases, cases with recurrence had significantly more size (2.2 \pm 0.4 vs 1.2 \pm 0.3 cm, $p=0.02$) but comparable morphology and location ($p>0.05$). (Table 2).

Table 2: Comparison of Ganglion characteristics in relation to cyst recurrence

Ganglion features	No recurrence (n=40)	Recurrence (n=10)	Total (n=50)	P value
Morphology				
Simple	15 (37.5%)	3 (30%)	18 (36%)	0.35
Complex	25 (62.5%)	7 (70%)	32 (64%)	
Location				
Volar	22 (55%)	6 (60%)	28 (56%)	0.98
Dorsal	18 (45%)	4 (40%)	22 (44%)	
Size (cm)	1.2 \pm 0.3	2.2 \pm 0.4	1.8 \pm 0.3	0.02

Mean \pm SD, N (%), Chi-square test

The patient satisfaction score was significantly better ($p<0.0001$) in patients experiencing no recurrence in the follow up as shown in Table 3.

Table 3: Comparison of patient satisfaction

Scores	No recurrence (n=40)	Recurrence (n=10)	Total (n=50)	P value
0-5	2 (5%)	9 (90%)	11 (22%)	<0.0001
5-10	38 (95%)	1 (10%)	39 (78%)	

N (%), Chi-square test

During the follow-up among the 10 cases with recurrence, two underwent surgical resection after 4 months of follow up while eight cases continued aspiration sittings without complete resolution with recurrence of the cyst after every two months and thus they were labeled as complete failure.

Discussion

Ultrasound-guided aspiration showed a recurrence rate of 20% in our study. The findings were almost similar to the study by Zeidenberg *et al* [1]. Where also the recurrence rate was 20% but the sample assessed was only 39. Another study by Nield and Evans reported a 59% recurrence rate of 34 patients at 1-year follow-up which was much higher than our study. It was seen that 17 out of 20 cysts recurred within the first 3 months following aspiration [11]. In another study, a recurrence rate of 35% was seen with aspiration and injection with triamcinolone [12]. Varley, in his study, reported a recurrence rate of 67% which was much higher than our study at variable follow-up (average,

12 months). Though we noted that size affected the recurrence, their study failed to recognise this association [13]. In another study, Dias *et al.* retrospectively reviewed long-term outcomes of multiple treatment methods for dorsal ganglion cysts where a recurrence rate of 58% was reported a 58% with an 81% patient satisfaction rate [14].

We found that only the size of the ganglion affected the recurrence rate. Besides, although we did not find a significant association in the volar location of the GC, it may affect the outcomes since it is located between the radial artery and the flexor carpi radialis tendon and such cysts require surgical management because aspiration carries an inherent risk of injury to the radial artery or the Palmar cutaneous branch of the median nerve [15]. Concurrent with this, there were more recurrences in the volar GC, however, statistically, there was no association. Similarly, in the study by Zeidenberg *et al.*, there was no association with the location of the GC ($p>0.99$) [1].

There were eight cases of complete failure in the present study as compared to 4 patients in a previous study by Zeidenberg *et al.* [1]. It was noted that all those 8 patients had additional wrist pathology due to which complete resolution could not be attained which included pathologies like full-thickness tears, osteoarthritis of the wrist joints and tendinitis. This warrants a thorough wrist examination while managing the patients of GC. Moreover, ultrasound provided advantages in terms of direct localization and observation of the GC, some of which may have lobulations and septa. The real-time observation of the size, contour and complexity of the cysts and the adjacent structures instructors provide better efficiency in treating the cysts, causing minimal complications [16-18].

Patient satisfaction was typically high with the US-aspiration procedure which may be due to a lesser number of punctures. The findings corroborate with Zeidenberg *et al.* [1].

Limitations of the study

The limitations of the present study included a lesser sample size due to the loss of certain patients to the follow-up. Secondly, there were no complications in the patients, although this may also be due to a lesser sample size. Thirdly, cysts present at other sites and managed were not included in the present study. Lastly, the ultrasound-guided aspiration may depend on the experience of the doctor performing the procedure and thus the recurrence rates and resolution rates may vary.

Conclusion

US-guided aspiration is a novel, effective and safe modality of treatment for wrist ganglion cysts with low recurrence rates and adequate patient satisfaction. The recurrence rates with US-guided aspiration were less in the young population and smaller ganglion cysts making those patients good candidates for US-guided aspiration to spare surgical removal or cyst excision.

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