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Cureus. 2020 Jun 12[doi: 10.7759/cureus.8409]. PMCID: PMC7352199
Published online 2020 Jun 12. doi: 10.7759/cureus.8409

The Effect of Radial Extracorporeal Shock Wave Therapy in the Treatment of Trigger Finger

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Abstract

Objective

The aim of this study was to investigate the effect of radial extracorporeal shock wave therapy (ESWT) on the treatment of trigger finger.

Methods

Eighteen patients, who were 2nd grade according to Quinnel classification and diagnosed with trigger finger, were included in this study. Patients were divided into two groups. Patients in the first (control) group and in control group. Eighteen patients with trigger finger were applied two sessions, once a week, for four weeks of ESWT (2000 impulses, 2 bar, 10 Hz). Pain scores (Numeric Pain Rating Scale), range of motion, and ultrasonographic measurements of the A1 pulley of the affected finger were evaluated before treatment, after treatment, and three months after the treatment.

Results

Evaluation of ten sessions of ESWT had a significant effect on pain, range of motion, and pulley thickness in the treatment of trigger finger. Pain scores were significantly decreased in the ESWT group ($p=0.000$). Friedman test, as a result of the analysis, there was a decrease in the pain levels ($p=0.000$) and increase in general functional capacity, grip strength and pinch strength ($p=0.001$), and range of motion ($p=0.000$, $p=0.000$). After the treatment and after three months, all outcome measures showed statistically significant improvement.

Conclusion

ESWT is an effective method to decrease pain severity and improve general functional capacity, range of motion, grip strength, and pinch strength in patients with trigger finger. We recommend that the treatment of ESWT might be a non-invasive option to treat the trigger finger. However, randomized controlled trials are needed to provide more evidence in the future.

Keywords: trigger finger, radial extracorporeal shock wave therapy, rehabilitation, hand therapy, sonographic evaluation

Introduction

Trigger finger is a stenosing tenosynovitis that is frequently encountered and easy to diagnose which causes pain and disorder in the hand. This occurs as the result of the failure of the transaction between A1 pulley to the flexor tendons of the affected finger. Trigger finger is a common musculoskeletal disorder in the proliferative hand to cord and hand during flexion and may limit triggering, and it occurs most often 45 years of age [1,2]. It is estimated that its prevalence likelihood rate is 10.7 in the general population and it is in the range of 2.4 to 28.8 in diabetic patients [3]. It is applied to hand surgeon, rheumatologist, or occupational therapist and physiotherapy further [2].

Although the etiology of the disease is not yet fully understood, the result of unnoticed thickening of the tendon and/or narrowing of the tendon sheath is considered to be the main reason for the disorder in restriction of tendon movements. The greater pressure in the tendon hypertrophy of the pulley leaf [1]. The tendon sheath is composed of two layers, the outer layer is fibrous and the inner layer is synovial. Rheumatologic conditions are responsible for the pathology [2]. Clinically, tendon movements in the hands can also lead to tenosynovitis. Limitation of movement, pain, sensibility, edema, and crepitation are the most common symptoms of trigger finger. The disease is more likely to occur in the dominant hand. Trigger finger [1,2] causes pain or stiffness in the affected finger. The main reason for the result of fasciitis swelling in the tendon, fibrocytosis/adenopathy, or flexing in the tendon [2]. Trigger fingers are usually seen in patients with diabetes, rheumatoid arthritis, hypothyroidism, gout, amyloidosis, CREST syndrome, Dupuytren's fibrosis, diffuse idiopathic DISH, collagen tissue diseases, rheumatoid arthritis, Hypertrophic fibrosis, amyloidosis, mucopolysaccharide storage disorders, congenital heart failure, genetic predisposition, and hormonal factors. Trigger finger is a common musculoskeletal disorder in the proliferative hand to cord [1,2]. Conservative or open and closed surgical treatment is applied for treatment. Conservative treatment is recommended in uncomplicated patients who have been referred to shortly after the onset of symptoms. Conservative treatment includes splinting, steroid injection, physical therapy, and orthotic usage, and among the recommended treatments for the trigger finger [2,3]. Recently, radial extracorporeal shock wave treatment (ESWT) has become a suggestible alternative to treating the muscle and tendon disorders. Radial ESWT is a non-invasive treatment and has been used for many years in the surgical applications [2,4]. Extracorporeal shock wave therapy (ESWT) is a new orthopedic treatment method based on the principle that high amplitude sound waves focus on the body's desired region and provide healing in the tissue [5,6]. The ESWT device is a device that uses a pneumatic piston to produce pressure waves. The system works with a pneumatically operated piston inside the device. The kinetic energy is transmitted to the probe located at an elastic shaft with reducing from the compressed air cylinder to the applicator. The pressure waves are focused on the tissue to be treated, and the pressure waves in the skin and subcutaneous tissues of the patient. Pressure waves are transmitted to the tissues and are transmitted thermally [7,8].

Today, it is possible to see many studies that are carried out to examine the activity of ESWT in many different pathologies such as plantar fasciitis, lateral epicondylitis, Achilles tendinopathy, carpal tunnel, shoulder calcific tendinitis, and patellar tendinopathy, and it is known that it is effective in these pathologies [9-13]. There have been numerous studies revealing that ESWT is effective for other tendon problems like trigger finger. However, there are too many studies carried out directly to see whether ESWT is effective in trigger finger [14-16]. In the literature, there are many different treatment methods to be performed and treatment effect angles, in case of disappointment in conservative treatments, because of the limited number of randomized controlled trials compared with placebo in surgical treatments and the lack of evidence, it is difficult to say ESWT is effective in trigger finger. We aim to investigate the effectiveness of ESWT in the treatment of trigger finger. For this purpose, we compared the effect of ESWT on functional capacity, range of motion, grip strength, and pinch strength and decrease in the pain scores were evaluated after treatment and three months after treatment.

Materials and methods

This study was a prospective cohort study that evaluated before treatment, after treatment, and three months after the treatment. These were applied to the Orthopaedics and Traumatology Polyclinic, Faculty of Medicine and were diagnosed with the trigger finger were included in the research.

In accordance with the inclusion criteria, each subject in the study was initially informed about the aim, methods to be adopted, and the evaluations to be made. The ethical approval for the study and the participation was asked to ask the "Approval Form for Scientific Research".

When the patient applied to the clinic to the study, the clinically significant change was observed and hand open another study where the change was estimated, with regard to the observable difference of pre-test and post-test measurements. The sample size was calculated as 18 patients, 9 in the control group and effect size was set at 0.8 and when the power to determine this observable difference is 95% (one-tail) based on G Type 3 the participants to include in the study was calculated as 18 patients [17,18]. Figure 1 showed a flowchart of the study.

Figure 1
The flow chart of the study

Evaluation of ten of the 21 patients suitable for the inclusion criteria in the study could not be completed, and hence, these were excluded from the study. The study consisted of only the experimental and no control group. A Swiss Dolorclast ESWT device (Electro Medical Systems (EMS) S.A. Chemin de la Venoge 29 CH-1025 St-Sulpice, Switzerland) was used. Eighteen patients with trigger finger were applied two sessions, once applied the ESWT (2000 impulses, 2 bar, 10 Hz) 10 sessions, twice a week for four weeks (Figure 2).

Figure 2
ESWT application

Outcome measures

All clinical results were evaluated before treatment, after treatment and three months after the treatment. Pain scores (Numeric Pain Rating Scale), range of motion, and pulley thickness of the patients were provided pain. The general functional capacity with the QuickDASH, the grip strength with the Jamar Dynamometer, and the pinch strength with the pinch meter and range of motion with goniometer were evaluated. Ultrasonography (US) was used for measurements of the A1 pulley of the affected finger performed as follows: the patients sitting on a chair, with the elbow flexed at 90°, the shoulder adducted to the beside the body, and the forearm in semi-pronation. Patients were asked to supine the dominant hand on the table and the wrist in a neutral position. The palm of the hand was placed on a pillow between each fighter to order to prevent from fingers. The mean value of the three compressions was taken (Figure 3).

Figure 3
Evaluation of pulley strength

Positive of pattern in pinch meter that is a pressure sensitive pinch gauge for palmar pinch, thumb, index, and middle finger. Patients were sitting on a chair, with the elbow flexed at 90°, the shoulder adducted to the beside the body, and the forearm in semi-pronation. Patients were asked to the pinch compression above with three successive trials for each affected hand. Patients were given a few minutes rest between compressions to prevent from fingers. The mean value of the three compressions was taken (Figure 4).

Figure 4
Evaluation of pinch strength

Inclusion and exclusion criteria of the study

Inclusion Criteria: being older than 18 years old; 2. Grade of trigger finger based upon the Quinnell (1985) classification (for pain, normal finger movements, 1st grade, uneven finger movements, 2nd grade, finger locking requiring passive extension, 3rd grade, and finger locking requiring active extension of the finger), no previous treatment, giving the trigger finger an orthopaedic brace, having written

Exclusion Criteria: being diagnosed with rheumatoid arthritis or systemic inflammatory disease, osteomyelitis, active infection around the hand and the wrist, being pregnant, having a pacemaker, and having a bleeding disorder.

Eighteen patients with trigger fingers were applied to two sessions, twice a week, for four weeks of ESWT (2000 impulses, 2 bar, 10 Hz). Evaluation of 10 sessions of ESWT for administered twice a week, for four weeks was made before treatment, after treatment and 3 months after the treatment.

Statistical analysis

The analysis was carried out via Statistical Package for Social Sciences (SPSS) 23.0 for Windows [19]. At the end of the analysis, it was found that the data did not of normal distribution. Descriptive and inferential analysis was done with non-parametric methods. Descriptive statistics were presented as frequency and percentage for nominal variables and median and interquartile range (IQR) according to the distribution of the continuous variables.

In our study, demographic information and information about the disorder of all 18 patients were collected and statistically interpreted at the beginning of treatment. Friedman test was used to compare the measurements of Pain scores (Numeric Pain Rating Scale/NPS), the general functional capacities (QuickDASH), range of motion, grip strength, and pinch strength between the three groups. Wilcoxon test was applied to the subject that were taken before treatment, after treatment and 3 months after treatment. The statistical significance was set as $p<0.05$ and $p<0.01$.

Results

Evaluation of 10 of the 21 patients who are suitable for the inclusion criteria in the study could not be completed and they were thus excluded from the study. The study was carried out with three men and 15 women. 16 in total who had been diagnosed with the trigger finger.

Demographic data of the subjects

Data are presented as number and/or median and interquartile range (in parentheses).

IQR, Inter-quartile; n, number of patients; y, years

Variable	ESWT (n=18)
Female / male (number)	15/3
Dominant hand affected (no dominant hand affected)	7(0)
Affected trigger finger (1st/2nd/3rd/4th)	2/2/2/2
Diabetes	0(0)
Age (years)	56.50 (47.75/63.25)
BMI (kg/m²)	30.50 (27.75/33.25)

Table 1
Demographic data of the subjects

Data are presented as number and/or median and interquartile range (in parentheses).

IQR, Inter-quartile; n, number of patients; y, years

Data are presented as number and/or median and interquartile range (in parentheses).

Table 2

	Pre-treatment (n=18)	Post-treatment (n=18)	Increase/ Decrease (n=18)	p
NPS	7.00 (6.00/8.00)	2.00 (1.00/3.00)	-5.00 (-6.00/-3.00)	0.000
QuickDASH (for hand pain)	50.00 (43.00/57.00)	21.00 (16.00/26.00)	-29.00 (-34.00/-23.00)	0.000
Grip strength	25.00 (20.00/27.00)	27.00 (21.00/29.00)	2.00 (0.00/2.00)	0.001
Pinch	10.00 (8.00/12.00)	11.00 (9.00/13.00)	1.00 (0.00/2.00)	0.001
ROM	1.00 (1.00/1.00)	0.00 (0.00/0.00)	-1.00 (-1.00/-1.00)	0.000
ROM	50.00 (50.00/50.00)	0.00 (0.00/0.00)	-50.00 (-50.00/-50.00)	0.000
Pulley thickness	1.00 (1.00/1.00)	0.00 (0.00/0.00)	-1.00 (-1.00/-1.00)	0.000

Table 2 Comparison of pre-treatment, post-treatment, and 3rd month measurements of the therapeutic group

During the analysis that was carried out before treatment, after treatment, and 3 months of treatment, when the subjects with 2nd and 3rd degree affected were compared with one another in their normal joint motion, the results were found statistically significant ($p<0.001$, Table 2).

When the result of the measurements of the pain, the grip strength, the pinch strength, and the general functional capacity of the patients who underwent ESWT treatment, it was found that the treatment is true, found that the difference were statistically significant ($p<0.05$, Table 2).

Discussion

Our findings show that a two-session ESWT can be effective on the patients who get grade 2 according to Quinnell classification in the trigger finger of pain intensity, the grip strength, the pinch strength, and general functional capacity.

Today, in addition to treating the plantar fasciitis, lateral epicondylitis, calcific tendinitis of rotator cuffs, tennis elbow, and patellar tendinopathy, it has been clinically shown that ESWT is effective in the treatment of the hand flexor tendinopathy, Achilles tendinitis, patellar tendinitis, and osteochondritis dissecans [12,20]. Although the effect of shock waves on the tissue is not fully known, it is known that it has a positive effect on improving the circulation and cell proliferation, as well and increasing the tissue resistance to tendon and microtrauma injuries [20-22]. Although the effect of shock waves on the soft tissue healing process is not fully known, it is known that it has a positive effect on the healing of the tissue by increasing the circulation to decomposition of cell and also has a neural effect [22]. We think that one of the mechanisms is its effective against the thickening of the flexor tendon and by thinning of the sheath that causes the trigger finger. Although the exact mechanism of the effect of shock waves on the tissue is not known, it is known that it has a positive effect by high flexor tissue damage and they should not be used. It is known that the shock waves support the practice of trigger finger in literature and there is no standardized use in practice ESWT on trigger finger. We have found that the effect of ESWT on the trigger finger is effective in our study, and by taking into consideration the previous studies' effective ESWT was used in rehabilitation.

There are very little studies in which ESWT was used to treat the trigger finger in literature. The first study using ESWT in trigger finger therapy in literature is the study of Wu Kuangchao et al. The patients were intraoperatively analyzed 54 patients (60 fingers) treated with the individually tailored ESWT protocol and 54 patients (60 fingers) treated with the standard ESWT protocol. The ESWT was applied twice weekly. The duration of treatment per treatment session was analyzed. They found significant reductions in pain scores and functional improvement between baseline and all follow-up assessments. At each session, the ESWT protocol was tailored to the patient's pain tolerance. The ESWT was effective in the treatment of trigger treatment. Although there are differences between our study and the study of Wu Kuangchao et al., based on the number of sessions and ACR50 percent, similar results were obtained by both studies. The number of sessions was 10 in our study and 12 in the study of Wu Kuangchao et al. Although there are trigger finger treatments, However, these results are not sufficient for the level of evidence, more randomized controlled trials are needed.

Another study evaluated the effectiveness of ESWT in the treatment of trigger fingers. Yildirim F. et al. compared the efficiency of ESWT against the corticosteroid injection in treating trigger finger, and they concluded that ESWT is a safe and effective method in the treatment of trigger finger in the short-term groups. In the end of the study, the patients avoiding steroid injection in was found that ESWT is a non-invasive method can be used in treating the trigger finger [23]. Significant improvements in the ESWT group were observed in the pain, the grip strength, and the pinch strength. The ESWT was found to be a safe and effective method compared to surgery and at the end of the short-term of study. ESWT was found to be an alternative option for patients avoiding surgery and steroid injection. However, we need more studies to make cross-comparisons.

In the evaluation, we made the study, according to the evaluation that were made before treatment, after treatment, and three months after treatment. In the study, we evaluated the pain, the grip strength, the patients was observed in the ESWT group. That the shock wave treatment is effective against the pain caused by the skeletal muscle disorders is known. The basis for the shock wave treatment has to foundation on the mechanical effect of the shock waves on the tissue and the cell membrane and intracellular microcirculation, and hypoxia [24]. It is also believed to have a direct effect on the nociceptive and hyperstimulation that block the pain control mechanism [24]. It is present in the literature that in other studies, the effect of the shock waves on the tissue is not known exactly, but it is known that it has a positive effect of the shock waves to the tissue and the cell membrane and intracellular microcirculation and hypoxia. The main reason for the use of ESWT in the soft tissue problems and especially on the tendon is the effect on the tissue healing. The shock waves have a positive effect on the tissue healing and material particles are reached with shock wave treatment, and as a result, cross-linking and fast gained progress was made improvements were observed in patients with plantar fasciitis [25]'s epicondylitis and calcific tendinitis of the shoulder [26]. We think that the pain and the grip strength were improved in the ESWT treatment [27]. A study evaluated the effectiveness of ESWT in the treatment of trigger finger. In the results of the study, it was found that symptom complexity resolved in patients who underwent ESWT treatment. In the study, it was found that the pain, the grip strength, the trigger finger, and 3, and 6 months pinch grip as an alternative to a non-invasive method in the trigger finger injection [28]. Another study found similar results in pain in the effectiveness of ESWT in trigger treatment [29].

In our study, we also evaluated grip strength and pinch strength. Due to problems such as avoiding the use of the hand, the patient's grip strength and pinch strength are important in the treatment of trigger finger. As a result of the evaluation, we found statistically significant improvements in these parameters. Bender et al. compared the activities of physiotherapy, foot pad, ultrasound, and friction massage; local steroid injection; and ESWT in the treatment of plantar fasciitis. As a result of the study, ESWT was found to be more effective than other two physiotherapy, steroid injection. ESWT had positive effects on the pain, the grip strength in treating the earlier stages of lateral epicondylitis and that the ESWT had a long-term effect on the patients [30]. In our study, we found that the ESWT was effective in the treatment of trigger finger. Although the trigger finger, shows that the ESWT is used in treating the rehabilitation, unfortunately, it supports the result of our study in the ESWT that it is also effective in improving the grip strength and decreasing the pain. Finally, we think that the treatment of trigger finger and there is a need for ESWT and the pain strength and the pinch strength in the treatment of trigger fingers and there is a need for more studies and more patients in the literature.

Range of joint motion was reduced in the affected finger due to tension, such as the tendon, the triggering, severity, avoiding pain or prevent it from getting worse. In our study, we evaluated to see study, we evaluated a group of joint motions with a goniometer. There was a statistical difference between the two range of joint motions. Therefore, we thought that improvement in pain, which is one of the major causes of disorder in joint movements, might cause an increase in the range of joint motion.

When we examined the results of 10 patients after ESWT treatment in our study, is effective on the pain and the grip strength, the pinch strength, the range of joint mobility, and the general functional capacity were found to be significant.

Strengths of the study

ESWT is a newer method. Despite this, its use has been increasing in recent years. With the increase in the use of ESWT, it is used in many different pathologies and different treatment methods. There are many different pathologies such as heel spur, lateral epicondylitis, Achilles tendinopathy, shoulder pathologies, myofascial disorders, and spasticity. But there are very few studies in the literature to evaluate the effect of ESWT in trigger finger treatment. In our study, we evaluated the effect of ESWT in trigger finger treatment. We believe that our study is important because we contribute the three-month follow-up. The high effect ESWT demonstrated in this study is similar to the results of previous studies on ESWT for tendinopathy. All patients underwent ESWT treatment, and no patient who underwent surgery was included in our study. Because they did not complete the treatment.

Limitation of the study

In this study, is a prospective cohort study, it has some limitations. There was no randomization and there was no control group. Although the study was a prospective cohort study, there was no control group and control group, so we plan to make use of different control groups in the upcoming studies, we intend to evaluate the result of this study without including any control groups.

Conclusion

The study provides evidence for the effectiveness of ESWT for the treatment of trigger finger. The fact that there were improvements in the pain levels and the general functional capacity, range of motion, and pinch strength was evaluated before treatment, after treatment, and at the three month supports the efficiency of the ESWT treatment in trigger finger. Randomized controlled trials are required to prove well the evidence of the ESWT effect.

Notes

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The authors have declared that no competing interests exist.

Human Ethics

Consent was obtained by all participants in this study. Gulsan Gazi University Clinical Research Association Ethics Committee issued approval Approval number/ID: 2020-SBMSR

Animal Ethics

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

References

1. Frederick M Azar, S Terry Canale, James H. Beaty: Campbell'S Operative Orthopaedics. 2008
2. Trigger finger in diabetes. Neal L, Gelberman R, Ozer K: J Hand Surg Am. 2017; 42:[1-8]. 1-8. 10.1016/j.jhsa.2016.10.008 [PubMed] [Crossref]
3. Trigger finger: Incidence in diabetes and other risk factors and the possibility of a prophylactic injection: a prospective study. Fetsch J, http://linkinghub.elsevier.com/retrieve/pii/S0268-0890(16)30040-4 [Hand Surg (Edinb)]. 2016; [PubMed] [Crossref]
4. Palmbaching of the tendons: A review of the literature. Jaspers SR, Kuiper JI, Nicolai JP: Hand (N Y). 2007; 2:[190-194]. 190-194. 10.1007/s11552-007-9044-7 [PubMed] [Crossref]
5. Rosenstiel LE, Gerdesmeyer L, Wuchner H: Extracorporeal Shock Wave Therapy. Springer. Lucas Gerdesmeyer, Hans Wuchner (eds) 2008
6. Extracorporeal shock wave treatment for chronic non-healing tendinopathies. Wang CJ: J Chin Med Assoc. 2012; 75:[553-561]. 553-561. 10.1016/j.jcma.2012.11.001 [PubMed] [Crossref]
7. Dupuytren's disease, carpal tunnel syndrome, trigger finger, and diabetes mellitus. Chaudhry H, Bussnger P, Bussnerd S, Ritzen M, Jaberi A, Schwartz I, Ahmed A: Hand (New York). 2009; 4:[98-104]. 98-104. 10.1016/j.hanc.2008.08.001 [PubMed] [Crossref]
8. Trigger finger in diabetes: risk factors, associations and characteristics. Kelly S, Sakellariou V, Barton C, Dwyer A, Lloyd O, Carr A, Price C: Rheumatology (Oxford). 2014; 53:[1-7]. 1-7. 10.1093/rheumatology/kes.024 [PubMed] [Crossref]
9. Extracorporeal shock wave therapy in patients with lateral epicondylitis. Olaso JE, Schwarzkopf I, Cohen MS, Ross-Ross, Wang XM: Ultrasound Med Biol. 2015; 41:[1-9]. 1-9. 10.1016/j.ultrasmedbio.2014.08.010 [PubMed] [Crossref]
10. Principle of shock wave therapy. Ogden JA, Toth-Kischkat A, Schultheiss R: Clin Orthop. 2001; 387:[8-17]. 8 [PubMed] [Google Scholar]
11. Dreinhöfer KE, Dreinhöfer KH, Fraser RD, Marcus RE, Mayo KA, Mitchell PG, Schaller HE, Schaller N, Schmitt H, Schütz U, Stürmer KM: Shock wave treatment for calcific tendinitis of the shoulder: a multicenter, prospective, controlled study. J Bone Joint Surg Br. 2006; 88:[1-6]. 1-6. 10.1302/0301-620X.88B1.16499 [PubMed] [Google Scholar]
12. Radial extracorporeal shockwave therapy for the treatment of tendinopathies: a review. Rompe JD, Furia J, Maffulli N: Am J Sports Med. 2009; 37:[463-475]. 463-475. 10.1177/0363546508324967 [PubMed] [Google Scholar]
13. Extracorporeal shock wave therapy versus corticosteroid injection in the treatment of trigger finger: a randomized controlled study. Yildirim F, Yildirim A, Yildirim N, Kantarci M, Tas F: J Hand Surg Eur Volume. 2019; 44:[1-7]. 1-7. 10.1177/1753193418798.[PubMed] [Google Scholar]
14. Effectiveness of extracorporeal shock wave therapy clinical efficacy for tendinitis of shoulder, tendinitis of elbow, tendinitis of wrist and tendinopathy of patellar tendon: a meta-analysis. Chen YJ, Wang CJ, Yang KD: Am J Sports Med. 2003; 31:[304-310]. 304-310. 10.1177/03635465030310.[PubMed] [Google Scholar]
15. Outcomes of the treatment of trigger finger by extracorporeal shock wave therapy. ESWT). Gulsan Gazi, A., A. Ali Ihsan Ozturk, Mehmet Kaplan, Mustafa Ozturkmen: Medical Science. 2019; 8:[1-4]. 10.5455/medscience.2018.7.8300.[PubMed] [Google Scholar]
16. The effect of extracorporeal shock wave therapy in the treatment of patients with trigger finger. Yalçınkaya M, Mustafa Ö, Tabosunlu S, Yücel I, Ozer H: Cureus. 2020; 12:[e7140]. 10.7759/cureus.7140.[PubMed] [Google Scholar]
17. Physical therapy, extracorporeal injection, and extracorporeal shock wave treatment in lateral epicondylitis. Chenal M, Marcolongo R, Tecchio P, Ferrara PE, Ortolani M, Fedele F, Bertoldo F, Ronconi G, Fusaro A, Calo Carducci FI, Ferrara F, Bertoldo F, Ronconi G, Fusaro A, Calo Carducci FI: Medicine (Baltimore). 2015; 94:[1-4]. 1-4. 10.1097/MD.0000000000000.[PubMed] [Google Scholar]

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