DOI: https://doi.org/10.53350/pjmhs20221611207

ORIGINAL ARTICLE

Outcome of Dorsal Wrist Ganglion Surgical Excision

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ABSTRACT

Objective: To investigate the clinical outcome of dorsal wrist ganglion treated with surgical excision.

Methodology: It was a cross-sectional study performed at Kazi Hospital Lahore. Non-probability purposive sampling technique was used to enroll 50 patients of dorsal wrist ganglion who responded through a questionnaire / research proforma. Surgical excision was done under local anesthesia as day case.

Results: We collected data of 55 patients. The mean age of the patients having dorsal wrist ganglion cyst was 31. Female patients were in a larger proportion than male patients. Right wrist was affected in n= 29 (58 %) of the individuals. At the end of our follow up only 2(45) patients had residual pain. Hypertrophic scar has been reported to be associated with the lower patient satisfaction (p = 0.001). Luckily in our study only two patients (4%) had this problem.

Conclusion: This study concluded that the outcomes of surgical excision of dorsal wrist ganglion is effective technique with high patient satisfaction and cost effectiveness.

Keywords: Dorsal wrist ganglion, aspiration, surgical excision, outcome, patient satisfaction**.**

INTRODUCTION

Wrist ganglion is a very common clinical condition presenting in both orthopedic, and general surgery clinics. It is a benign synovial swelling,filled with gelatinous mucoid materialand can be multi-lobulated[1, 2].Ganglions are most common benign tumor is hand and wrist accounting for upto70% pathological swellings lumps in the hand.

The wrist ganglion can be volar or dorsal based and dorsal ganglions are the most frequent variety up to 60%.Among gender, females have higher incidence of wrist ganglion. Most of them are reported between second to fifth decades of life[3]. Occurrence is rare among children but has been reported. One article shows more frequent occurrence of volar ganglion and flexor sheath involvement in younger population[4].

Various studies have worked on origin of these mucin filed cysts and their links to various factors such as sports injury, profession, repetitive movements and underlying arthritis. One study reported up to three times higher incidence in females and more frequent among gymnasts due to repetitive stress[1, 4].

Ganglions are most common in hand but can occur in any joint. Natural history of ganglion is variable and 50% of them can undergo spontaneous resolution. Patients mostly seek treatment for this benign lesion when they are either painful due to local neurovascular pressure symptoms or for cosmetic reasons[5].

Regarding the origin of these cysts, dorsal ganglion usually arises from scapho-lunate interosseous ligament and appears between 3rd and 4th extensor compartment of wrist.In proximity to extensor pollicis longus tendon but location can be variable. These ganglions have a long pedicle leading to its origin from joint space.

These long pedicles act as one way valve to let fluid accumulate but no escape and this leads to gradual increase in size of ganglion. Joint capsule and interosseous ligament help in valve effect[6].

Ganglions can be single or multi-lobulated cysts which can mimic like a more complex malignant tumor and that's why all excised specimens must be sent for histopathological evaluation. At microscopic level, the cell lining of a ganglion cyst is made up of collagen sheets which are randomly oriented. Within the collagen sheets, few cells are modified and working as fibroblasts or multipotent stem cells[7, 8].

The topic of our study is dorsal wrist ganglion where a lump is present on the back side of wrist joint and where most of them are a symptomatic, then can become a source of cosmetic nuisance, ache in the joint and restriction in the range of movement of the hand. These lumps when increase in size can also cause pressure on dorsal interosseous nerve and patient seek medical help.Reduction in grip strength can also be a presenting symptom[9, 10].

Clinical diagnosis is made with typical history, examination and radiology. X-rays are done to rule out underlyingarthritis, especially in scapho-lunate articulation. If any suspicion arises, MRI of wrist joint with contrast is helpful in ruling out more sinister underlying pathology.Ultrasound is also done for diagnosis but mainly if treating physician wants to inject an ultrasound guided aspiration and injection[11, 12].

Traditionally surgical excision has been the gold standard for treatment of symptomatic dorsal wrist ganglion and highest success rate. Conservative measures start with reassurance and patient education, avoidance of causative factor such as change of profession, avoiding heavy sporting activity like gymnastics. Initially wrist support, gentle massage therapy and analgesia can also be prescribed. Next comes the intervention like aspiration with or without ultrasound guidance, steroid injection and compression bandage[12, 13].If all these measure fail, then surgical treatment is prescribed. Recently lot of research work has been done on arthroscopic resection of wrist ganglions and various results have been published but that's beyond the scope of our current study[14, 15 and 16].

Most of the surgical excisions are performed via a transverse incision, a vertical skin cut is also used centered over the ganglion.Surgical excision is most common technique but not without its own risks such as infection, painful scar, neuroma formation and recurrence[17, 18]. Some patients can experience joint stiffness and very rarely complex regional pain syndrome and that's why patient selection for interventional procedure is crucial for successful outcome[19, 20].

In this study we aim to look at the outcome of our study population who underwent surgical excision of dorsal wrist ganglion, patient reported satisfaction after surgery and any complications reported.

MATERIALS AND METHODS

Study Design and setting: It was a cross sectional study performed at a private hospital in Lahore.

Study Duration: This study duration was of 6 months after approval of IRB committee.

Target Population: All male and female patients, diagnosed with wrist ganglion in Orthopedic Department of Kazi Hospital Lahore.

Study Population: All male and female patients who underwent surgical excision of dorsal wrist ganglion have been included in the study.

Sample Size: For the cross-sectional study of patients; data was collected from orthopedic department. We use Cochran formula: $n=Z2\alpha 2pq\rho 2$
p = 0.034, q = 0.966, z =1.96 and p = 0.05 where, q =1-p =1-0.034 = 0.966, n= sample size, z=level of confidence to the standard normal distribution (for a level of confidence 95%) z=1.96, p =0.05.15
So, as per this calculation, sample size will be 50 patients n=50.
Sampling Technique: Non-probability purposive sampling was used as the sampling technique.
Sampling Selection:
Inclusion Criteria: All male and female patients diagnosed with dorsal wrist ganglion and underwent surgical excision after failure of non-operative treatmentwill be included in the study
Exclusion Criteria: Volar wrist ganglion will not be part of study. Patient who did not try non-operative management as first step in treatment, recurrent ganglion lesion and suspected malignant lesions will be excluded from the study.
Operational definitions;
Ganglion: A benign synovial cyst filled with gelatinous mucinous material occurring around joints. Around the wrist they can be volar or dorsal based on their anatomical location.
Surgical excision: Surgery will involve excision biopsy of dorsal wrist ganglion under local anesthesia (LA) or general anesthesia (GA). All specimens will be sent for histopathology.
Surgical technique: After informed consent site was marked. Every Patient received Injection Xylocaine 10cc 2%w/v with adrenaline (1:200,000) Figure 1 diluted to 20cc and given under aseptic technique as ring block around the lesion Figure 2. Then patient was shifted to operative room and sterile draping done. Longitudinal skin incision, deep dissection to identify the stalk, complete excision of cyst with stalk and dorsal capsulotomy was performed for all patient. Wound washed and closed with Prolene 3/0 skin sutures. Sterile dressing applied. All cases were done as day case procedure. Hand elevation for 48 hours and return to simple activities after 5 days and return to normal activities after removal of stitches at 2 weeks was allowed.
Conservative treatment: All ganglions will be eligible for this study only after a trial of non-operative treatment which will include analgesia, local massage, wrist support and removal of any causative factors such as repetitive sports.
Patient satisfaction: One of the Outcome measures is patient satisfaction and this was recorded at final follow up at 3 months from the date of surgery. Satisfaction was scored from excellent to poor i.e., score 1-5. One = very satisfied and 5 = very dissatisfied.
Pre-operative pain: Pre-operative pain was one of the major reason patient opted for surgical intervention. This will be defined as pain affecting patient's activity of daily living, intractable pain needing regular analgesia and not responding to simple rest, activity modification or conservative measures. The pain will be scores as severe, moderate and mild based on intensity of symptoms.
Data Collection Tools/Procedure: After approval of ethical committee, patient consent was obtained and Data was collected on a proposed proforma through medical records, operation notes and outdoor follow up at clinic.
Data Analysis: Statistical analysis was performed using Microsoft excel software. The categorical value was expressed in the form of frequency and percentages, bar charts and pie charts were used to display the data.

All the evidence was entered into a database and suitable statistical analysis was performed with the presentation of categorical data in the form of graphs (bar chart, pie chart) and tables (frequencies, percentages).

RESULTS

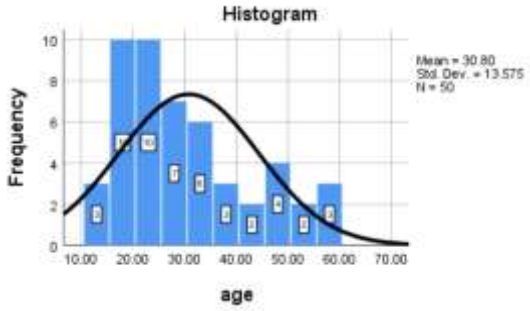
We collected data of 55 patients in total whole were operated at our hospital. Five patients lost to follow up and remaining 50 patients were analyzed. The mean age of the patients having dorsal wrist ganglion cyst was 31 with minimum age of 13 and maximum age was 60.

Table 1: Descriptive table of age of the patients after excision of the ganglion by surgery

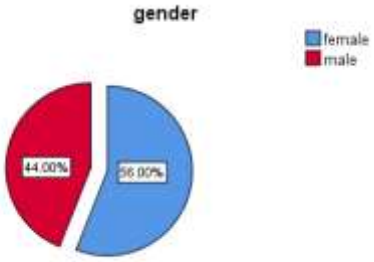
Total Participants:	50
Mean	30.8
Median	27.0
Mode	25.0
Std. Deviation	13.57
Minimum	13.0
Maximum	60.0

Table 2: Frequency table of age of patients having surgical excision of dorsal wrist ganglion.

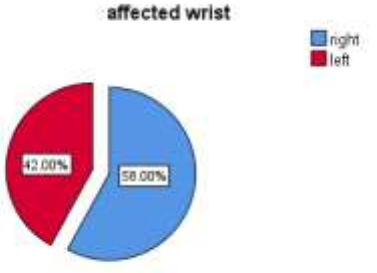
Class Interval	Frequency	Percentage
13-24	19	38.0
25-36	17	34.0
37-48	5	10.0
49-60	9	18.0
Total:	50.0	100.0



Findings suggested that the male participants were n=22 (44 %) and the female participants were n=28 (56 %). So, the female patients were in a larger proportion than male patients chart 1.



Pie Chart of Gender Affected



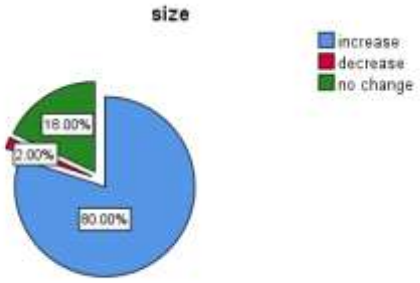
Pie chart of affected wrist Side of patients having surgical extraction of dorsal wrist ganglion cyst.

Right wrist was affected in n= 29 (58 %) of the individuals and left wrist was affected in n=21 (42 %) of the participants whichshows that mostly patients had a ganglion on their right wrist and that was hindering in their daily activities. This observation led to belief that left sided ganglion are better tolerated and can be managed conservatively as compared to right sided.

Our data analysis showed that the restriction of movement at wrist was present in n= 34 (68 %) patients and n= 16 (32 %) had no limitation of movements in their hand. This explains that a major reason to opt for surgical excision was restricted hand movements due to painful ganglion.

The proportion of patients who were complaining of severe pain before surgery were n=35 (70 %), 10 (20%) patients had moderate and five (10%) patients had minor pain. There was a greater proportion of patients who reported pain as the initial symptom of wrist ganglion and seeking medical help.

Variation in size of the ganglion was also investigated in this study which showed that the size gradually increased in n=40 (80 %) of the patients. Size remained unchanged in n=9 (18 %) patients. So, the size of the cyst varies from individual to individual Chart 4.Regarding the concern of a pathological swelling over the wrist, n=41 (82 %) were distressed about the emergence of the ganglion.



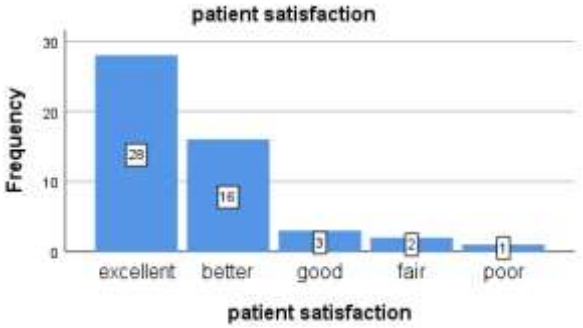
Pie chart of size of wrist ganglion on the dorsal aspect of hand.

Regarding post-operative pain score, n=13 (26 %) patients reported pain for first 2 weeks while n=37 (74 %) patients reported significant improvement in pain after surgery. At the end of our follow up only 2(45) patients had residual pain.N=18 (36 %) of the patients reported stiffness after the surgery while 32 out of 50 patients (64 %) had no stiffness in the wrist.

Severe Pain=35, Moderate Pain=10, Minor Pain n=5
Bar chart of pre-operative pain in patients with dorsal wrist ganglion.

No infection was reported in our study population and all patient went to an uncomplicated healing. Stitches were removed at two weeks. Regarding the scar n=2 (4 %) patients developed a hypertrophic scar and n=48 (96%) patients had no scar issues.

In this study, the patient satisfaction was evaluated as a numerical score from 1-5.N=28 (56 %) patients scored 1 (very satisfied), n=16 (32 %) patients scored 2 (satisfied), n=3 (6%) patients scored 3 (neutral) opinion after surgery and only one patient (2%) scored 4 with poor satisfaction. So, most of the patients were satisfied with the outcome of their surgery Chart 6.Chi square test was appliedand showed a clear association of post-operative scores with patient satisfaction.Post-operative wrist stiffness was also associated with poor patient satisfaction (p = 0.016)



Bar chart of patient satisfaction after surgical excision of dorsal wrist ganglion.

Hypertrophic scar has been reported to be associated with the lower patient satisfaction (p = 0.001). Luckily in our study only two patients (4%) had this problem. The results showed statistical significance so, the outcome of surgical excision of dorsal wrist ganglion in terms of patient satisfaction was effective and patients were satisfied with their surgery.

DISCUSSION

Ganglions are benign pathological swelling and very common benign tumor that occurs around the wrist joint. Dorsal lesion are more frequent (70%) than volar and topic of our discussion and study. Females, gymnasts and some peculiar professions have higher incidence of these lesions. Surgical excision of dorsal wrist ganglion has been gold standard and despite its few associated complications, has high success rate[1, 8 and 11].

Our results of surgical excision are comparable with the literature[12, 13 and 19] and In this cross-sectional study, results suggested that total 50 patients underwent surgical excision of dorsal wrist ganglion. Female to male ratio was 3:1, mean age of presentation was 31 years. Some studies have reported a female to male ratio of 1.5:1[20, 21].

Figure 1. Injection for Local Anesthesia

Figure 2 a and b showing multi lobulated dorsal wrist ganglion which becomes prominent on flexion of wrist

Literature review about outcome of surgical excision has elaborated various factors leading to recurrence. Surgical inaccuracy mainly insufficient excision of cyst at first procedure or missing the stalk leading to its origin from the joint or tendon sheath are the main reasons for high recurrence[22, 23, 24].

Recent studies have suggested various technique to accurately identify the stalk for complete excision and low risk of recurrence. A clean surgical field with tourniquet control, knowledge of anatomical structures and good dissection is important[24]. In some studies, stalk has not been identified as a separate entity from the ganglion cyst itself. Therefore it has been suggested that in such cases to avoid recurrence, wide excision of cyst, with a portion of dorsal capsule around the scapho-lunate ligament be also excised until extensor tendons of fingers are visualized[25].

Rates of local recurrence of ganglion after open surgery is low as compared to aspiration and injection therapy but recurrence is variable in different studies[26, 27]. Recent literature is comparing the recurrence rates between open vs arthroscopic excision of dorsal wrist ganglion and results are promising with good arthroscopic technique[22, 26] but involves expensive equipment, learning curve and general anesthesia as compared to most of our cases were done under local anesthesia.

Pain in dorsal wrist ganglion comes from pressure on posterior interosseous nerve and improves with decompression or excision. Regarding pain improvement after surgical excision, one study reported 78 % patients had pain before going for intervention, and this improved to 28% percent at first follow-up and improved further at final follow up[20].In another study, 87% patients had pain and 19% had pain severe enough to hinder their activities of daily living (ADL). After open excision this ratio improved and 79% patient were comfortable (Lee et al., 2017)[20]. In our study 42 patients (84 %) reported pain pre operatively prior to the surgical excision and a decrease in pain was reported post operatively when only 13 patient (26 %) reported pain. At final follow-up only 2 patients (4%) had residual pain.

Considering the follow up over a longer time period, one study presented 5 year results of their wrist ganglion surgical excision. 48 out of 59 patients had telephone interview follow up. Average follow up was for 44 months. At the end of the study, discomfort and stiffness was improved and 98% patients were satisfied with surgery[5].

When it comes to cost analysis, a recent study has done comparison of various treatment methods and most cost effective is aspiration of cyst in clinical setting or procedure room, followed by surgical excision in procedure room or operative room. Arthroscopic excision was most expensive technique[28].

Our study has successfully demonstrated that open surgical excision of dorsal wrist ganglion gives good results with minimum complications and high patient reported satisfaction. Our technique is also cost effective and reproducible. Limitation of the study was lack of comparison group with other techniques and we aim to expand the scope of our research on this topic in future.

CONCLUSION

Dorsal wrist ganglion is very common benign lesion of hand. Various treatment modalities have been available to patient and our study has successfully proved that open surgical excision under local anesthesia in operation room has excellent patient outcome and satisfaction. We recommend continue good medical practice

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