

**TITLE: EFFECTIVENESS OF MODIFIED THREAD
TECHNIQUE IN COMPARISON WITH SURGICAL
EXCISION IN TREATMENT OF WRIST GANGLION: A
RANDOMIZED CONTROLLED TRIAL**

DR. PEDDIREDDY VIGENESWAR REDDY, POSTGRADUATE,

DEPARTMENT OF GENERAL SURGERY, GOVERNMENT MEDICAL COLLEGE,
ANANTHAPURAMU, ANDHRA PRADESH, INDIA

DR.M. RAMASWAMY NAIK, MS. PROFESSOR AND HOD

DEPARTMENT OF GENERAL SURGERY, GOVERNMENT MEDICAL COLLEGE,
ANANTHAPURAMU, ANDHRA PRADESH, INDIA

DR.V.V. RAMABAI, MS. ASSOCIATE PROFESSOR

DEPARTMENT OF GENERAL SURGERY, GOVERNMENT MEDICAL COLLEGE,
ANANTHAPURAMU, ANDHRA PRADESH, INDIA

DR.K.V. MADHUSUDHAN, MS. ASSISTANT PROFESSOR

DEPARTMENT OF GENERAL SURGERY, GOVERNMENT MEDICAL COLLEGE,
ANANTHAPURAMU, ANDHRA PRADESH, INDIA

CORRESPONDING AUTHOR

DR.K.V. MADHUSUDHAN, MS. ASSISTANT PROFESSOR

DEPARTMENT OF GENERAL SURGERY, GOVERNMENT MEDICAL COLLEGE,
ANANTHAPURAMU, ANDHRA PRADESH, INDIA

ADDRESS

**DR.K.V. MADHUSUDHAN, D/NO:28-6-233, AP HOUSING BOARD COLONY,
ANANTAPURAMU-515001 , ANDHRA PRADESH**

MOBILE-9493344388

MAIL ID-madhujwala@gmail.com

Abstract

Introduction: Ganglions are tense and cystic swellings account for as much as 70% of all soft tissue tumors in the hand. Surgical excision is considered the best treatment for preventing recurrence. The modified threading technique is a simple outpatient procedure. This study aimed to compare the efficacy, recurrence rates, and complications between the excision method and thread technique used in the treatment of wrist ganglion.

Methodology:

A Randomised control trial was conducted among 100 patients presenting with wrist ganglion, they were randomly allocated to undergo either surgical excision or a modified thread technique. Patients with compound palmar ganglion, infected ganglion, and ganglion less than 5mm in size were excluded from the study. All patients were operated under local anaesthesia. They were followed up for 6 months. Descriptive data was presented in mean (with standard deviation), percentages, and proportions. The chi-square test and unpaired t-test were used to test statistical association.

Results:

The age of study participants ranged from 12 to 58 years out of which 68% were females and 32% were males. Out of 50 participants who underwent the modified thread technique, complications were observed in 8% in which the recurrence rate was 4%, and infections were 4%, which was markedly low compared to patients who underwent surgical excision where recurrence was observed in 16% of patients, infections in 20% and other complications were observed in 14% patients.

Conclusion:

Thread technique was found to be more effective than surgical excision with low recurrence rates, and fewer complications

KEYWORDS: Modified thread technique, Surgical excision, Wrist ganglion

Introduction:

Ganglions are tense and cystic swellings containing gelatinous material in it.¹ They account for as much as 70% of all soft tissue tumors in the hand. They are most common in the third to fifth decades of life and are more common in females. Of all the ganglia, dorsal wrist ganglia make up 70% and volar wrist ganglia, up to 20%.²

Many studies in the literature explain the causes of ganglion cysts. Trauma, mucoid degeneration, and a one-way valve mechanism causing ligament injury are the most widely accepted factors in the development of ganglion cysts. These cysts are then enclosed by fibrous tissue or caused by the fibrous sheath's mucoid degeneration.³⁻⁵ They lack a cellular epithelial lining, unlike true cysts, which are seen in synovial tissue or adventitial bursa.

The diagnosis before surgery can be confirmed by performing transillumination or needle aspiration on ganglion cysts, as well as with imaging methods such as ultrasound and MRI.³⁻⁵ The range of treatments includes aspiration with or without the injection of different medicines, as well as simple observation to arthroscopic resection and surgical excision.

Surgery is the most effective treatment but can be challenging. Surgical excision is considered the best treatment for preventing recurrence, it is associated with a higher risk of complications when compared to simple aspiration. The modified threading technique is a simple outpatient procedure and cost-effective technique with minimal expected

complications. This study aimed to compare the efficacy, recurrence rates, and complications between the excision method and thread technique used in the treatment of wrist ganglion.

PATIENTS AND METHODS

Study design: A Randomized Controlled Trial

Study setting: Government General Hospital, Ananthapuramu.

Study sample: The study was conducted among 100 patients. 50 patients in the study group undergoing thread technique and 50 patients belonging to the control group undergoing surgical excision.

Sampling technique: Consecutive sampling.

Study period: 1 year (February 2023-February 2024)

Study population: Patients presenting with wrist ganglion to the surgical outpatient department of Government General Hospital, Ananthapuramu.

Inclusion criteria: a. Patients presenting with dorsal ganglion or volar ganglion of wrist

Exclusion criteria: a. Patients with compound palmar ganglion

b. Infected ganglion

c. Ganglion less than 5mm in size

Randomization:

Patients were randomly allocated to undergo either Surgical excision or a modified thread technique by drawing sealed envelopes. Blinding was not done as it is not practically possible.

Operating Procedures:

Modified Thread technique:

The patients in the study group were treated on an outpatient basis as a daycare procedure. Under strict aseptic precautions wrist was cleaned with povidone iodine. After stabilizing the ganglion cyst(fig-1), a sterile 2.0 silk was passed through the cyst and taken out from the opposite side, the contents of the ganglion were squeezed out completely by applying firm pressure (fig-2). After completely emptying the cyst a sterile betadine-soaked gauze piece was placed over the ganglion site and thread was tied over it (fig-3). A pressure dressing was done over it, the patient was instructed not to take any antibiotics or anti-inflammatory medication until told to do so, and the patient was asked to come for follow-up on days three, five, and seven. During the follow-up visit dressing was opened and inspected for any yellowish discharge which indicates infection, if the discharge was present swab for culture and sensitivity was sent and also thread was removed and the patient was started on appropriate antibiotics. The patient has been allowed to take only oral paracetamol in case of persistent pain. If no discharge from the surgical site on day three, the sterile dressing was

reapplied and the dressing was reopened and inspected for the same in the next follow-up visits. Suture was removed irrespective of the discharge on day seven and the patient was treated with oral antibiotics for five days after thread removal. Patients have not been restrained from their routine work in between the follow-ups. Patients were then followed at a monthly basis for the next 6 months(fig-4).



fig-1-stabilising the ganglion cyst



**fig-2- passing thread and
evacuating the content**



**fig-3- keeping a sterile guaze and
tying the thread over it**



fig-4 – after 6 months

Surgical excision:

The patients in the control group were treated on an outpatient as well as inpatient basis as a daycare procedure. Under strict aseptic precautions wrist was cleaned with povidone iodine. A pneumatic tourniquet was applied and the tissue around the ganglion was infiltrated with a local anesthetic (lidocaine 1%). A transverse incision was made over the prominent part of the swelling and the incision deepened till the underlying dermis opened and the ganglion, including its connection with the wrist capsule, was then excised completely as shown in the figures 5-8. A pressure bandage was worn postoperatively for 48 hours. Both procedures were performed by one surgeon and the patients were followed up and clinically assessed for 6 months postoperatively.

**fig-5 -incision****fig-6-deepening the incision****fig-7 -exposing the cyst wall****fig-8-ganglion excision**

Variables: Age, gender, size of the ganglion, location of the ganglion, and pain were studied. The study and control groups were compared in dependent variables such as mean duration of surgery, postoperative pain, and the occurrence of complications like recurrence, infection, scar formation, keloid formation, and joint stiffness. The postoperative pain was evaluated by Visual Analog Scale (VAS). It is a subjective measure of pain intensity, used to compare pain severity between patients with similar conditions or to record a patient's pain progression. The score ranges from 0 to 10 with 0 indicating no pain and 10 indicating excruciating severe pain.⁶

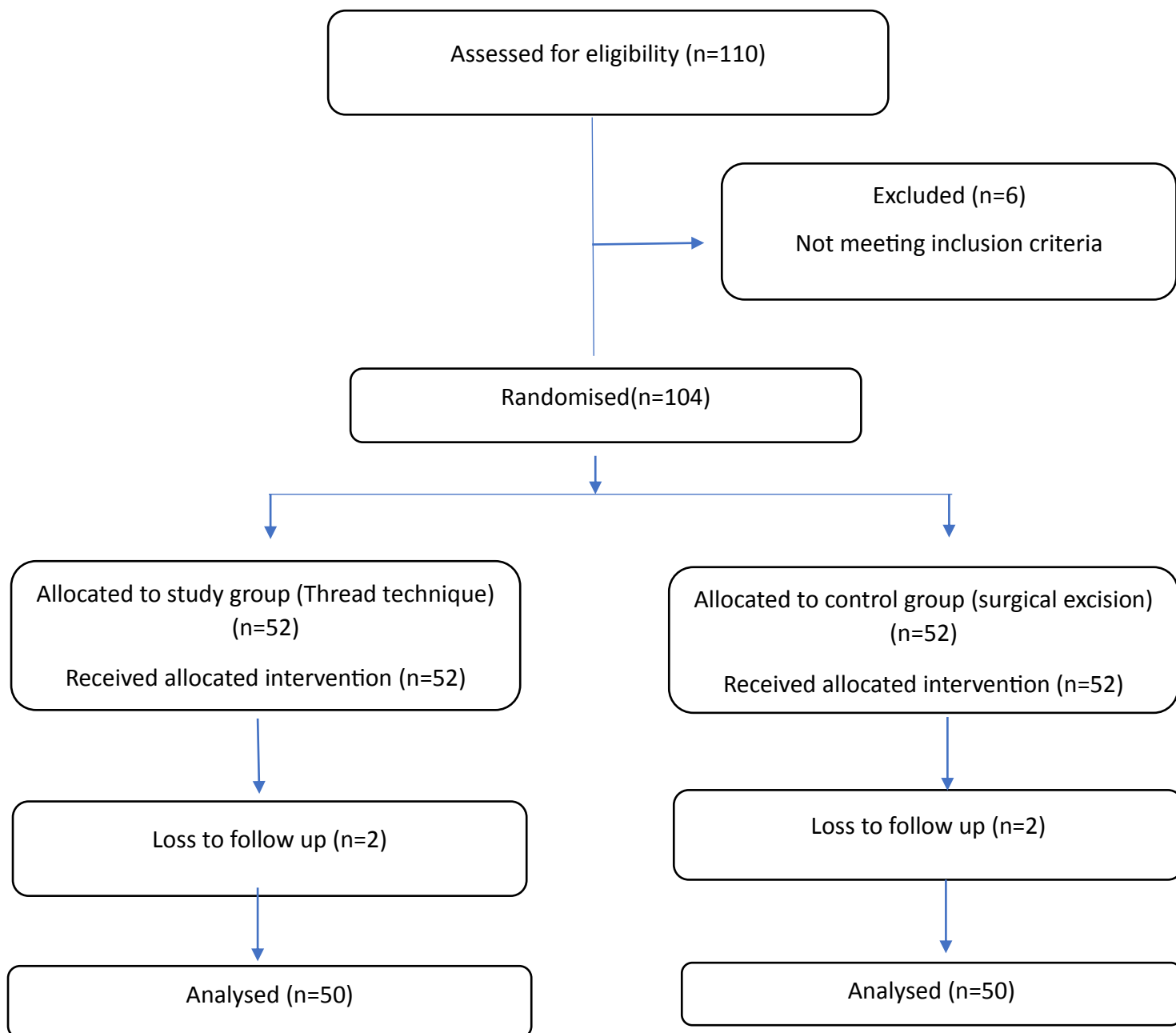


Figure 9: Consort flow diagram showing the flow of patients in the study.

Statistical Analysis: Collected data was entered into MS Excel and the analysis was done using SPSS version 25. Descriptive data like age, size of the ganglion, and mean duration of surgery in minutes were expressed in mean (SD) and range. Frequency tables were used for categorical variables. The chi-square test was used to test the statistical significance of the difference between the two proportions. An unpaired t-test was done to test the difference between the mean VAS scores in the two groups postoperatively. p-value of <0.05 was considered to be statistically significant.

Human subject protection: Informed consent was obtained before the study after ensuring confidentiality. For patients less than 18 years of age informed consent was obtained from their parents. Institutional Ethical Committee clearance was obtained before the study.

RESULTS:

The majority of study participants 68% belonged to the age group of 12-25 years and 68 % were females. The size of the ganglion ranged from 8-20 mm in the study group and 10-20 mm in the control group. 66% of patients presented with dorsal ganglion and 34% presented with volar ganglion. A large proportion of patients,73% complained of pain sometimes. The study and control group were similar in demographic and clinical characteristics as represented in Table 1. The p value for all the variables was > 0.05 indicating that there is no statistically significant difference between the two groups.

Table 1: Demographic and clinical characteristics of study participants (n=100)

Characteristics	Study group (n=50)	Control group(n=50)	p-value
Age in years			
12 - 25	33(66%)	35(70%)	0.74
26 - 35	12(24%)	9(18%)	
>35	5(10%)	6(12%)	
Gender			
Females	35(70%)	33(66%)	0.67
Males	15(30%)	17(34%)	
Size of ganglion	8-20 mm	10-20 mm	--
Location of Wrist Ganglion			

Dorsal	35(70%)	31(62%)	0.71
Volar	15(30%)	19(38%)	
Pain			
None	9(18%)	11(22%)	0.79
Sometimes	38(76%)	35(70%)	
Continuous	3(6%)	4(8%)	

The mean duration of surgery was only 7.5 (SD 2.2) minutes in the study group compared to 15.8 (SD 4.2) minutes in the control group. On the unpaired t-test, the p-value was <0.0001 indicating that there is a statistically significant difference between the two groups. (Table 2)

Table 2: Mean duration of surgery (n=100)

	Study group (n=50)	Control group(n=50)	p-value
The mean duration of surgery in minutes	7.5 ± 2.2	15.8 ± 4.2	<0.0001

Infection was the most common complication observed in 12(12%) patients. 4% of patients operated with the modified thread technique developed infection compared to 20% of patients operated with surgical excision. P value was 0.01 indicating a statistically significant difference between the two groups. Recurrence was observed in 10(10%) patients. Around 4% of the patients in the study group developed recurrence compared to 16% recurrence in the control group. p-value was 0.04 indicating a statistically significant difference between the two groups. (Table 3).

Table 3: Comparing complications of study and control groups (n=100)

Complications	Study group(n=50)	Control group(n=50)	p-value
Recurrence	2(4%)	8(16%)	0.04*
Infection	2(4%)	10(20%)	0.01*
Other complications	0(0%)	7(14%)	-

*Significant at p value<0.05

Complications like scar formation, keloid formation, and joint stiffness were observed in 8%,4%, and 2% of the patients belonging to the control group respectively. These complications were not seen in patients of the study group(Figure 10)

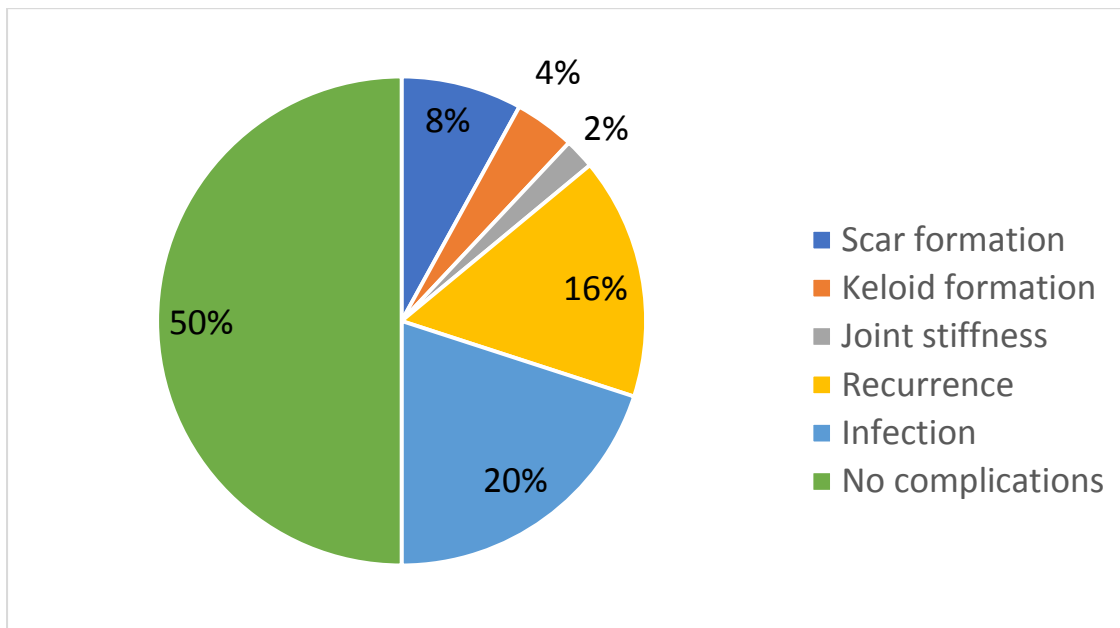


Fig 10: Complications in the control group (n=50)

A statistically significant difference ($p < 0.0001$) was present between the two groups when the mean VAS scores of patients were compared on postoperative day 0 and day 3.

Table 4: Comparison of pain on VAS score in study subjects postoperatively using t-test (n=100)

Pain	Study group(n=50)	Control group(n=50)	
POD-0	0.12 (SD 0.33)	1.64 (SD 0.63)	t=15.12 p<0.0001
POD-3	0 (SD 0)	0.82(SD 0.49)	t=11.83 p<0.0001

DISCUSSION:

Gang et al. introduced the thread technique for the treatment of ganglion in the late 1980s. They passed the thread 2.0 mersilk in a crisscross manner through the cyst and the cyst contents were completely evacuated with firm pressure over the cyst, the thread was tied over a sterile gauze piece to form two loose loops. The dressing was changed weekly and the

thread was taken out after three weeks They reported a cure rate of ninety-five percent. They discovered microbial growth in seven out of sixty patients this may be the result of keeping the thread in place for a prolonged period of three weeks.⁷

We adopted a modified version of the thread technique in this study. The patient will experience less pain because there will only be one needle pass necessary rather than two loops around the gauze piece. The patient is firmly instructed not to take any antibiotics or anti-inflammatory drugs since this will allow low-grade inflammation to develop and result in the production of yellowish serosanguinous fluid at the cyst's entrance point. We believe that the thread's goal is to trigger a foreign body reaction, so once inflammation begins, there's no benefit to retaining it longer. The thread is hence removed and the patient was prescribed oral antibiotics to prevent the cyst from being secondarily infected, this may be the reason why the majority of our patient's swabs didn't show any microbial growth.⁷

In a study done by Sumedh Choudhary et al., (2020),⁸ recurrence rates of 9% were observed in patients treated with a modified thread technique. This is higher compared to the recurrence rate of 4% observed in the present study. 7.1% of the patients complained of pain in the study conducted by Sumedh et al while none of the patients complained of pain in the present study on POD-3.

Jagers Op Akkerhuis M et al (2002) reported a recurrence rate of 24%⁹, Jacob et al (1990) reported a recurrence rate of 28% after surgical excision.¹⁰ These rates were higher than the recurrence rate observed in our present study which was 16%. The study conducted by Jagers Op Akkerhuis M et al also stated surgical excision technique was preferable compared to other techniques like hyaluronidase injections where the recurrence rate was 77%.⁹

A retrospective study conducted by Surjit lidder et al(1998-2005) on surgical excision of wrist ganglion showed an overall recurrence rate of 41.8% which was much higher compared to the present study with a recurrence rate of 16%.¹¹

In the present study, we found that the Modified thread technique is a superior method with less recurrence and complications compared to surgical excision. However, studies with higher sample sizes and longer follow-ups are recommended for further understanding in this regard.

CONCLUSION:

Thread technique was found to be more effective than surgical excision with low recurrence rates, and fewer complications. It is a minimally invasive technique that can easily be done in less time compared to surgical excision.

REFERENCES:

1. Nelson CL, Saw Miller S, Phalen GS. Ganglion of the wrist and hand. *J Bone Joint Surg [Am]* 1972;54:1459.
2. A. P. Westbrook, A. B. Stephen, J. Oni, and T. R. C. Davis, "Ganglia: the patient's perception," *Journal of Hand Surgery*, vol. 25, no. 6, pp. 566–567, 2000.
3. Synovial fistula as a complication of recurrent dorsal wrist ganglion excision: case report. Naam NH. *J Hand Surg Am.* 2012;37:1225–1228. [[PubMed](#)] [[Google Scholar](#)]
4. Arthroscopic diagnosis and treatment of dorsal wrist ganglion. Nishikawa S, Toh S, Miura H, Arai K, Irie T. *J Hand Surg Br.* 2001;26:547–549. [[PubMed](#)] [[Google Scholar](#)]
5. Arthrographic studies of wrist ganglions. Andrén L, Eiken O. https://journals.lww.com/jbjsjournal/Abstract/1971/53020/Arthrographic_Studies_of_Wrist_Ganglions.9.aspx. *J Bone Joint Surg Am.* 1971;53:299–302. [[PubMed](#)] [[Google Scholar](#)]
6. Sondenaa K, Andersen E. Patient characteristics and symptoms in chronic pilonidal sinus disease. *Int J Colorectal Dis.* 1995; 10:39-42
7. Gang RK, Makhlof S. Treatment of ganglia by a thread technique. *J Hand Surg.* 1988;13(2):184e186
8. Chaudhary S, Mandal S, Kumar V. Results of modified thread technique for the treatment of wrist ganglion. *J Clin Orthop Trauma.* 2020 Aug 27;13:57-62. doi: 10.1016/j.jcot.2020.08.018. PMID: 33717876; PMCID: PMC7919974
9. Jagers Op Akkerhuis M, Van Der Heijden M, Brink PR. Hyaluronidase versus surgical excision of ganglia: a prospective, randomized clinical trial. *J Hand Surg Br.* 2002 Jun;27(3):256-8. doi: 10.1054/jhsb.2002.0764. PMID: 12074614
10. Jacobs LGH, Govaers KJM (1990). The volar wrist ganglion: just a simple cyst? *Journal of Hand Surgery*, 15B: 342–346.
11. Lidder S, Ranawat V, Ahrens P. Surgical excision of wrist ganglia; literature review and nine-year retrospective study of recurrence and patient satisfaction. *Orthop Rev (Pavia).* 2009 Jun 30;1(1):e5. doi: 10.4081/or.2009.e5. PMID: 21808669; PMCID: PMC3143961.