Traditional surgical excision versus lay-open technique in the treatment of hand and wrist ganglia

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Aim
The aim of the study was to compare the results of two techniques for the treatment of hand and wrist ganglia, either traditional surgical excision or lay-open technique.

Patients and methods
This study was conducted in Surgery Department, Minia University Hospital, Egypt during a period between January 2013 and October 2013. This study was conducted on 40 patients presented with hand or wrist ganglion. Patients were divided into two groups by random allocation. One group (group A) was treated by traditional surgical excision, whereas the other group (group B) was treated by lay-open technique. Both were followed up for 6 months and recurrences were recorded.

Results
Operative time was significantly longer for the traditional surgical excision than for lay-open technique (61.2 vs. 23.7 min; $P < 0.001$). There was a significant difference between the two groups with respect to the operative technique difficulty ($P < 0.001$). Postoperative complications were significantly higher in group A. However, the differences between the two groups were not statistically significant with respect to wound infection and occurrence of mild postoperative pain ($P = 0.3$). Satisfaction was significantly higher among patients in group B (90 vs. 45%; $P < 0.001$).

Conclusion
Lay-open technique seems to be superior when compared with traditional surgical excision in the treatment of hand and wrist ganglion.

Keywords:
ganglion, lay open, management

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Introduction

Ganglia are benign cysts that are found in various areas of the body, usually near a joint capsule, tendon, or tendon sheath. Ganglion cysts contain a thick, clear, and mucus-like fluid similar to the fluid found in joints. The ganglion capsule is formed from compressed stroma, with no cellular lining, and may be linked to the underlying joint capsule by a narrow channel that functions as a one-way valve [1]. Common sites for ganglia on the hand include the dorsal wrist, volar–radial wrist, dorsum of the distal interphalangeal joint, and the proximal digital flexion crease. In some cases, ganglia can develop at an intraosseous location where they adhere to tendons (e.g. extensor tendons at the wrist) or can be associated with a carpal boss of the second and third carpometacarpal joints [2]. Wrist ganglia commonly develop at the dorsal and palmar–radial aspects of the wrist [3].

Ganglia are more prevalent in female individuals and occur most commonly in the second to fourth decades of life [4]. They are also common in the pediatrics and elderly population, although in children the majority resolve in less than 1 year [5,6]. The etiology of common wrist ganglia remains unknown. Onset may be sudden or insidious. However, specific traumatic events precede 10% of cases and repeated minor trauma may be a factor in their development [7]. There is no correlation with occupation and they may subside with rest and enlarge with activity and rupture or disappear spontaneously [8].

Clinical presentation is usually with a lump and often pain. The 'lump' raises cosmetic and cancer concerns. Westbrook *et al.* [9] studied the views of 50 patients attending a hand clinic with a diagnosis of ganglion and found that 38% of patients presented with cosmetic concerns only, 28% were concerned that it was cancer, 26% presented with pain, and only 8% with restricted hand function or altered sensation.

Examination of the lump will usually confirm the clinical suspicion of a ganglion, as it is usually presented as a small, rounded cystic swelling, sometimes tense cystic giving a false impression of being hard; a characteristic physical sign is that the mobility of the swelling is markedly restricted by contraction of the related tendon. Transillumination of a lump in the

usual anatomical location will confirm a fluid-filled cyst unless this cyst is very small or deep [1].

Ultrasound scan is an effective way of demonstrating ganglia, which may be either deep-seated or too small to palpate [10]. MRI scanning is of use in the diagnosis, and one study suggests that MRI is a sensitive and relatively specific imaging modality for the occult ganglion [11]. Surgical excision of the cyst with capsule and any attachments to the underlying wrist ligaments may be performed either by open surgery or arthroscopically [12,13]. Published recurrence rates after excision vary markedly from 1 to 40% [14,15].

Objectives

The aim of the study was to compare the results of two techniques for the treatment of hand and wrist ganglia, either traditional surgical excision or lay-open technique.

Patients and methods

This study was conducted in Surgery Department, Minia University Hospital, Egypt during a period between January 2013 and October 2013. This study was conducted on 40 patients presented with hand or wrist ganglion. Patients were divided into two groups by random allocation. One group (group A) was treated by traditional surgical excision, whereas the other group (group B) was treated by lay-open technique. Both were followed up for 6 months and recurrences were recorded.

Criteria of inclusion

All patients above 15 years of age, presenting for the first time with hand or wrist ganglion were included.

Criteria of exclusion:

(1) All patients coming with recurrent ganglia.
(2) Known history of wrist injury, pregnancy/breast feeding, and bleeding disorders.
(3) Those with incomplete excision in the past.

Operative technique

Group A was given local intravenous anesthesia and tourniquet was applied to create a bloodless field, whereas group B was given local infiltration anesthesia at the site of ganglion without the need for tourniquet.

The lay-open technique was performed by marking the site of the ganglion before giving anesthesia. Local infiltration anesthesia is given at the site of ganglion. Incision is performed according to Langer's line exception in areas that contain great or major vessel or nerve; longitudinal incision is preferred.

Dissection is performed until the ganglion is reached. The ganglion is opened at its dome followed by evacuation of its content, holding the opened wall of the ganglion with four mosquito forceps in the cruciate direction, then interrupted sutures are taken in the ganglion wall to fix it to the surrounding subcutaneous tissue or fascia without damaging any nerve, vessel, or tendon.

Four interrupted sutures are enough to keep the ganglia patent and to prevent its closure and reaccumulation of the fluid inside it – that is, recurrence. Closure of the skin incision was performed by interrupted simple or subcuticular 3/0 sutures without drain and with tie over and crepe bandage for 48 h.

Ethical approval

The title, aim, and plan of the study were discussed in and approved regarding ethics of research from General Surgical Department, Faculty of Medicine, Minia. Full written, informed consent was obtained from all participants.

Statistical analysis

The statistical program SPSS (SPSS Inc., 233 South Wacker Drive, 11th Floor, Chicago, IL 60606-6412). for windows, version 13 was used for data entry and analysis. Quantitative data were presented by mean and SD, whereas qualitative data were presented by frequency distribution. The χ^2-test was used to compare between two or more proportions. The Student *t*-test was used to compare two means. The lowest accepted level of significance was 0.05 or less.

Results

This study was conducted in Surgery Department, Minia University Hospital, Egypt during a period between January 2013 and October 2013 on 40 patients. The study included 12 female patients (60%) and eight male patients (40%) in group A and 14 female patients (70%) and six male patients (30%) in group B, and this difference was not statistically significant (P = 0.5). The age of the patients ranged between 15 and 30 years (mean age 23.6 ± 5.3). The two groups were comparable regarding age and sex as a consequence to the matching process.

Table 1 shows that the operative time was significantly longer for the traditional surgical excision than for lay-open technique (61.2 vs. 23.7 min; P < 0.001).

Table 2 shows that there was a significant difference between the two groups with respect to the operative technique difficulty ($P < 0.001$). Radial artery injury occurred in two patients (10%) in group A as against one patient (5%) in group B; cut tendon occurred in one patient (5%) in group A, whereas no patients in group B experienced cut tendon. These differences were not statistically significant. With respect to intraoperative bleeding, there were two patients in group A who complained of intraoperative bleeding as against none in group B, but this difference was not statistically significant.

Table 3 shows that the postoperative complications (such as neuropraxia, moderate to severe pain, intake of analgesia, scarring, incision length, and recurrence) were significantly higher in group A. However, the differences between the two groups were not statistically significant with respect to wound infection and occurrence of mild postoperative pain ($P = 0.3$).

Table 4 shows that the return to normal activities was rapid in group B (18.1 vs. 4.9 days; $P < 0.001$). Satisfaction was significantly higher among patients in group B (90% vs. 45%; $P < 0.001$).

Table 1 Comparison between traditional surgical excision and lay-open technique with respect to the operative time

Operative time (min)	Group A ($n = 20$)	Group B ($n = 20$)	*P* value
Range (mean ± SD)	45–90 (61.2 ± 14.4)	15–30 (23.7 ± 5.8)	< 0.001*

*Statistically significant.

Table 2 Intraoperative complications

Intraoperative complications	Group A ($n = 20$) [*n* (%)]	Group B ($n = 20$) [*n* (%)]	*P* value
Operative technique difficulty	15 (75)	2 (10)	<0.001*
Radial artery injury	2 (10)	1 (5)	0.3
Median nerve injury	1 (5)	0	0.2
Cut tendon	1 (5)	0	0.2
Intraoperative bleeding	2 (10)	0	0.07

*Statistically significant.

Table 3 Comparison between two groups with respect to the postoperative complications

Postoperative complications	Group A ($n = 20$) [*n* (%)]	Group B ($n = 20$) [*n* (%)]	*P* value
Wound infection	2 (10)	1 (5)	0.3
Neuropraxia	5 (25)	0	<0.001*
Pain			
Moderate to severe	17 (85)	0	<0.001*
Mild	3 (15)	2 (10)	0.3
Analgesia			
Up to opioid analgesia	14 (70)	0	<0.001*
NSAIDS	6 (30)	20 (100)	<0.001*
Scarring	11 (55)	1 (5)	<0.001*
Surgical incision length (cm)	5–10 (7.7 ± 1.9)	2–4 (3.4 ± 0.8)	<0.001*
Recurrence	3 (15)	0	0.04*

*Statistically significant.

Table 4 Convalescence and patient satisfaction after operation

Postoperative	Group A ($n = 20$) [*n* (%)]	Group B ($n = 20$) [*n* (%)]	*P* value
Convalescence (return to normal activities) days	14–30 (18.1 ± 4.9)	3–7 (4.9 ± 1.5)	<0.001
Patient satisfaction toward operation	9 (45)	18 (90)	<0.001

Discussion

Surgical excision of ganglion cysts can be performed under local or general anesthetic. Surgical excision is the definitive treatment for ganglion cysts but is also associated with the highest risk, as it can result in nerve or blood vessel damage especially in the dangerous areas, scarring, and tenderness. However, serious complications of surgery are rare [12]. The most frequent complication is recurrence, which has been estimated to occur in up to 40% of patients [15].

Difficult operative technique was experienced in 75% of patients and radial artery injury occurred in two patients (10%); cut tendon occurred in one patient (5%) in group A (Table 2). These figures approximate those found by Aydin *et al.* [16] who evaluated the surgery-related issues concerning the excision of volar wrist ganglia. It was found that injury to the median palmar cutaneous nerve occurred in four patients (10%) and injury to the radial artery occurred in two patients (5%). The ganglia were attached to the radial artery in 26 patients (65%), and hence the operative technique was difficult.

It was found that recurrence of ganglion occurred in 15% of patients who underwent traditional surgical excision (Table 3). Similar finding was reported by Berghoff and Amadio [17] and it was concluded that ganglion surgery requires a formal operative environment and careful technique to minimize injury to the adjacent structures and to minimize the likelihood of recurrence.

This study showed that satisfaction was significantly higher among patients in group B (90 vs. 45%; $P < 0.001$) (Table 4). This finding was in agreement with two large studies that looked independently at the treatments for volar and dorsal wrist ganglia over 5 and 6 years, respectively, and showed that patient satisfaction was higher in the group that received surgical intervention [14,15]. It has been suggested that the increased level of satisfaction associated with surgery may be related to the

extent of the intervention and the speed of resolution [18]. This highlights the importance of ensuring that patients are fully informed about their treatment options and the possible role of patient information leaflets to provide reassurance and present the relative potential for benefits and harm, including recurrence rates, arising from each of the treatment options.

Strength of the study

The resultant scarring after traditional surgical excision and the invasive nature of the treatment modality seem to be the only barrier to be recommended to every patient. However, the results of lay-open technique were very encouraging to be applied to every patient with ganglion.

Limitations of the study

Lay-open technique is a new technique; hence, the comparison between our findings and other studies findings was difficult.

Many patients refused lay-open technique as they have in their mind that the ganglion should be completely excised. Hence, they asked for traditional surgical excision.

Some patients refused surgery and preferred aspiration.

Conclusion

Wrist and hand ganglion is a very frequent problem in clinical practice. The outcome of treatment can be varied, but in the current study lay-open technique seems to be superior when compared with traditional surgical excision in the treatment of hand and wrist ganglion.

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Conflicts of interest

None declared.

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