Original Article

J Babol Univ Med Sci
22; 2020. P: 275-282

Comparison of Methylprednisolone Injection Versus Diclofenac Injection in Treatment of Trigger Finger

S. Mohammadi Jami (MD)[1], S. Khafri (PhD)[2], M. Bahrami Feraydoni (MD)*[1]

1.Department of Orthopedic, School of Medicine, Babol University of Medical Sciences, Babol, I.R.Iran

2.Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, I.R.Iran

J Babol Univ Med Sci; 22; 2020; PP: 275-282

Received: Apr 6th 2020, Revised: Jun 9th 2020, Accepted: Aug 1st 2020.

ABSTRACT

BACKGROUND AND OBJECTIVE: Trigger finger is a condition in the finger that is locked in flexion or has a heterogeneous movement and is one of the most common causes of pain in the hand; the first line of treatment is the use of corticosteroids. Due to the fact that corticosteroid injection has side effects in diabetic patients, therefore, this study was performed to compare the results of injecting non-steroidal anti-inflammatory drugs (NSAIDs) as an alternative treatment instead of corticosteroid injection in trigger finger therapy.

METHODS: This double-blind clinical trial study was performed on 84 patients with trigger finger referred to Shahid Beheshti Hospital in Babol which were divided in two equal groups of 42 individuals of injections of diclofenac and methylprednisolone. The severity of the disease was compared according to the Quinnell classification (with a score of 0-4) and the rate of improvement in the two groups in the first, third, sixth weeks and third, sixth and twelfth months.

FINDINGS: The mean age in the diclofenac injection group was 52±9 years and in the prednisolone group was 53±7 years. There was no statistically significant difference between the two groups in terms of age, sex, presence of underlying disease, symptoms and duration of disease. The need for re-injection due to no improvement in symptoms was 34 patients (81%) in the diclofenac group and 20 patients (46%) in the methylprednisolone group (p=0.001). In the methylprednisolone group, the mean Quinnell rank was 1.4±0.8. The rate of recovery was higher in the methylprednisolone injection group than in the diclofenac group. From the beginning of the study to week 6th and from the beginning of the study to the 12th month, the improvement rate in the methylprednisolone injection group was significantly better than the diclofenac group (p=0.0001).

CONCLUSION: The results of the study showed that both treatments are effective in improving the symptoms of trigger finger disease. But corticosteroid injections are associated with better and faster results in long-term and short-term studies.

KEY WORDS: *NSAID, Corticosteroid, Trigger Finger.*

Please cite this article as follows:

Mohammadi Jami S, Khafri S, Bahrami Feraydoni M. Comparison of Methylprednisolone Injection Versus Diclofenac Injection in Treatment of Trigger Finger. J Babol Univ Med Sci. 2020; 22: 275-82.

***Corresonding Author: M. Bahrami Feraydoni (MD)**
Address: Department of Orthopedic, School of Medicine, Babol University of Medical Sciences, Babol, I.R.Iran
Tel: +98 11 32252071
E-mail: bahramimasoud478@gmail.com

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

Introduction

Trigger finger and trigger thumb is a condition in the finger that is locked in the flexion state in the more advanced stages of finger disease (1). The incompatibility between the tendon and the sheath due to the thickening of the first annular pulley (A1) causes uneven movement and clicking sound while the flexor tendon of the finger moves (2). This problem is one of the most common causes of hand pain and its incidence in the general population is about 2.6% and this amount increases to 10% in patients with diabetes (3).

The two ages of onset of this disease are less than 6 years and 50s and 60s of life and is more common in women. The overall prevalence of flexion of the flexor tendon during life is estimated at2- 2.6% (4) and its incidence in people with diabetes mellitus (5, 6), hypothyroidism, gout, renal failure, amyloidosis (7-9) and regional hand lesions such as Decor Vein tenosynovitis, carpal tunnel syndrome, and Dupuytren contracture are more common (4-10). Some underlying conditions such as rheumatic diseases, diabetes, and gout or kidney disease can predispose a person to this complication, but this phenomenon occurs spontaneously due to the frequent use of the hand over the years and at middle age and especially in women (11-13).

Trigger finger treatments are surgical and non-surgical. The first line of treatment is the use of non-surgical methods such as finger rest, splinting and topical injection of corticosteroids (14, 15). If the amount and duration of use of this drug is long, it has symptoms such as osteoporosis, muscle weakness, hyperglycemia, adrenal suppression, increased eye pressure (glaucoma), necrosis of the femoral head, etc. In cases where a person has high blood sugar, topical injection is less likely to be successful and there is a possibility of hyperglycemia following the injection (16-18).

Oral nonsteroidal anti-inflammatory drugs (NSAIDs) and NSAID creams and ointments are often used clinically, although their effects have not been well documented in studies. NSAIDs are injected intramuscularly as well as elsewhere. The best treatment option is still not clearly defined. Hansen et al. (19) as well as Zyluk et al. (20) found that there was no clear difference between pain relief in patients treated with corticosteroid injections and surgical treatment at 3-month follow-up. Sato et al. also reported that the percentage of patients complaining of pain was generally equal to that of patients treated with corticosteroid injections or surgery at 6 months of follow-up (21). In contrast, Chao et al. showed that pain intensity was clearly higher in the group treated with corticosteroid injections than in the group in which surgery was performed at one month follow-up (22). The results of a study by Shakeel et al., comparing corticosteroid injections with diclofenac, showed that although steroids provide faster relief, NSAID injections are also effective in treating trigger finger symptoms after three months (23).

Many surgeons prefer hand injections of soluble corticosteroids (such as dexamethasone) and suggest that insoluble corticosteroids (such as triamcinolone) may be located in the tendon sheath of the flexor and affect optimal function (24, 25). But other surgeons prefer to inject insoluble steroids. There are no reports or studies of adverse effects of various treatments. Therefore, the aim of this study was to compare the results of NSAID injection with corticosteroid injection in the treatment of Trigger Finger.

Methods

This study is a double-blind randomized clinical trial after registration in the clinical trial system with the number IRCT20160508027797N6 and approval in the ethics committee of Babol University of Medical Sciences with the code IR.MUBABOL.HRI.REC.1398.170 and obtaining written consent from patients. It was performed on 84 patients with the trigger finger referring to Shahid Beheshti Hospital in Babol during 2018-2019. The sample size was determined by considering the impact factor of 0.6 (26) and 80% power at the 95% confidence level in each group of 45 patients. Finally, this study was performed on 84 patients with trigger finger. 42 patients were in the diclofenac injection group prepared by Mino Company (group one) and 42 patients were in the methylprednisolone injection group (Depomedrol) (group two).

The necessary information was collected through interviews at the time of referral by completing the relevant checklists. Adult patients older than 21 years with one trigger finger and in need of treatment and the absence of any accompanying tenosynovitis in the hand such as Decor Vein, carpal tunnel syndrome and Dupuytren contracture , involvement of other fingers, clinical suspicion of other diseases with similar symptoms and their confirmation were included in the study. Patients with a history of diclofenac or methylprednisolone allergy, pregnant or lactating patients, and patients with a history of injection of the

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

drug in the same finger, and if patients do not cooperate to follow up, choose other treatments to continue the treatment process and cause side effects were also excluded from the study.

To inject, the patient first lay on his back with his hand on his side, his wrist at rest, and his palm in supine position. The drug was injected in a double-blind manner in such a way that the drugs were prepared by the researcher, covered with a paper cover on the syringe so that the color of the drug was not clear, and were given to the treating physician for injection. The injection site was the tendon sheath and 8 mm above the MP (Metacarpo-phalangeal crisis). Examination, drug injection, evaluation of treatment results were compared between the two groups based on the severity of the disease and based on Quinnell classification (27) and re-injection was performed if necessary. Patients were compared in terms of symptom duration, underlying disease, recovery rate, need for re-injection, and Quinnell grading at baseline, first, third, sixth weeks and third, sixth, and twelfth months. The collected data were analyzed using SPSS.v23 statistical software using chi-square, t-test, paired t-test, Mann-Whitney and GEE model and $p<0.05$ was considered significant.

Results

The mean age in the diclofenac injection group was 52±9 years and in the other group was 53±7 years, which was not statistically significant. In this study, 21 patients were male (25%), of which 10 patients (23.8%) were in the first group and 11 patients (26%) were in the second group. Also, 63 patients were female (75%), of which 32 patients (76%) were in the first group and 31 patients (73.8%) were in the second group. There was no significant difference between the two groups in terms of gender. Among the patients, 16 patients had diabetes (19%), one case had rheumatoid arthritis (1.2%) and 2 patients had hypothyroidism (2.4%). There was no significant difference between the two groups in terms of underlying disease. At different times during the study, the frequency of patients based on the Quinnell grading in grading 4 and zero had the lowest frequency (Table 1).

Patients were divided into two groups of less than 6 months and more than 6 months in terms of duration of symptoms, with 11 patients (13%) and 73 patients (87%) in these two groups, respectively. There was no significant difference between the two groups in terms of duration of symptoms.48 patients, including 15 patients in the diclofenac group, 33 patients in the methylprednisolone group, had the disease in their right hand, 36 patients, including 27 patients in the diclofenac group, and nine patients in the methylprednisolone group had the disease in their left hand (Table 2). After 3 weeks, 54 patients (64%) were re-injected with the previous drug because the symptoms did not go away. The difference between the two groups was significant ($p<0.001$). Patients requiring re-injection due to no improvement in symptoms were divided into 34 patients (81%) in the diclofenac injection group and 20 patients (46%) in the methylprednisolone injection group.

In the methylprednisolone group, the mean Quinnell grading was 1.4±0.8. In this group, the difference in patients' symptoms was significant until the third week ($p=0.001$) and in the first month after re-injection of the drug, there was a significant difference ($p=0.01$) in patients 'symptoms, but in other visits in 6th and 12th months, no significant difference was observed in the process of improving patients' symptoms. In the diclofenac group, the mean Quinnell grading was 2.3±0.7that in this group, there was a significant difference in patients' symptoms up to the third week ($p=0.001$), but in the third week visit, the difference in symptom improvement was not significant compared to the beginning. Also, after injection in the third week, again at the end of the study at 12th month of follow-up, the improvement of symptoms in this group was significant ($p=0.001$).

According to the mean improvement of Quinnell grading in the two groups, it was found that in the diclofenac injection group, the mean improvement between the beginning of the study and one week after injection was 0.22 and this value was 1 for the methylprednisolone injection group. Also, the difference between the first week and the third week, ie before the second injection, the mean change in Quinnell grading for the diclofenac injection group was 0.05, which was 0.22 for the methylprednisolone injection group. In the continuation of the study, from the third week and after re-injection until the end of the study, the mean improvement in the Quinnell grading in the diclofenac group was 0.15, which was 0.11 for the methylprednisolone group. According to the statistical results in the first week after injection of drugs in both groups, the trend of symptom improvement based on changing the Quinnell grading in the methylprednisolone injection group was higher than the other group. Also, in the third week after the injection, there was a significant difference in the improvement of

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

symptoms between the two groups, which showed a greater improvement in the Quinnell grading in the methylprednisolone injection group. At 6th and 12th months, the improvement in symptoms in the methylprednisolone injection group was significantly different from the diclofenac injection group, and this improvement was greater. Mean changes in Quinnell grading from the beginning of the study to 6th week (1.07±0.51 in the methylprednisolone group and -0.3±0.56 in the diclofenac group, p<0.0001) and from the beginning of the study to the 12th month -1.28±0.59 in the methylprednisolone group and -0.35±0.53 in the diclofenac group, p<0.0001) in the methylprednisolone injection group and diclofenac group in both mentioned time intervals, the rate of improvement in the methylprednisolone injection group was significantly better than diclofenac group (p=0.0001). Mean changes in Quinnell grading from the beginning of the study to 6th week and from the beginning of the study to the 12th month in the methylprednisolone injection group and in the diclofenac injection group in terms of age, sex and underlying disease were evaluated that there was no statistically significant difference based on the mentioned variables (Tables 3, 4).

Table 1. Frequency of patients in each Quinnell grading during the study

Grade	Week 0 (start treatment)		3th week		3th month		12th month	
	Diclofenac	Methyl prednisolone	Diclofenac	Methyl prednisolone	Diclofenac	Methyl prednisolone	Diclofenac	Methyl prednisolone
4	-	-	-	-	-	-	-	-
3	25	21	22	8	15	5	17	3
2	16	19	12	16	21	9	18	12
1	1	2	8	11	6	22	7	21
0	-	-	-	7	-	6	-	6

Table 2. Quinnell average mean at different times during the study in the two groups

Quinnell grading	Mean±SD	Lowest	Highest	P-value
The beginning of the study				
Methylprednisolone	2.43±0.59	1.00	3.00	0.182
Diclofenac	2.59±0.54	1.00	3.00	
The first week				
Methylprednisolone	1.43±0.99	1.00	3.00	0.0001
Diclofenac	2.38±0.73	1.00	3.00	
3th week				
Methylprednisolone	2.21±0.84	1.00	3.00	0.0001
Diclofenac	2.33±0.79	1.00	3.00	
6th week				
Methylprednisolone	1.36±0.76	1.00	3.00	0.0001
Diclofenac	2.21±0.77	1.00	3.00	
3th month				
Methylprednisolone	1.09±0.62	1.00	2.00	0.0001
Diclofenac	2.21±0.72	1.00	3.00	
6th month				
Methylprednisolone	1.14±0.65	1.00	2.00	0.0001
Diclofenac	2.24±0.73	1.00	3.00	
12th month				
Methylprednisolone	1.14±0.65	1.00	2.00	0.0001
Diclofenac	2.24±0.73	1.00	3.00	

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

Table 3. Comparison of mean changes in Quinyl grading from the beginning of the study to 6th week and from the beginning of the study to the 12th month in the methylprednisolone injection group

Methylprednisolone injection group	Mean±SD	p-value
The beginning of the study to 6th week		
Male	-1.2±0.42	0.70
Female	-1.03±0.54	
Without underlying disease	1.08±0.5	0.717
With underlying disease	-1.00±0.66	
Age (year) ≤ 54	-1.09±0.7	0.768
Age (years)> 54	-1.05±0.22	
The beginning of the study to 12th month		
Male	-1.4±0.52	0.494
Female	-1.25±0.62	
Without underlying disease	-1.28±0.61	0.836
With underlying disease	-1.33±0.52	
Age (year) ≤ 54	-1.19±0.68	0.306
Age (years)> 54	-1.39±0.50	

Table 4. Mean changes in Quinell grading from the beginning of the study to 6th week and from the beginning of the study to the 12th month in the diclofenac injection group

Diclofenac injection group	Mean±SD	P-value
The beginning of the study to 6th week		
Male	-0.37±0.67	0.715
Female	-0.30±0.53	
Without underlying disease	-0.32±0.58	0.648
With underlying disease	-0.20±0.45	
Age (year) ≤ 54	-0.26±0.54	0.544
Age (years)> 54	-0.37±0.59	
The beginning of the study to 12th month		
Male	-0.36±0.50	0.963
Female	-0.35±0.55	
Without underlying disease	-0.38±0.54	0.489
With underlying disease	-0.20±0.44	
Age (year) ≤ 54	-0.30±0.47	0.487
Age (years)> 54	-0.42±0.60	

Discussion

In this study, the mean changes in Quinnell grading from the beginning of the study to 6th week and from the beginning of the study to the 12th month in the methylprednisolone injection group and diclofenac group in both mentioned time intervals, the improvement rate in the methylprednisolone injection group was significantly better than the diclofenac group. In the study of Shakeel et al., the results showed that (70%) in the corticosteroid group and (53%) in the NSAID group were completely asymptomatic. There was no difference between patients' response and diabetes. In the 3-month study, there was no significant difference between the Quinnell system scores between the two groups. However, at 3th week, steroid-treated patients had significantly better Quinnell scores. Finally, it was concluded that although steroids provide faster relief, NSAID injections are equally effective in treating trigger finger symptoms after 3 months (23). In the present study, patients requiring re-injection due to no improvement in symptoms were divided into 34 patients (81%) in the diclofenac injection group and 20 patients (46%) in the methylprednisolone injection group. The difference between the two groups was significant. The results of this study have somewhat confirmed our study and show the positive effect of both corticosteroids and NSAIDs, but according to our

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

studies and results, the effect of corticosteroids has been better and faster recovery. In the study of Mardani-Kivi et al., the results showed that during one year after the first injection of 112 thumbs, 15 cases (13.4%) required re-injection or surgery, of which 12 cases (80%) required re-injection, in 2 cases, surgery and in 1 case, first re-injection and then surgery was performed due to lack of recovery. The decrease in Quinnell grading in all thumbs after injection was statistically significant. At the end of one year after injection, 111 thumbs (99.1%) were completely asymptomatic (28).

The differences between this study and our study were that in this study, only the treatment was performed on trigger thumb disease, while in our study, different fingers and both right and left hands were included. In the study by Ring et al., the results showed that six weeks after injection, in 22 individuals of 35 patients in the triamcinolone group and in 12 individuals of 32 patients in the dexamethasone group, recovery and complete relief of symptoms were recorded. The frequency of recovery and complete relief of symptoms 3 months after injection was 27 out of 41 patients in the triamcinolone group and 22 out of 31 patients in the dexamethasone group. The recovery of the triamcinolone group was significantly better and the Quinnell grading was higher than the dexamethasone group in the 6-week follow-up but not in the 3-month follow-up. There was no significant difference between the arm, shoulder and hand restriction scores in 6-week follow-up and 3-month follow-up (29).

In the study of Veluthamaningal et al., the short-term results of the TCA and NaCl groups' satisfaction and immediate response to treatment were 16 out of 25 and 5 out of 25, respectively. It was concluded that topical injection with TCA is an effective and safe treatment compared to placebo injection for the treatment of trigger finger and the effects of steroid injection last up to 12 months (30). Also in this study, there was no statistically significant difference between the mean changes in Quinnell grading from the beginning of the study to 6th week and from the beginning of the study to the 12th month in the methylprednisolone injection group and in the diclofenac group in terms of age, sex and underlying disease. In this study, in the first week after injection of drugs in both groups, the trend of improvement of symptoms based on changing the Quinnell grading in the group of methylprednisolone injection was higher than the other group. Also, in the third week after the injection, there was a significant difference in the improvement of symptoms between the two groups, which showed a greater improvement in the Quinnell grading in the methylprednisolone injection group. At 6th and 12th months, symptoms improved significantly in the methylprednisolone injection group than the diclofenac injection group and this improvement was greater.

In the study of Zare-zadeh et al., the effectiveness of topical injection of corticosteroids in the treatment of trigger finger disease was investigated. The results of the study showed that the difference between the relative frequencies of tenderness in the A1 pulley position in 4 examinations was significant and decreased significantly after injection (26). One of the differences between this study and our study was that in our study, two treatment methods were evaluated and also the sample size was higher in our study and on the other hand, the method of assessing the response to treatment was different in the two studies. Finally, it should be noted that all studies point to the effective and better and faster recovery of corticosteroids, and there is little difference between the results of studies in the type of study design and treatment response assessment methods and the difference in sample size of studies. However, the need for more studies with a larger sample size is strongly felt.

According to the results of the present study, it can be concluded that both corticosteroid and NSAIDs injections have been effective in improving the symptoms of trigger finger disease. However, corticosteroid injection is associated with better and faster results in long-term and short-term studies and has shown a better response to treatment based on the evaluation criteria. However, more studies with higher sample sizes are needed to obtain more reliable results.

Acknowledgment

Here by we would like to thank the Vice Chancellor for Research and Technology of Babol University of Medical Sciences for its financial support of the research and also the Clinical Research Development Unit of Shahid Beheshti Hospital in Babol for their cooperation.

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

References

1.Inoue M, Nakajima M, Hojo J, Itoi M, Kitakoji H. Acupuncture for the treatment of trigger finger in adults: A prospective case series. Acupunct Med. 2016;34(5):392-7.

2.Mardani-Kivi M, Karimi-Mobarakeh M, Babaei Jandaghi A, Keyhani S, Saheb-Ekhtiari K, Hashemi-Motlagh K. Intra-sheath versus extra-sheath ultrasound guided corticosteroid injection for trigger finger: a triple blinded randomized clinical trial. Phys Sportsmed. 2018;46(1):93-7.

3.Ma S, Wang C, Li J, Zhang Z, Yu Y, Lv F. Efficacy of Corticosteroid Injection for Treatment of Trigger Finger: A Meta-Analysis of Randomized Controlled Trials. J Invest Surg. 2019;32(5):433-41.

4.Moore JS. Flexor tendon entrapment of the digits (trigger finger and trigger thumb). J Occup Environ Med. 2000;42(5):526-45.

5.Griggs SM, Weiss AP, Lane LB, Schwenker C, Akelman E, Sachar K. Treatment of trigger finger in patients with diabetes mellitus. J Hand Surg Am. 1995;20(5):787-9.

6.Blyth MJ, Ross DJ. Diabetes and trigger finger. J Hand Surg Br. 1996;21(2):244-5.

7.Makkouk AH, Oetgen ME, Swigart CR, Dodds SD. Trigger finger: etiology, evaluation, and treatment. Curr Rev Musculoskelet Med. 2008;1(2):92-6.

8.Uotani K, Kawata A, Nagao M, Mizutani T, Hayashi H. Trigger finger as an initial manifestation of familial amyloid polyneuropathy in a patient with Ile107Val TTR. Intern Med. 2007;46(8):501-4.

9.Nimigan AS, Ross DC, Gan BS. Steroid injections in the management of trigger fingers. Am J Phys Med Rehabil. 2006;85(1):36-43.

10.Chammas M, Bousquet P, Renard E, Poirier JL, Jaffiol C, Allieu Y. Dupuytren's disease, carpal tunnel syndrome, trigger finger, and diabetes mellitus. J Hand Surg Am. 1995;20(1):109-14.

11.Patel MR, Bassini L. Trigger fingers and thumb: when to splint, inject, or operate. J Hand Surg Am. 1992;17(1):110-3.

12.Rozental TD, Zurakowski D, Blazar PE. Trigger finger: prognostic indicators of recurrence following corticosteroid injection. J Bone Joint Surg Am. 2008;90(8):1665-72.

13.Baumgarten KM, Gerlach D, Boyer MI. Corticosteroid injection in diabetic patients with trigger finger. A prospective, randomized, controlled double-blinded study. J Bone Joint Surg Am. 2007;89(12):2604-11.

14.Rodgers JA, McCarthy JA, Tiedeman JJ. Functional distal interphalangeal joint splinting for trigger finger in laborers: a review and cadaver investigation. Orthopedics. 1998;21(3):305-9.

15.Maneerit J, Sriworakun C, Budhraja N, Nagavajara P. Trigger thumb: results of a prospective randomised study of percutaneous release with steroid injection versus steroid injection alone. J Hand Surg Br. 2003;28(6):586-9.

16.Wang J, Zhao J-G, Liang C-C. Percutaneous release, open surgery, or corticosteroid injection, which is the best treatment method for trigger digits?. Clin Orthop Relat Res. 2013;471(6):1879-86.

17.Bain GI, Wallwork NA. Percutaneous A1 Pulley Release a Clinical Study. Hand Surg. 1999;4(1):45-50.

18.Turowski GA, Zdankiewicz PD, Thomson JG. The results of surgical treatment of trigger finger. J Hand Surg Am. 1997;22(1):145-9.

19.Hansen RL, Søndergaard M, Lange J. Open surgery versus ultrasound-guided corticosteroid injection for trigger finger: a randomized controlled trial with 1-year follow-up. J Hand Surg Am. 2017;42(5):359-66.

20.Zyluk A, Jagielski G. Percutaneous A1 pulley release vs steroid injection for trigger digit: the results of a prospective, randomized trial. J Hand Surg Eur Vol. 2011;36(1):53-6.

21.Sato ES, Gomes dos Santos JB, Belloti JC, Albertoni WM, Faloppa F. Treatment of trigger finger: randomized clinical trial comparing the methods of corticosteroid injection, percutaneous release and open surgery. Rheumatology (Oxford). 2012;51(1):93-9.

22.Chao M, Wu S, Yan T. The effect of miniscalpel-needle versus steroid injection for trigger thumb release. J Hand Surg Eur Vol. 2009;34(4):522-5.

23.Shakeel H, Ahmad TS. Steroid injection versus NSAID injection for trigger finger: a comparative study of early outcomes. J Hand Surg Am. 2012;37(7):1319-23.

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]

24.Itzkowitch D, Ginsberg F, Leon M, Bernard V, Appelboom T. Peri-articular injection of tenoxicam for painful shoulders: a doubleblind, placebo controlled trial. Clin Rheumatol. 1996;15(6):604-9.
25.Marks MR, Gunther SF. Efficacy of cortisone injection in treatment of trigger fingers and thumbs. J Hand Surg Am. 1989;14(4):722-7.
26.Zare-zadeh A, Samavarzade M, Noorian V, Padidar B. Efficacy of local corticosteroid injection in trigger finger treatment. J Arak Uni Med Sci. 2006;9(4):18-25. [In Persian]
27.Quinnell RC**.** Conservative management of trigger finger. Practitioner. 1980;224(1340):187-90.
28.Mardani-Kivi M, Lahiji FA, Babaei Jandaghi A, Saheb-Ekhtiari Kh, Hashemi-Motlagh K. Survey on Efficacy of Sonographically Guided Intra Flexor Sheath Corticosteroid Injection in the Management of Trigger Thumb. Iran J Orthop Surg. 2011;9(4):162-9. [In Persian]
29.Ring D, Lozano-Calderón S, Shin R, Bastian P, Mudgal C, Jupiter J. A prospective randomized controlled trial of injection of dexamethasone versus triamcinolone for idiopathic trigger finger. J Hand Surg Am. 2008;33(4):516-22; discussion 523-4.
30.Peters-Veluthamaningal C, Winters JC, Groenier KH, Jong BM. Corticosteroid injections effective for trigger finger in adults in general practice: a double-blinded randomised placebo controlled trial. Ann Rheum Dis. 2008;67(9):1262-6.

[DOR: 20.1001.1.15614107.1399.22.1.38.0]
[DOI: 10.22088/jbums.22.1.275]