

Aspiration and steroid injection in ganglion cysts: An ultrasound guided evaluation of the response

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ABSTRACT

Purpose: The Response of ganglion cysts to Intralesional steroids is variable. They may disappear completely to never recur again. Others may disappear for some period or show no response to the treatment. We wanted to analyse the response with the help of ultrasound. We also tried to search for the factors responsible for the unpredictable outcome.

Methods: A single centre prospective cohort study was conducted. Ganglion cysts located near the wrist and the ankle region of the limbs were included in the study. Overall 40 patients were followed for 6 months. The ultrasound was used to measure the volume which was measured at zero & sixth month. **Results:** Volume of the cysts reduced to more than half in 45% of the participants. Complete disappearance was seen in only 10%.

Conclusion: Aspiration and steroid injection reduces the volume of the cyst. The effect wanes off progressively over a period of time. Majority will have a smaller cyst at sixth month at the same site. It may work better in the smaller cysts.

Type of study and level of evidence: Therapeutic, Level IV.

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1. Introduction

Ganglion is a mucin filled cyst arising from the underlying joint capsule or the tendon sheath. It is most commonly seen in the hand region of the body.¹ History and examination is usually sufficient to reach the diagnosis. However in difficult cases ultrasound or MRI may be needed.² A Variety of procedures are in use for its management. As it is a benign cyst watchful waiting is also a treatment strategy. Among the interventional procedures, radical excision is associated with least recurrence. However due to significant post-operative morbidity, it is not the first line of treatment for this condition. Aspiration is usually the treatment of first choice. Combining aspiration with steroid injection is widely practiced. However its efficacy is controversial. Earlier reports of its success in 80% of the cases has been challenged.³

No attempt till date has been made to correctly measure the volume of the cyst following aspiration and steroid injection. We don't know about the quantum of response with this treatment strategy. Our study aims to look into this matter with the help of ultrasound. It will reflect the effectiveness of this procedure and will try to identify the factors associated with less favourable outcome.

2. Materials and methods

A Single centre prospective clinical cohort study was conducted from March 2017–July 2018. The project was started after getting approval from the scientific advisory committee and the institutional ethics committee. We Planned to observe the response of intralesional triamcinolone on the volume of the ganglion cyst with the help of ultrasound. All patients with diagnosis of ganglion cysts were screened at the Surgery OPD. Only Patients having cysts near the wrist & hand region and the ankle & foot region of body were considered for the study. Rest were excluded from the study.

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Similarly patients having recurrent cyst, cysts following trauma and the infected cysts were excluded from the study. Pregnant and those with bleeding disorders were also excluded.

All eligible participants were informed of the various treatment options available. They were also informed about the benign course of the disease. Those who consented for the procedure were also informed about the compulsory six month follow up. A written and informed consent in this regard was obtained from each of the participants.

Thereafter patients were sent to the radiology department. There the ultrasound of the cyst was performed. The volume of the cyst was calculated by measuring the length, breadth and the height of the cyst. The largest measurement in any direction was used for the calculation (Fig. 1). The septations if present were also noted. With this the patient was sent back to the surgery OPD. In the procedure room of the OPD under all aseptic precautions the cysts were punctured with 20 Gauge needle and the contents were aspirated. The syringe containing ganglionic content was then replaced with 2 ml syringe containing 1 ml of 40 mg injection Triamcinolone. If the aspirate was less than 0.5 ml then only half of the content was injected otherwise whole of the content was injected into the cavity. A sterile pressure bandage was applied after removing the needle. The patients were sent back to home with advice to remove the dressings after 6 h. If the aspirate used to be dry then aspiration with 18 gauge needle was attempted. In case of failure with 18G needle the cysts were injected with 0.5 ml Triamcinolone without any further attempt to aspirate.

The follow up was requested at one month and at sixth month. They were reminded of the same by telephone also. At the first visit only clinical examination of the area was performed. The clinical evidence of residual cyst were searched. If found they were counselled to wait till 6 months or if not satisfied then repeat the injection therapy or take other treatment. The latter were excluded from the study. At the sixth month both clinical and ultrasonological evaluation was done. The volume and septations were noted. Those who had reduction in volume of cysts by more than 50% percent were termed as responders and others non responders. The non-responders were also detailed about the time when they first appreciated reappearance of the swelling. This time was arbitrarily named as time of recurrence in non-responders.

Ganglion cyst is a rare disease with described incidence of 25/100000 in males and 43/100000 in females.³ The study was planned as a single centre study. We aimed to enrol the patients till

eleven months only. With follow up of six months the duration extended to one year and five months. The idea was to get a preliminary indication of the possible outcome. The epidemiological data and the patient related variables were analysed after classifying them into different groups. Using SPSS (Statistical Package for the Social Sciences) version 22 we searched for factors responsible for the poor outcome. The same statistical package was also used to search for the significance of difference between the means of pre and post treatment ganglion volumes.

3. Results

40 patients were successfully followed till 6 months (Fig. 2). The Majority of the participants were below 40 years of age (72.5%). There was almost equal division between males and females. The average volume of the ganglions reduced by 45% during this period ($p = 0.000$). For the cysts on hand region the reduction was by 42% ($p = 0.000$). For the cysts on the foot and ankle region it was 48% ($p = 0.016$) (Fig. 3).

The volume of the cysts reduced but the reduction was not uniform for everyone (Fig. 4). Only 45% of the participants experienced more than 50% reduction in the volume at the end of sixth month. We termed them as responders. However residual cysts were present on ultrasound in majority of these cases. In only four cases (10%) even the residual cysts could not be traced.

In the remaining 55%, the cysts regained more than half of their pre-treatment volume. Among these non-responders the swelling reappeared before one month in 25% of the cases [10/40]. In rest 30% of the cases [12/40] it was noted after the first month. In two cases (5%) the size actually increased after the treatment. The pre-treatment volume of the cyst was found to be significantly affecting the outcome. 71% (10/14) of the cysts which were less than <0.5 ml in volume responded to the treatment. The success rate with larger cysts was only 31% (8/26) (Table 1).

Overall 20% cysts ($n = 8$) were found to be septated on ultrasound. But it was not found to be significantly affecting the outcome. Similarly duration of the cyst, its presence on right or left side or presence over the foot or wrist region did not affected the outcome. Only two of the cysts near the wrist were over the volar aspect. They did not responded to the steroids.

Hypopigmentation of the overlying skin was the only significant complication observed during the study. 30% of the patients ($n = 12$) developed this complication. No active intervention was required for it.

4. Discussion

We measured the volume of the cysts by ultrasound. Bredahl and Adler (1996) have also used the same with slight difference. They used ultrasound for guided injection of the steroid. They measured the cysts in two dimensions and did not calculated the actual volume.⁴ Most of the other studies have used scales and callipers to calculate the degree of response. Calculation of volume with these is difficult and inaccurate. Varley (1997) used volume of aspirated fluid for measurements. This technique has its own limitation. When the fluid is very thick it cannot be aspirated completely. Many of these cysts are small and exact volume calculation after aspiration is difficult. The persistent feel of the swelling, the VAS score for pain, PEM (patient evaluation measure) hand disability score for patient satisfaction have also been used to measure the response to treatment.^{5,6} They assess the subjective feeling and its effect on quality of life.

The average volume of the cyst in our study reduced to by 45%. 10% of the cysts resolved completely. Bredahl and Adler (1996) had better results. They cured 4 out of 10 individuals and achieved

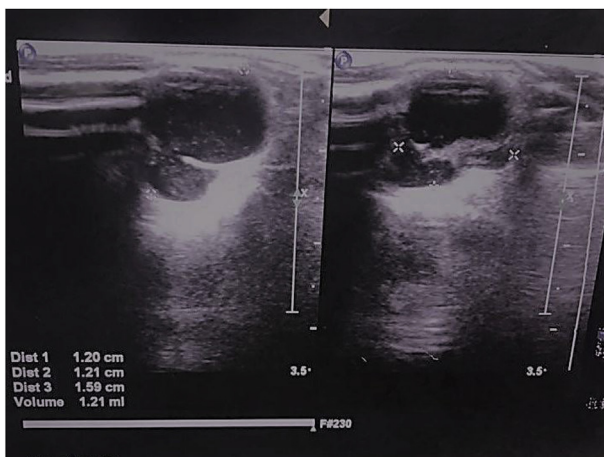


Fig. 1. The Ultrasound of the ganglion showing volume calculation. The largest measurement in three directions were used to calculate the volume. The cyst in the figure is septated with volume of 1.2 ml.

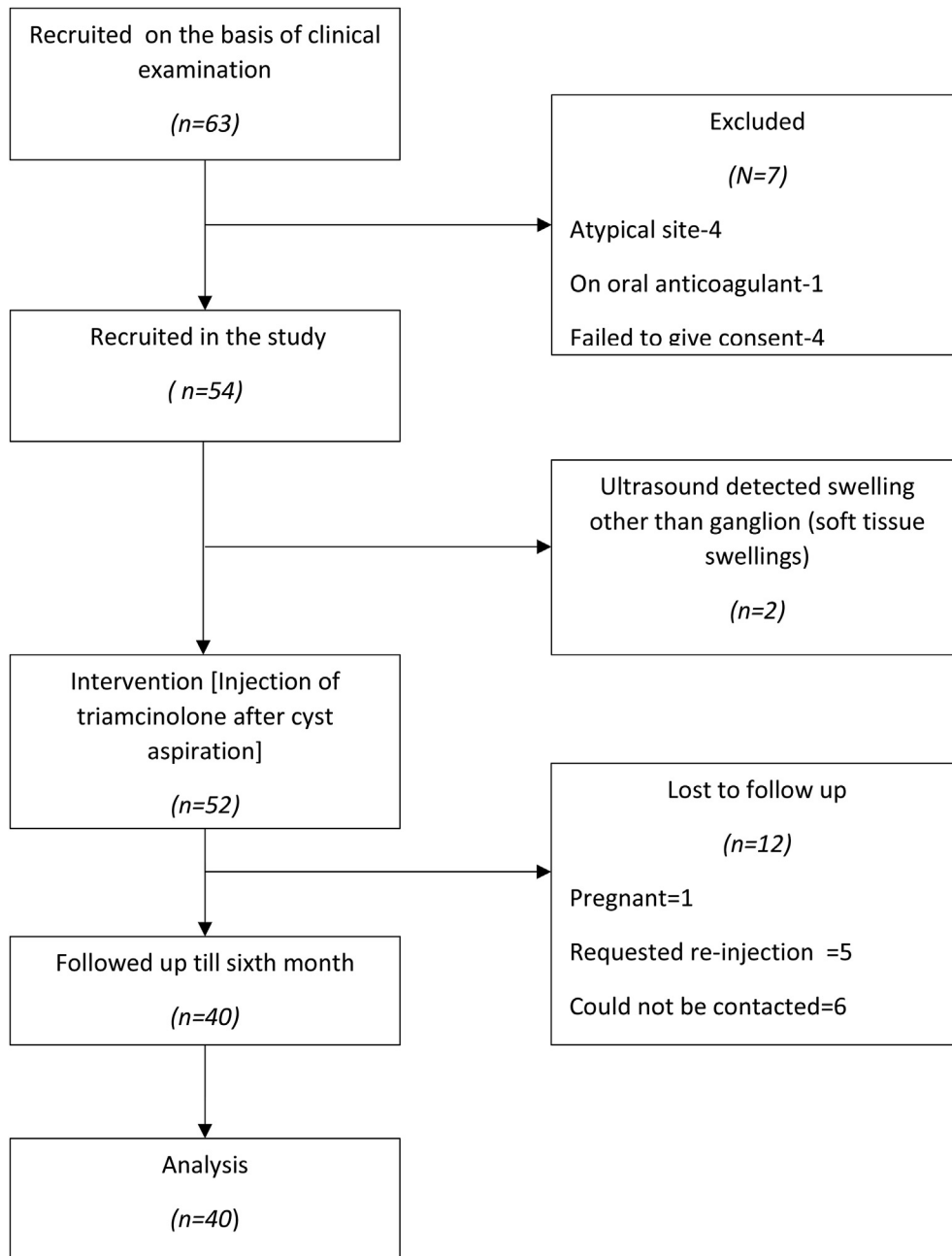


Fig. 2. Flow diagram of the study. The participants were informed of the benign course of the disease.

satisfactory volume reduction (more than half of the volume) in another 5 patients. Only one had recurrence. Ultrasound guided accurate injection of the steroid may be the reason. However such a result after a long term follow up has not been reported in other studies.

Reduction in the size of cyst can be due to the natural course of the disease also. In a three arm study by Dias et al. (2007) spontaneous resolution was seen in 23 of the 55 patients (58%).⁷ The observation period was 70 months long. With this he concluded that on long term there is no significant difference between expectant management and aspiration. In a separate study Gude (2008) averaged the results of six studies. He concluded that nearly

half of the cysts can resolve spontaneously. Interestingly the observation period in one of these studies was 12 years long.³

We declared the cysts as non-responder if they failed to reduce to less than half by six months. 55% of the participants fell into this group. A almost similar criteria was used by Breidhal and Adler (1996) to classify the responses. However many of the researchers have used disappearance of the cyst as criterion for successful outcome. The disappearance is patient's perspective in the study by Dias (2007). He used questionnaires to collect the data. Varley (1997) also used the same method. However Paul and Sochart (1997) also performed the physical examination before reaching the conclusion. The failure rate in the study by Dias et al. was 58%.

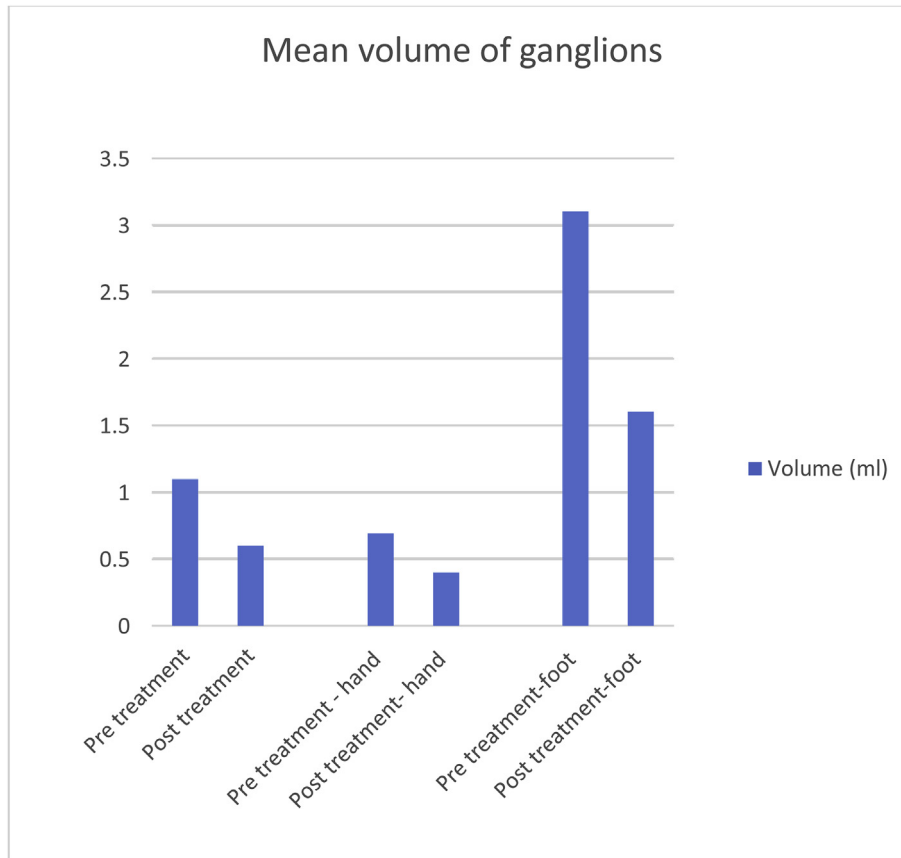


Fig. 3. The Bar chart depicts change in the average volume of ganglions Pre & post treatment at sixth month.

They followed the patients till 6 years. The same was 67% in the study by Varley.⁸ Here the follow up was till two years. For a similar duration of follow up Paul and Sochart reported a failure of 43%.⁹

The short term results of steroid injection can be very satisfying. In our study 75% cysts reduced to less than half at the end of 1 month. In the past also, the studies of short duration reported good outcomes. Derbyshire who followed the patients for a variable period of time, mostly for more than 2 months reported a success rate of 86%.¹⁰

Aspiration and steroid injection may not significantly reduce the volume of cysts in all patients. The response may be just similar to plain aspiration alone. Many modifications has been suggested to increase the efficacy of the treatment. Injection of hyaluronidase, sclerosant, splinting after aspiration and multiple punctures have all been attempted.^{3,5,11} None of these are significantly more effective than the other. Due to simplicity intralesional steroids are preferred by many as the first line of treatment.

Intralesional steroid injection is a safe procedure. We did not encountered any localised infection or rash at the site of injection. Paul and Sochart (1997) reported the same in 5% of their patients. Localised depigmentation of the skin was seen in 30% of our patients. This was higher than reported by Paul and Sochart (1997). They reported the same in one patient only.

Only radical surgery is effective in preventing the recurrences. A 99% cure rate was reported by Angelides.¹² However similar success could not be repeated by other workers. Simple excision is not effective and can lead to recurrences in 40% of the cases. The surgery is also associated with a complication rate of 20%. The

procedure is meticulous and costly. The absence from work increases the financial burden. The presence of scar decreases the patient satisfaction. In long term the patient satisfaction may be equivalent to watchful waiting only.¹³

Cysts smaller than 0.5 ml in volume responded better to the treatment. This was a significant finding of our study. We classified the cysts into two categories. Those who were less than 0.5 ml in volume on initial presentation were found to have a better outcome than those having a larger volume ($p = 0.016$). This was true at 6 months also. This is in contrast to findings of many other who have not found any evidence of such association. Possibly ultrasound guided volume estimation is more accurate and thus has revealed this association.

Cysts are common in younger age group. In our study more than 2/3rd of the patients were less than 40 years of age. This is also seen in the work of others. In one of the largest studies on dorsal wrist ganglia by Angelides (1976). The average age of participants was 29.6 years only.

This study was without controls and was limited to one centre only. There was a possibility of selection bias. The sample size was also small. Future studies without these limitations will help to shed more light on factors affecting the response.

Our observation that small cysts persist even in clinically satisfied patient was a noble finding of this study. Our study reinforces the observation that even though the cysts reduce significantly initially, this is not permanent in all cases. As the procedure is simple and almost harmless, it can be the first line of management.

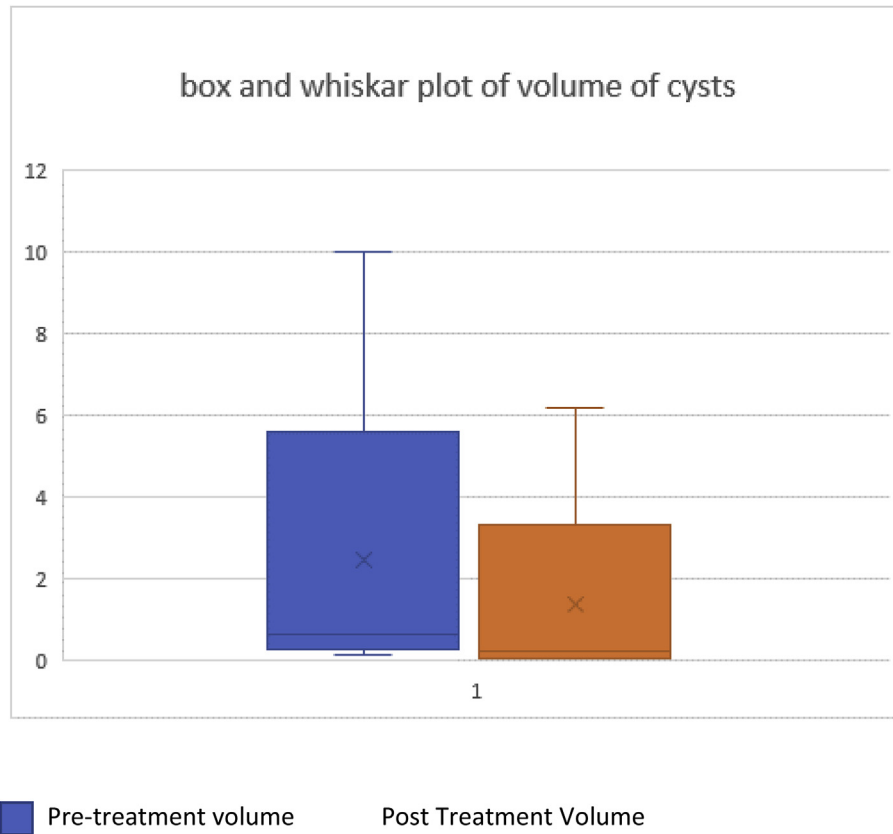


Fig. 4. Distribution plot of volume of cysts before treatment and after 6 months of intralesional steroid injection. Volume shrinkage is seen in all quartiles. The median of the volume has also decreased.

Table 1
Relationship of epidemiological & patient related variables with response to treatment.

Variables	Responders (Volume reduced By >50%)	Non responders	p value
Age			0.72
<40 years (n = 29) 72.5%	14 (35%)	15 (37.5%)	
>40 years (n = 11) 27.5%	4 (10%)	7 (17.5%)	
Sex			0.34
Male (n = 22) 55%	8 (20%)	14 (35%)	
Female (n = 18) 45%	10 (25%)	8 (20%)	
Side			0.73
Right (n = 13) 32.5%	5 (12.5%)	8 (20%)	
left (n = 27) 67.5%	13 (32.5%)	14 (35%)	
Limb			1
Upper (n = 33) 82.5%	15 (37.5%)	18 (45%)	
Lower (n = 07) 17.5%	3 (7.5%)	4 (10%)	
Pre-treatment volume			0.02
<0.5 ml (n = 14) 35%	10 (25%)	4 (10%)	
>0.5 ml (n = 26) 65%	8 (20%)	18 (45%)	
Septation			0.26
non-septate (n = 32) 80%	16 (40%)	16 (40%)	
Septate (n = 8) 20%	2 (5%)	6 (15%)	
Duration			0.5
<12 months (n = 27) 67.5%	11 (27.5%)	16 (40%)	
>12 months (n = 13) 32.5%	7 (17.5%)	6 (15%)	
Site of wrist ganglion			0.5
Dorsum (n = 31)	15 (45.5%)	16 (48.5%)	
Volar (n = 2)	0 (0%)	2 (6%)	

Conflicts of interest

None.

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