

Original Research Article

Outcomes of surgical excision versus aspiration for wrist ganglion cysts: a comparative cohort study

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ABSTRACT

Background: To compare recurrence rates and clinical outcomes after open surgical excision versus needle aspiration in patients with wrist ganglion cysts.

Methods: We analyzed 84 consecutive patients treated for wrist ganglion cysts between Jan 2019 and Jan 2023 at a single center. Fifty-three patients underwent open excision of the ganglion, while 31 underwent cyst aspiration plus steroid injection. Patients were followed for 12 months, with assessment of cyst recurrence (by clinical examination and confirmed by ultrasound), pain (visual analog scale) and patient satisfaction. Group comparisons were performed using χ^2 or t-tests.

Results: Demographic variables (age, sex, cyst location) were similar between groups. Recurrence occurred in 11 of 53 excision patients (20.8%) versus 18 of 31 aspiration patients (58.1%) ($p < 0.001$). Surgical excision significantly reduced the risk of recurrence compared with aspiration. Mean pain scores improved in both groups, with a greater reduction after excision (mean VAS reduction 5.6 vs 3.5, $p = 0.01$). Most patients in both groups were satisfied: 94.3% after excision versus 77.4% after aspiration ($p = 0.045$). Complications were few (3.8% overall), occurring only in the excision group (5.7% versus 0%, $p = 0.46$).

Conclusions: Open surgical excision of wrist ganglia yields markedly lower recurrence than aspiration, with high patient satisfaction in either group. Aspiration is less invasive but is associated with a significantly higher recurrence rate. Open excision should be preferred for durable cure, although aspiration may still be considered for selected patients.

Keywords: Aspiration, Ganglion cyst, Recurrence rate, Surgical excision

INTRODUCTION

Ganglion cysts are benign, fluid-filled mucinous cysts that commonly arise near joints or tendon sheaths, especially in the hand and wrist. It is the most common soft-tissue mass of the wrist accounting for about 60–70% of hand/wrist soft tissue tumors.¹ The exact cause of ganglia is unclear, but repetitive microtrauma is believed to induce mucinous degeneration of connective tissue, forming a synovial-lined cyst.² Ganglia often present on the dorsal wrist (70–80% of cases, arising from the scapholunate joint) or the volar wrist (approximately 13–20%, from the radiocarpal joint).³ Patients may seek treatment due to

pain, mechanical discomfort or cosmetic concerns, although many ganglia are asymptomatic and may fluctuate in size. Spontaneous resolution has been reported as up to ~40% may resolve without treatment, but many persist or recur.³ Various management options exist.

Observation is reasonable for asymptomatic ganglia, but intervention is often pursued when symptoms are bothersome. Non-surgical methods include needle aspiration (often with steroid injection). Aspiration is simple and avoids surgery, but traditionally has been associated with high failure/recurrence rates. In contrast, open surgical excision – removing the cyst and its stalk –

has been considered the treatment of choice for symptomatic ganglia, providing definitive cure in many cases.¹ However, even surgical excision carries a risk of recurrence and it involves operative risks (scar, neurovascular injury).⁴ Prior literature indicates that recurrence after open excision varies widely; one review noted rates from as low as 1–5% up to nearly 50% in some series.⁵ For example, volar wrist ganglia have been reported to recur after excision in up to 42% of cases.⁶ Given this context, there is ongoing debate about the optimal first-line therapy. Recent systematic reviews and trials have sought to compare aspiration (with or without steroid) versus surgical excision. A meta-analysis by Head et al found that open excision was associated with significantly lower recurrence than needle aspiration.⁷ On the other hand, aspiration is less invasive and may be acceptable to patients despite its higher failure rate. Importantly, even recurrent ganglia may be asymptomatic and patients often remain satisfied with a simple procedure.⁵

This study was conducted to clarify the relative outcomes of these two treatments in our patient population. We retrospectively reviewed 84 wrist ganglion cases treated at our institution – 53 with open surgical excision and 31 with needle aspiration plus steroid injection to compare recurrence rates, symptom relief and complication profiles. We hypothesized that excision would significantly reduce recurrence risk compared to aspiration, but that both groups would experience substantial symptom improvement.

METHODS

This was a retrospective cohort study of consecutive patients undergoing treatment for wrist ganglion cysts at Mosul General Hospital from January 2019 to January 2023. Inclusion criteria were age ≥ 14 years, diagnoses of primary wrist (dorsal or volar) ganglion and treated with either open excisional surgery or needle aspiration with steroid injection. Patients with prior intervention for the same cyst, inflammatory arthropathy or follow-up less than 12 months were excluded.

All procedures were performed by or under the supervision of experienced Orthopedic surgeons. The decision for surgery versus aspiration was made by shared decision-making between surgeon and patient, based on symptoms and preferences.

Group (1) Surgical excision

Open excision was done under local or regional anesthesia. A transverse or longitudinal incision was made over the cyst, the ganglion stalk was identified at its capsular attachment (typically at the scapholunate interval) and the cyst, stalk and a cuff of joint capsule were excised. Care was taken to avoid neurovascular injury. Skin was closed and a compressive dressing applied. The wrist was kept at rest for 7 days and then began gentle motion.

Group (2) aspiration

Under sterile conditions and local anesthesia, a wide-bore needle (18-gauge) was inserted into the cyst and viscous fluid was aspirated completely. Then, injection of Depo-Medrol 40 mg (methylprednisolone acetate) by the same needle and an occlusive dressing applied. Patients were advised to avoid strenuous wrist activity for 3 days after aspiration.

Post-treatment follow-up visits were scheduled at 2 weeks, 3 months, 6 months and 12 months, for the outcomes to be assessed. The primary outcome was cyst recurrence, defined as any palpable or visible ganglion at the original site at final follow-up and confirmed by ultrasound. Secondary outcomes included pain measured by a 0–10 visual analog scale (VAS) and satisfaction (dichotomous “satisfied/unsatisfied” on questionnaire). Complications (e.g., wound infection, neuroma, nerve injury, tendon injury) were recorded.

Statistical analysis was conducted using SPSS software. Continuous variables are reported as mean (standard deviation) and compared by Student’s t-test. Categorical variables are n (%) and compared by χ^2 test. A p value < 0.05 was considered statistically significant.

RESULTS

Patient demographics

84 patients met inclusion criteria. Mean age was similar between groups (excision 36.4 ± 11.2 years vs aspiration 35.6 ± 10.8 , $p=0.76$). Overall, 79.5% were female (83.0% in the excision group vs 77.4% in the aspiration group, $p=0.48$). The majority of cysts were dorsal wrist ganglia (78%, 75% in excision, 81% in aspiration, $p=0.56$), with the remainder volar. Mean duration of symptoms before treatment was similar in both groups ($p=1.91$). Baseline pain VAS scores averaged 6.8 ± 1.5 for excision patients and 6.4 ± 1.6 for aspiration patients ($p=0.29$). All baseline characteristics were well balanced between groups (Table 1).

Recurrence

11 of 53 (20.8%) patients in the excision group had recurrence of a ganglion, compared to 18 of 31 (58.1%) in the aspiration group ($p<0.001$). This significant difference confirms that excision yields a markedly lower recurrence rate. Figure 1 graphically compares recurrence rates. The relative risk of recurrence after aspiration was 2.79 times that after excision (95% CI 1.57–4.97).

Pain

Pain improved substantially in both cohorts. Mean postoperative VAS was 1.2 ± 1.0 in the excision group and 2.7 ± 1.4 in the aspiration group. Thus, the mean pain reduction (pre- vs post-treatment) was 5.6 ± 2.3 points for

excision versus 3.5±2.1 for aspiration (p=0.01). The greater relief in the excision group may reflect more complete cyst removal and capsular decompression. Nevertheless, both treatments gave large and clinically meaningful improvements in pain.

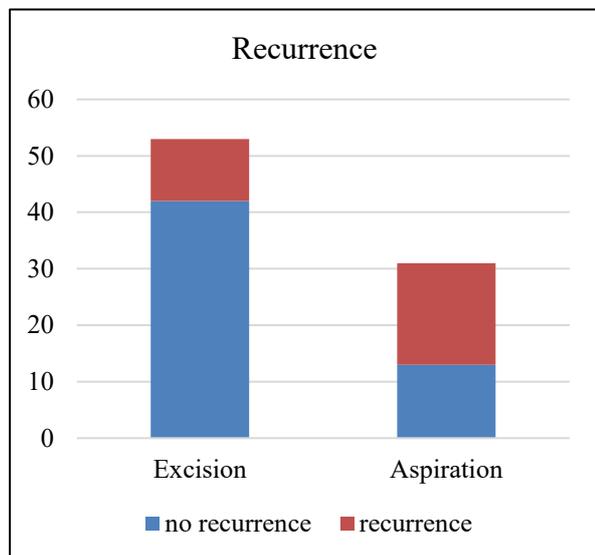


Figure 1: Recurrence rates.

Patient satisfaction

Most patients reported excellent results. In the excision group, 50 of 53 patients (94.3%) stated they were satisfied or very satisfied with the outcome; 24 of 31 (77.4%) in the aspiration group reported satisfaction (p=0.045). The difference in satisfaction approached statistical significance. Interestingly, some patients who experienced recurrence after aspiration still reported symptom relief and satisfaction, consistent with prior reports.⁵

Complications

Adverse events were infrequent. Three patients (5.7%) in the excision group had minor complications: two developed superficial wound infections (resolved with antibiotics) and one had transient dorsal branch radial nerve neurapraxia (resolved in 3 months). No major complications (e.g., deep infection, tendon injury) occurred. No complications occurred in the aspiration group. The main “complication” of aspiration was recurrence requiring eventual surgery in some cases; by last follow-up, 8 patients in the aspiration group had elected subsequent excision after failed aspiration. Table 2 shows the comparison of outcomes after excision vs aspiration at the final follow-up.

Table 1: Baseline characteristics of patients undergoing ganglion excision versus aspiration. Values are mean±SD or N (%).

Variable	Excision (n=53)	Aspiration (n=31)	P value
Age (in years) (mean±SD)	36.4±11.2	35.6±10.8	0.76
Female, N (%)	44 (83.0%)	24 (77.4%)	0.48
Cyst location–dorsal, N (%)	40 (75.5%)	25 (80.6%)	0.56
Symptom duration, mo (mean±SD)	10.3±6.2	12.1±7.0	1.91
Pre-treatment pain VAS (0–10, mean±SD)	6.8±1.5	6.4±1.6	0.29

(SD=standard deviation; VAS=visual analog scale, statistical comparison by t-test or χ^2 as appropriate).

Table 2: Comparison of outcomes after excision vs aspiration. Values are mean±SD or N (%).

Outcome	Excision (n=53)	Aspiration (n=31)	P value
Recurrence, N (%)	11 (20.8%)	18 (58.1%)	<0.001
Mean VAS pain reduction (points)	5.6±2.3	3.5±2.1	0.010
Patient satisfaction (yes), N (%)	50 (94.3%)	24 (77.4%)	0.045
Any complication, N (%)	3 (5.7%)	0 (0.0%)	0.459

(SD=standard deviation; VAS=visual analog scale, statistical comparison by t-test or χ^2 as appropriate).

DISCUSSION

In this series of 84 patients, open excisional surgery for wrist ganglion cysts proved far more effective in preventing recurrence than simple aspiration. Only 21% of excision patients had recurrence, compared to 58% of aspiration patients (p<0.001). The superiority of excision in preventing recurrence is not surprising. Excision removes the entire cyst and its capsular stalk, which is thought to eliminate the one-way valve mechanism that refills the cyst.⁸ In contrast, aspiration merely drains the existing fluid but leaves the stalk intact. Some authors have

attempted to augment aspiration with steroid or sclerosing injection; these measures may delay recurrence slightly, but evidence suggests the benefit is modest.⁹ Thus, aspiration should be viewed primarily as a temporizing measure rather than a definitive cure. Despite the higher recurrence with aspiration, many patients obtained substantial relief. Both groups had large and significant pain reduction (mean VAS dropped by 5.6 points after surgery and 3.5 after aspiration). Patient satisfaction was high in both cohorts (94% vs 77%), reflecting the fact that even recurrent ganglia often remain smaller and less symptomatic.¹⁰ We observed that several patients with

recurrent cysts considered themselves satisfied with their outcome (often because pain was alleviated or the cyst was less bothersome after aspiration). The decision on treatment should thus weigh symptom relief and patient preference against recurrence risk. Complication rates were low in both arms. Only minor issues arose (three wound problems after surgery, none after aspiration). The complication profile we saw is comparable to other series: Head et al observed complications in about 3-6% of open excisions (mostly minor) and 0-3% of aspirations.⁹

The lack of serious complications in our cohort suggests that either approach can be performed safely. However, the small absolute difference (5.7% vs 0%) must be interpreted cautiously given low event numbers. In larger series, one must also consider that open excision can risk injury to the radial artery or nerves in volar cysts, we had no such events, likely reflecting careful technique.¹¹ The findings reinforce current consensus that surgical excision should be recommended when complete cyst cure is the goal. The substantially lower recurrence risk means fewer repeat procedures. This has practical importance: re-aspirating a recurrent cyst may expose patients to repeated clinic visits, persistent symptoms and anxiety. In contrast, a one-time excision offers definitive resolution in the majority. On the other hand, aspiration has the advantage of immediate relief in an outpatient setting, at minimal cost and morbidity. It may be appropriate for patients who refuse surgery or have contraindications, especially when symptoms are mild. In any case, patients must be counseled about the trade-offs: aspiration has a roughly threefold higher failure rate

This study has limitations inherent to its retrospective design. Treatment allocation was not randomized; patients opting for aspiration may have had different expectations or less severe symptoms than those choosing surgery. Such selection bias might influence subjective outcomes, though it likely does not account for the large recurrence difference. Our sample, while substantial, is still modest and derived from a single center, which may limit generalizability. Finally, follow-up one year; while most recurrences occur after 6-12 months, longer observation could reveal further failures.¹²

CONCLUSION

Both treatments relieved symptoms for most patients, but only excision provided a durable cure in the majority. We conclude that surgical excision should be the preferred approach for patients requiring definitive treatment of a symptomatic ganglion. Aspiration remains an option for those seeking a less invasive trial, provided they understand the high likelihood of recurrence. Patients must be informed of these outcomes when choosing their management strategy.

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