Randomized Controlled Trial between Surgery and Aspiration Combined with Methylprednisolone Acetate Injection plus Wrist Immobilization in the Treatment of Dorsal Carpal Ganglion

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Dorsal carpal ganglion is one of the most common benign tumors of the hand. Many treatment modalities had been proposed and yielded the same success rate. In the present study, the authors conducted a randomized controlled trial to compare the success of treatment between surgery and aspiration combined with methylprednisolone acetate injection plus wrist immobilization. There were 28 patients enrolled and randomized into two treatment groups. Only 24 patients were available for the final follow up at 6 months. According to the present study, dorsal carpal ganglion was more common in females (83.3%) at an average age of 30 years. Pain was the most common presenting symptom (58.3%). The success by excision was 81.8% and by aspiration combined with methylprednisolone acetate injection plus wrist immobilization was 38.46%. The p-value was 0.047 by Fisher exact test. The present study has clearly shown that surgical excision gave a better success rate in the treatment of dorsal carpal ganglion.

Keywords : *Carpal ganglion, Surgery, Aspiration*

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Carpal ganglion cyst[1,2] is the most common benign soft tissue tumor, approximately 50-70% of the tumors of the hand and wrist area. Furthermore, the majority of this kind of tumor (60-70%) was found on the dorsum of the wrist over the scapholunate interval. The etiology of this dorsal carpal ganglion (DCG) is still unclear. Many reasons such as pain, fear or cosmetic lead the patient to seek medical advice[3].

The diagnosis can be made clearly by history and physical examination but the treatment options have many varieties. Each treatment option yields different success results. Varley[4] reviewed that the success achieved by rupture of the cyst was 66%, aspiration 36-85%, aspiration and hyalunodase injection 57%, aspiration and sclerosent agent injection 81%, surgical excision 73-99% and 40% by conservative treatment. Richman et al[5] also reported that wrist immobilization after treatment may improve the result. But most of the previous literature included all sites and types of the ganglion into their study and few of them compared the result between each treatment option. With many advantages of the aspiration technique it may be an alternative choice for the patient if the success is comparable to surgical excision.

The objective of the present was to compare the result of treatment between surgical excision and aspiration, methylprednisolone acetate injection plus wrist immobilization in the treatment of dorsal carpal ganglion.

Material and Method

With the null hypothesis that the success rate of treatment of dorsal carpal ganglion between surgical excision and aspiration combined with methylprednisolone acetate injection plus wrist immobilization has no clinical difference, the authors

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conducted a randomized controlled trial at the out patient department, Department of Orthopedics, King Chulalongkorn Memorial Hospital.

The patients who met the following criteria were selected for the present study

Inclusion criteria;

-age more than 15 years old

-first time dorsal carpal ganglion

-no known history of steroid usage or allergy to steroid

Exclusion criteria;

-recurrence of dorsal carpal ganglion

-known history of steroid usage or allergy

-known history of wrist injury

The sample size was calculated by the sample size for the negative trial method. The success rate of surgical excision of DCG was set to 95% and 30% difference in success was determined clinically acceptable. $\alpha = 0.05$, $\beta = 0.10$. The calculated sample size was 11 in each group when adding 10% drop-out. The authors expected to have 13 patients in each treatment group. All the patients were given detailed information about the advantages and disadvantages of each treatment and discussed it until they were satisfied, then the patients had to sign the consent form for the surgical procedure. The patients were randomly assigned into 2 groups by the sealed envelope method.

Excision

Surgical excision was performed in the operating room as an outpatient. Under the sterile technique, 5cc of 1% Xylocaine was infiltrated over the mass and esmach bandage was used to control bleeding. The DCG was excised under direct vision. The skin was closed with nylon and compressive dressing.

Aspiration

Aspiration was performed in the out patient department. Under sterile technique, 2-3 cc of 1% Xylocaine was infiltrated to the overlying skin. The DCG was aspirated by 18 G needle connected to a 10 cc syringe. Each ganglion was aspirated by a single attempt only then methylprednisolone acetate 40mg/ml, 1 ml was injected without changing the 18G needle. A gauze compressive dressing was applied to the aspirated area and the wrist was immobilized by short arm volar slab in slight dorsiflexion position for two weeks.

Fig. 1 The surgical excision was performed as an outpatient

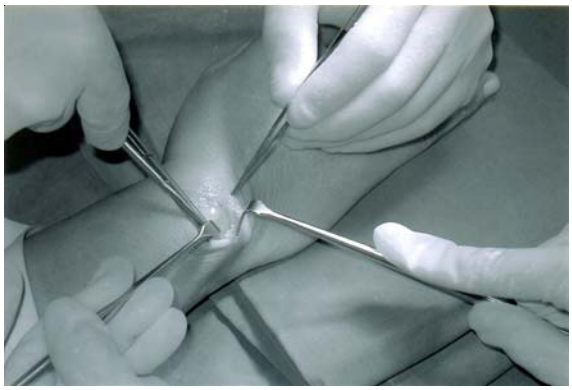

Fig. 2 The dorsal carpal ganglion was excised under direct vision

Fig. 3 The aspiration procedure begins with local preparation of the skin by povidone-iodine solution

Every patient was given the same post-procedure care protocol and paracetamol (500mg) tablet was given as a pain controlled medication. They were scheduled back for follow up at 2-week and 6-month intervals.

Fig. 4 The dorsal carpal ganglion was aspirated by 18G needle connected to 10 cc syringe. The aspiration was done only in a single attempt

Fig. 5 Injection of Methylprednisolone acetate 40mg/ml, 1 ml was done without changing the 18G needle

Fig. 6 A gauze compressive dressing and short arm volar slab was applied

At 6-months, the success of treatment was determined by palpation at the dorsal of the wrist in flexion position if this could not detect the mass, the procedure would be considered as successful. The success of treatment in each group was compared by chi-square or fisher-exact test. Demographic data about age and duration before treatment were compared by Mann-Whitney U-test and gender proportion, presenting symptom, side and size were compared by chi-square or Fisher-exact-test. $P < 0.05$ was considered as statistical significance. SPSS program was utilized.

Result

Between July 2000 to April 2002, 28 patients met the inclusion and exclusion criteria and were willing to participate in the project.

At the 6-month follow-up period, there were 24 patients available for final examination, 11 in the surgery group and 13 in aspiration, methylprednisolone injection plus wrist immobilization. Most of the subjects were female (83.3% (20/24) versus 16.7% (424)) with the presenting symptom of pain. All ganglions were located on the dorsum of the wrist over the scapholunate interval. The demographic data was not different between these 2 study groups and is presented in Table 1 and 2.

Table 1. Age and Duration

	Surgery	Aspiration	p-value
Age (years)	29.91±9.79	32.00±13.08	0.667
Duration (weeks)	57.64±42.38	51.92±67.7	0.811

Age and Duration before treatment, Data shown in mean and standard deviation

Table 2. Gender proportion, Presenting symptom, Side and Size

		Surgery (n =11)	Aspiration (n = 13)	p-value
Gender	Male	2 (18.2%)	2 (15.4%)	
	Female	9 (81.8%)	11 (84.6%)	0.637
Symptom	Pain	7 (63.6%)	7 (53.8%)	
	Weakness	1 (9.1%)	1 (7.7%)	
	Malignancy concern	0 (-)	1 (7.7%)	
	Cosmetic	0 (-)	1 (7.7%)	
	Anxious	3 (27.3%)	3 (23.1%)	0.764
Side	Left	5 (45.4%)	6 (46.2%)	
	Right	6 (54.5%)	7 (53.8%)	0.647
Size	0-1 cm	4 (36.4%)	5 (38.5%)	
	1-3 cm	7 (68.6%)	7 (53.8%)	
	> 3 cm	0 (-)	1 (7.7%)	0.622

Data show number and percentage of patients in each treatment group

Table 3. Result of treatment

	Success	Recurrence	Total
Surgery	9 (81.8%)	2 (18.2%)	11 (100%)
Aspiration	5 (38.5%)	8 (61.5%)	13 (100%)
Total	14	10	24

2x2 table of the result in each treatment group, p=0.047 by Fisher-Exact test

The success of each treatment group is shown in Table 3. The success rate by surgery was 81.8% (9/11) and 38.5% (5/13) by aspiration, methylprednisolone injection plus wrist immobilization. The p value was 0.047 by Fisher-exact test. The hypothesis was rejected.

There was no complication followed any treatment during the study period. The patient who had recurrence of carpal ganglion in each group was taken care of by the investigator until satisfied.

Discussion

Dorsal carpal ganglion at Department of Orthopedics, King Chulalongkorn Memorial Hospital was more commonly found in females, average age was 30 years and pain (14 cases) was the most common presenting symptom (58.3%). At the 6-month follow-up the success rate was 81.8% by surgical excision and 38.5% by aspiration, methylprednisolone acetate injection plus wrist immobilization. When comparing these 2 methods, the p-value by Fisher exact test was 0.047 and the authors rejected hypothesis that the success between these 2 methods has no clinical significant difference.

From the previous report on DCG, the success in each treatment varied and depended on the type of treatment. For surgical excision, Clay[8] had a success rate of 97%, and Varley[4] 73-99% in their report. For aspiration, Richman[5] had a success rate of 27%, Varley[4] 33%, Holm[7] 60%, Janecki[9] 80% and Derbyshire[6] 86%. Richman[5] concluded that 3 weeks immobilization following the aspiration could improve the outcome, but was in contrast to the report by Korman[10]. The number of attempts in aspiration might affect the result, Janceki[9] and Zubowics[11] found that repeated aspiration for 3 times could improve the success. Most of the previous literature included all sites and types of hand and wrist of the ganglion into their study.

According to the present findings, the result by surgical excision was comparable to many of the previous reports but the result by aspiration was lower than the result obtained by Derbyshire, in which hydrocortisone was used and the authors followed his aspiration procedure and it was lower than the report by Holm, in which methylprednisolone acetate was used. In the present report, the authors included only the ganglion at the dorsum of the wrist because it is the most common form of ganglion encountered in general practice and the authors wanted to minimize the error that might occur in treatment between different sites and types of hand and wrist ganglion. Although the follow-up time was 6 months, Janzan[12] reported that most of the ganglion (60%) recurred in this period.

Operative treatment was believed to be the best method when considering the recurrent rate only[11] but the operative method also consumed more time from the physician. The patients had to take time off their work for an average of 19.7 days[8] compared to the aspiration method, when patients could fully return to their activities as soon as the cast was removed, generally 10-14 days.

From another point of view, the patient might have other reasons for seeking advice such as cosmetic or being anxious about malignancy. So aspiration, methylprednisolone acetate injection plus wrist immobilization is one of the alternative methods[7] which has an advantage in simplicity, can be performed by a general practitioner in an out patient setting with an acceptably low rate of complications. In addition, acceptance by the patients was relatively high. Stephen[13] found that only 18% of his patients requested surgery after failure of the aspiration procedure. Also Westbrook[14] reported 74% of the patients referred for ganglion surgery by a general practitioner were satisfied with the result of aspiration. This kind of treatment is still the mainstay of conservative treatment in many clinics[8]. Prior to selecting treatment, physicians should explain the advantages and disadvantages of each treatment modality to their patient and obtain the expectation from them. The physician should be aware of the difference in success between treatments even though the acceptance by the patient might be relatively high for the aspiration method. The result from the present study might be used as a practice guideline to communicate with the patient. However, the authors are aware that there are many limitations in the present study such as the authors' experience and limited time for follow-up which might explain why the success was lower by the aspiration method compared to the

previous author. A larger scale of study with a long term follow-up is still necessary.

In conclusion, dorsal carpal ganglion is a frequent problem in clinical practice. The result of treatment can be varied but by this randomized controlled trial, surgery was shown to obtain a superior result in terms of success rate than aspiration, methylprednisolone acetate injection plus wrist immobilization.

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การศึกษาเปรียบเทียบการรักษาก้อนถุงน้ำที่ด้านหลังของข้อมือด้วยวิธีการผ่าตัด หรือ การเจาะดูดฉีดสาร Methylprednisolone acetate ร่วมกับการดามข้อมือ

ณพชาติ ลิมปพยอม, วัชระ วิไลรัตน์

ก้อนถุงน้ำที่ด้านหลังของข้อมือเป็นปัญหาที่พบบ่อย การรักษามีผู้นำเสนอไว้หลายวิธีที่ให้ผลการรักษาใกล้เคียงกัน ในงานวิจัยนี้ ผู้วิจัยได้ทำการวิจัยแบบ Randomized controlled trial โดยมีวัตถุประสงค์ที่จะเปรียบเทียบผลสำเร็จของการรักษาที่ได้จากวิธีผ่าตัด หรือ วิธีเจาะดูดร่วมกับการฉีดสาร Steroid ชนิด Methylprednisolone acetate และการดามข้อมือ การศึกษากระทำในผู้ป่วย 28 ราย แบ่งกลุ่มการรักษาเป็น 2 กลุ่มโดยการสุ่มเลือก มีผู้ป่วยทั้งสิ้น 24 ราย ที่สามารถติดตามจนครบระยะเวลาหกเดือน จากการศึกษาพบว่าก้อนถุงน้ำที่ด้านหลังข้อมือ พบได้บ่อยในเพศหญิง (83.3%) อายุเฉลี่ยประมาณ 30 ปี มาพบแพทย์ด้วยอาการปวดเป็นส่วนใหญ่ 58.3% การติดตามการรักษากระทำที่ระยะเวลา 6 เดือน โดยทำการตรวจร่างกายว่าไม่มีก้อนถุงน้ำที่ข้อมือกลับเป็นซ้ำพบว่า ผลการรักษาโดยวิธีผ่าตัดสำเร็จ 81.87% และวิธีเจาะดูดร่วมกับการฉีด Steroid และการดามข้อมือสำเร็จ 38.46% ทำการเปรียบเทียบโดยสถิติ Fisher exact ได้ค่า p เท่ากับ 0.047 ผลที่ได้จากการศึกษานี้แสดงให้เห็นว่า การผ่าตัดเป็นวิธีการรักษาที่ให้ผลสำเร็จที่ดีกว่าต่อการรักษาก้อนถุงน้ำที่ด้านหลังข้อมือ