Percutaneous trigger finger release with an MS64 scalpel

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Summary

***Introduction*: Trigger finger is one of the common causes of hand pain and disability. The percutaneous surgical technique is a convenient, cost-effective method with a low complication rate. The object of this study is to produce a new technique for percutaneous trigger finger release using an MS64 scalpel.**
***Methods*: When conservative treatment fails, open or percutaneous A1 pulley release is recommended. Various methods using several instruments have been reported. We used an MS64 scalpel in percutaneous trigger finger release. An anatomical study was performed.**
***Results*: Percutaneous release was performed in 58 chronic trigger finger cases (15 females, 18 males, mean age of 63 years). Satisfactory results were achieved in 57 (98,27%), according to Strickland's evaluation method.**
***Conclusion*: Percutaneous surgical release with an MS64 scalpel is a safe effective technique to treat trigger fingers Green's grade II-IV.**
Level of evidence: IV cases series.

KEY WORDS: trigger finger disorder, percutaneous release.

Introduction

Trigger finger is a frequent condition which can develop in childhood (in the thumb area). However, the highest incidence occurs for people aged 50-60, mostly females[1,2].
The etiology of this condition is unknown. One can palpate a nodule on the metacarpophalangeal joint (MCP), which some Authors consider is caused by the bunching up of spiral fibers of the flexor and by the constriction of the tendon sheath that corresponds to the A1 pulley. That nodule creates a conflicting ratio between the space it takes up and the space the pulley occupies, which causes proximal locking and leads to characteristic symptoms[2]. Structural studies have proved the proliferation of chondrocytes and the presence of type III collagen fibers in the pulley affected pulley (A1). This is why some Authors talk about a kind of fibrocartilaginous metaplasia in the pulley and on the corresponding surface of the tendon secondary to the influence of chronic compressive strength[1-4].
In early clinical stages, patients come to the consultation because they feel vague discomfort and also have difficulty extending one finger or more, which can be fixed with forced passive extension. This causes intense pain and makes patients feel a sort of crack.
In more advanced stages, the tendon is barely able to move into the sheath, which results in the appearance of a characteristic feature: the trigger finger. The appearance of a nodule on the thumb is more painful and incapacitating than when it occurs on other fingers as it makes it difficult to perform a pincer grasp. In all cases, the clinical features and palpation of the nodule in the flexor tendon of the affected finger proximal to the metacarpophalangeal joint suffice to make a diagnosis.
A natural resolution for the condition is possible, but in most cases hand pain and limited use need a therapeutic solution. The first treatment can consist of rehabilitation and local infiltration of corticosteroids, but in those cases in which patients do not respond to treatment, performing a surgical opening on the A1 pulley is required. This can be achieved by the conventional open technique or the percutaneous surgery described by Lorthioir in 1958, which was simplified by Eastwood in 1992 using a 19-21 gauge needle[1,2,4-9].

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The aim of this study is to describe a technical modification of the percutaneous surgery for trigger finger, and to show the steps to follow and an anatomical dissection in a cadaveric model of the anatomical references on each finger. An analysis of the results obtained by that technique on a number of patients was also carried out.

Materials and method

The current study is a retrospective, descriptive, and observational study that was conducted at the Clinic-Malvarrosa University Hospital, Valencia (Spain). 33 patients (15 females, 18 males) were treated in 2016 by the same surgeon (58 fingers).

Inclusion criteria:

Patients diagnosed with trigger finger Green's grade II-IV[10-11].

Location on any finger.

Aged over 15 years.

Having referred to symptoms for more than 3 months with unsuccessful conservative treatment.

Exclusion criteria:

Previous surgery on the affected finger.

Trigger finger grade I (classification modified by Green).

All the patients underwent percutaneous release using an MS64 scalpel, and the minimal follow-up time was 6 months. The purpose, procedure, risks and benefits of the study were explained to patients from whom a formal written consent was taken. Postoperative monitoring was carried out according to the therapy protocol after 10 days, 6 weeks and 6 months.

The results were evaluated and presented according to Strickland's method[12], including the involved finger, functional recovery, finger range of motion and surgical complications. Data were analyzed by SPSS v21.

Strickland's method.

TAM (healthy finger)=IFP+IFD=100o+75o=175o TAM (affected finger) x 100 = Result (%) 175o	TAM: Total Active Motion IFP: Interphalangeal proximal joint IFD: Interphalangeal distal joint
Excellent: 75 - 100 %} Satisfactory Good: 50 - 74 %} Satisfactory Not so good: 25 - 49 %} Unsatisfactory Bad: 0 - 24 %} Unsatisfactory	

Percutaneous surgical technique

The patient is placed in the dorsal decubitus position, and asepsis and antisepsis are carried out on the affected hand. Surgical drapes are placed and local anaesthesia is applied with a 1% lidocaine solution, by administering 3 cm^3. It is easier to determine the direction of tendons (mostly in the 2nd and 5th fingers) if counter-resistance muscular contraction is applied to them.

The skin is sectioned by a thin handle MS64 scalpel following its creases proximal to the A1 pulley (Fig. 1). Next the blunt end of a Rochester-Pean hemostatic curved forceps is introduced to dissect the subcutaneous space (Fig. 2). Afterward, with the same scalpel and following the axis of the tendon in its most central position, the transverse fibers of the A1 pulley of the flexor mechanism is sectioned (Fig. 3). The MCP joint must be hyperextended to mobilize the pulley superficially and to distance the neurovascular pedicles. If this is done when the tendon is locked in flexion, its immediate release takes place. The curved end of the Rochester-Pean hemostatic (curved forceps) can be placed again to palpate the total A1 pulley release.

If thumb surgery is being performed, a distal approach to the pulley can be followed and to release it retrogradely, to thus avoid the vascular bundle.

Caution must be taken to not insert the blade too deeply so as to not wound the flexor tendons or enter the metacarpophalangeal joint. The sound the pulley section makes is characteristic.

The approach does not require skin suturing, but implie simply applying a compressive bandage and performing active and passive exercises of the digital flexo-extension.

The study data were retrospectively collected with informed consent from the patients, which was carried out according to international ethical and scientific standards after being passed by the local Ethical Committee[13].

Anatomical study in a cadaveric model

Anatomical dissection was performed to study the anatomical references (particularly the neurovascular ones) in each finger.

Results

For our case study, the general characteristics of the data recorded in the series are shown in Table I. The mean patient age was 63 (range between 21-87) and the mean duration of symptoms was 6.9 months (range

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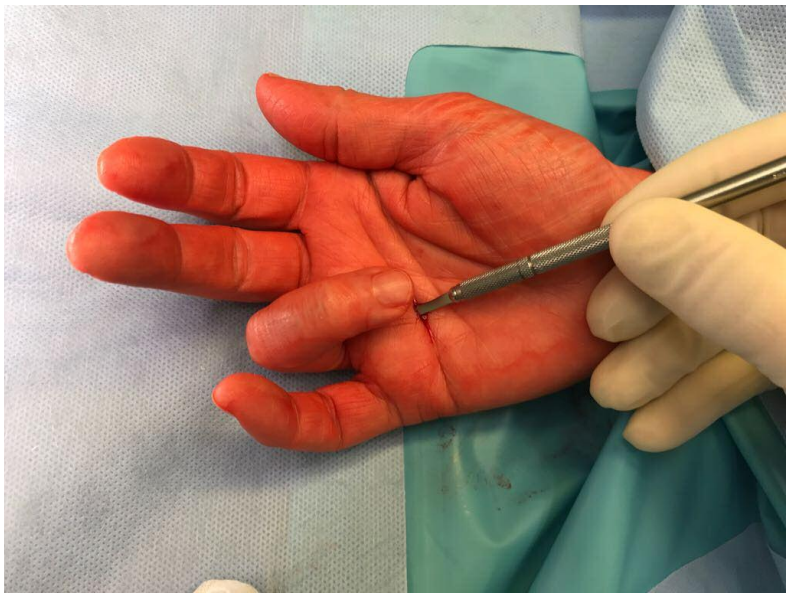

Figure 1. Hand's palmar incision, proximal to the A1 pulley (4th finger).

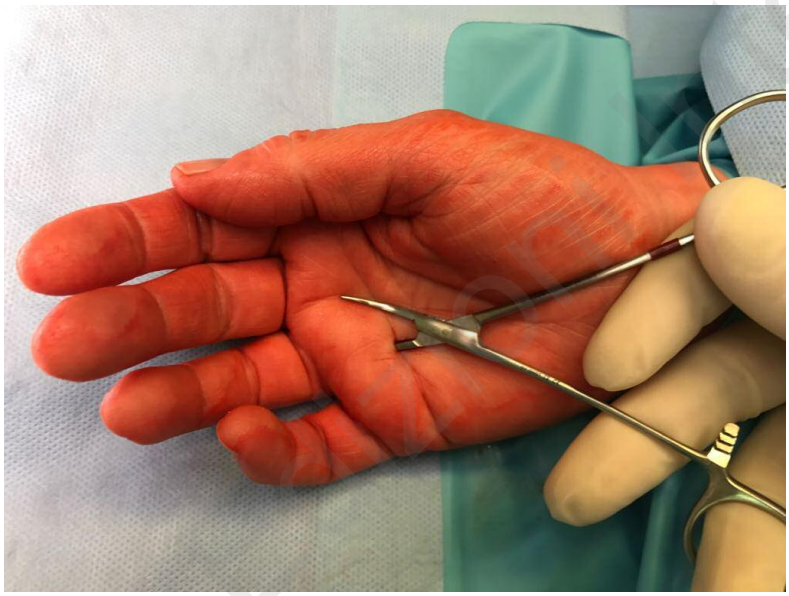

Figure 2. Subcutaneous dissection with Rochester-Pean Hemostatic.

between 3-18 months). The most frequent occurrence took place in the 4th and 1st fingers, and the ratio of cases according to gender (male/female) was 18/15.
Source: Health history
Surgery was performed under local anesthesia and without ischemia that lasted 5 minutes on average. No case of recurrence was observed during the study period, nor were neurological lesions found.
According to Strickland's evaluation method, 100% cases showed Excellent or Good results (47/11 respectively), with total recovery of mobility. Only one case presented some discomfort and swelling of the treated finger, which the patient associated with trauma where the proximal interphalangeal joint was. After a radiographic study and magnetic resonance imaging, it was ruled out as being related to the surgery carried out in any way.
The average duration of postoperative pain was 5 days and the recovery of motor function took 10 days on average. The time before returning to work was 10 days on average (Tab. II).
Source: Health history
Anatomical study: the flexor tendons of the 3rd and 4th fingers followed the axis of the finger itself. However, the 2nd and the 5th fingers leaned slightly toward the carpal tunnel, a fact that must be taken into account when the surgical approach occurs (Fig. 4). In the specific case of the thumb, the anatomical course of both the collateral nerves and the vascular bundle must be known (Fig. 5). For this reason, a distal approach to the pulley and its retrograde release are safer, and there is no need to apply any proximal ap-

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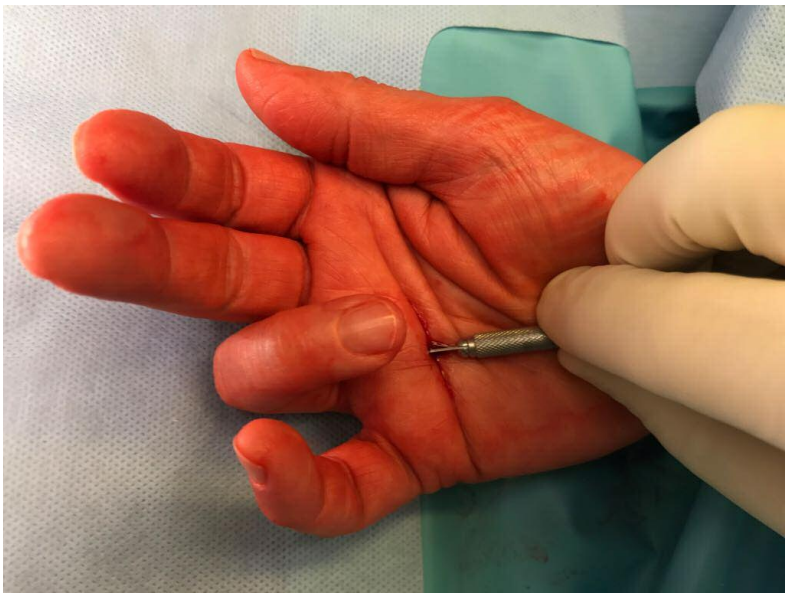

Figure 3. Longitudinal section of the A1 pulley with MS64 scalpel.

Table I. General characteristics of the series.

Variables	Percutaneous procedure
No. of fingers	58
Mean age (years)	59.4 (range 37- 83)
Mean duration of the symptoms (months)	6.9 (range 3 - 18)
Gender (M / F)	18 / 15
Finger involved (No. and %)	
1st finger	15 (25.86%)
2nd finger	5 (8.62%)
3rd finger	10 (17.24%)
4th finger	24 (41.37%)
5th finger	4 (6.69%)

Table II. Specific results.

Variables	Percutaneous procedure	
	Average	SD
Duration of the surgery (min.)	5'	0.45
Duration of postoperative pain (days)	5	3
Recovery of motor function (days)	10	2
Return to work (days)	10	2
Success rate (%). Satisfactory results	98.27	1
Complications (No. and %)	0	-

proach.

Discussion

Currently, open release is still the pillar of surgical treatment of trigger fingers, mostly in areas where percutaneous release is limited. Conservative management is also carried out in early stages and on patients not willing to undergo release surgery, which also includes corticosteroid injections.

The main disadvantage of open treatment is the small but defined incidence of complications like infections, pain, appearance of scars, stiffness or joint weak-

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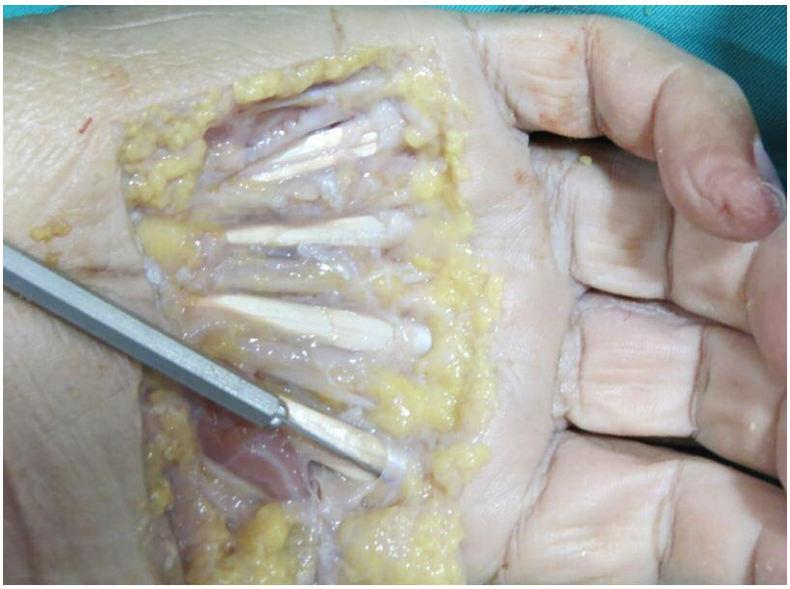

Figure 4. Anatomical view of A1 hand pulleys .

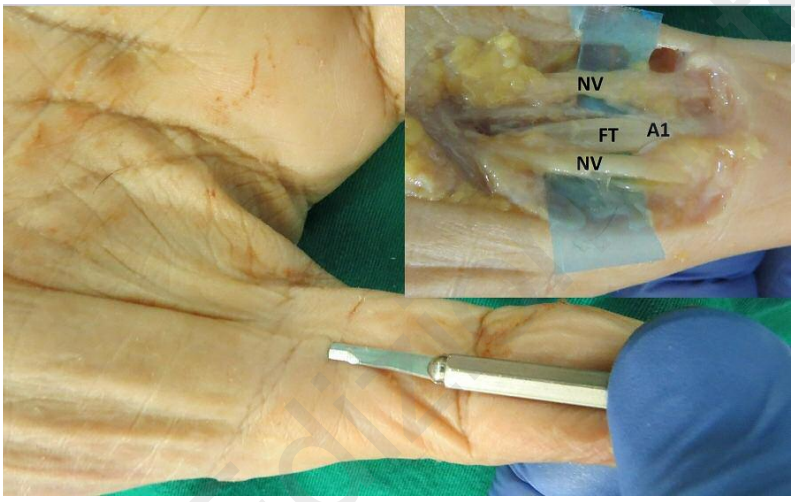

Figure 5. Thumb's Anatomical dissection: NV= collateral nerve; FT: flexor tendon; A1: Pulley.

ness, dislocation of flexor tendons due to injuries on pulleys and digital nerve or artery damage[14].

The percutaneous surgical release technique performed by Eastwood et al.[6] is a convenient economical method that is minimally invasive, and has a very low complication rate. It is becoming more popular than open surgery.

In his study, Elsayed[15] observed a high success rate (97%) of percutaneous release with 40 fingers. The thumb and the 4th finger are the commonest ones, as in our study, with a 100% release rate.

Sahu et al.[14] reported successful results in 95.6% of patients (excellent in 82.6% and good in 13% cases). In another study, Diab[16] analyzed 43 patients in which he reported incomplete A1 pulley release for three fingers in 6.97% cases and superficial laceration of the flexor tendon with sis fingers (13.95%). Ha KI et al.[17] reported no complications after their 185 PR procedures. Amrani et al.[18] reported no complications, but two recurrences in their 63 PR cases. Pope et al.[9] indicated that 10-15% of the area distal to the pulley could not have been cut by PR. Bekir[19] did not indicate any complications in 48 cases with premature return to their daily activities. Recently, Marij et al.[20] in their study on 52 patients treated with an 18-gauge needle, and Weiss[21] who treating 596 trigger fingers, concluded that it was a safe and cost-effective technique.

There is a close anatomical relation between the radial digital neurovascular bundle of the thumb and the A1 pulley, as seen in the anatomical dissection (Fig. 5). Some studies recommend not performing percutaneous release on the thumb and carrying out open release instead. Pope and Wolfe[9] performed percutaneous release in 25 cadaveric palms and found that the distance between the radial digital nerve and the

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needle puncture site was between 2 and 3 mm in three out of five thumbs and in five out of five index fingers. Guler et al.[22] reported digital nerve injury in 5.7% patients who underwent percutaneous trigger thumb release. In our study, no patients suffered that injury.

No significant differences were observed when correlating age, sex and location to the surgical technique results, which is similar to what other Authors have published[1].

Conservative treatments delay return to work and extend symptoms duration, which presents less satisfactory results (44%) when it exceeds the 6 months and has multiple locations. Surgery is the most effective treatment because trigger finger is refractory to conventional methods in more than 60% cases due to its natural history[1,2, 5-9].

The success rate of open release is 97%, with 2% recurrence. This technique is bloodier, lengthier, less simple, and involves slow motor recovery and delayed return to daily activities, which makes it an inferior procedure than the percutaneous method[1,2].

In their open surgery series with 305 trigger finger cases, Lange-Riess et al.[23] reported only nine complications, including two superficial wound infections, one delayed wound healing, and six temporary digital sensory losses. They detected no permanent complications during their 14-year follow-up period. Will et al.[24] performed 78 open surgeries for trigger fingers of 43 patients. They reported 3% major complications (synovial fistula, arthro-fibrosis) and 28% minor complications (erythema, scar tissue stiffness, and loss of range of motion).

Some studies have compared open and percutaneous methods. Wang[25] performed a retrospective study bycomparing 32 open surgical cases and 40 PRs, and detected no statistical clinical differences. The results suggested that PR is a satisfactory alternative to open release.With his long-term comparative study, Gilberts[1] indicated outstanding results for both techniques.

The percutaneous technique results are similar to those of Tanaka and Eastwood[5,6], who, instead, used needles to section the pulley and performed less bloody surgery. Nevertheless, these Authors reported some postoperative reflex sympathetic dystrophy cases and other types of relapsing due to incomplete pulleycut[8].

As a novelty our work provides the use of an MS64 scalpel to perform percutaneous the trigger finger release, which has been done with a needle to date. In this way quick simple release is achieved. We found no published works that describe this technical modification.

Conclusion

Percutaneous surgical release with an MS64 scalpel is a safe effective technique to treat trigger fingers that implies, minimal aggression to soft parts and fast recovery. It is a semi-invasive, very quick and simple, outpatient technique that can be applied from the beginning. It is well-tolerated, cost-effective, entails few resources, and provide satisfactory results. It is necessary to have perfect command of anatomy and have performed open surgeries before.

This surgical technique is indicated for the Grade II-IV cases of the Green Classification (inclusion criterion of the present study).

The use of a specific scalpel for percutaneous surgery like an MS64 scalpel, facilitates surgical work compared to performing a cut with the bevel of a needle, and thus avoids incomplete A1 pulley releases.

With the thumb, we saw in the anatomical dissection, that distal to proximal release was safer with a lower risk of neurovascular injury.

Conflicts of interest

The Authors declare no conflicts of interest for this study.

References

1. Gilberts E, Beekman W, Stevens H, Wereldsma J. Prospective randomized trial of open versus percutaneous surgery for trigger digits. J Hand Surg. 2001;26A:497-500.
2. Corradi M, Vaienti E, Corradi D. Puleggiotomia percutanea nel ditto a scatto. Riv Chir Mano. 2000;37:135-139.
3. Sampson S, Badalamente M, Hurst L, Seidman J. Pathobiology of the human A1 pulley in trigger finger. J Hand Surg. 1991;16A:714-721.
4. Lambert MA, Morton RJ, Sloan JP. Controlled study of the use of local steroid injection in the treatment of trigger finger and thumb. J Hand Surg. 1992;17B:69-70.
5. Tanaka J, Muraji M, Negoro H, Yamashita H, Nacano T, Nacano K. Subcutaneous release of trigger thumb and fingers in 210 fingers. J Hand Surg. 1990;15B:463-465.
6. Eastwood DM, Gupta KJ, Johnson DP. Percutaneous release of the trigger finger: an office procedure. J Hand Surg. 1992;17A:114-117.
7. Lorthioir J. Surgical treatment of trigger finger by a subcutaneous method. J Bone Joint Surg. 1958;40A:793-795.
8. Cihantimur B, Akin S, Ozcan M. Percutaneous treatment of trigger finger: 34 fingers followed 0.5-2 years. Acta Orthop Scand. 1998;69:167-168.
9. Pope DF, Wolfe SW. Safety and efficacy of percutaneous trigger finger release. Hand Surg. 1995;20A:280-283.
10. Quinnell RC. Conservative management of trigger finger. Practitioner. 1980;224:187-190.
11. Froimson AI. Tenosynovitis. In Green DP: Operative Hand Surgery. 3ed. T.2 New York: Churchill Livingstone. 1993; 1992-2029.
12. Strickland JW, Glogovac SV. Digital function following controlled passive motion technique. J Hand Surg. 1980;5A:537-543.
13. Padulo J, Oliva F, Frizziero A, Maffulli N. Muscles, Ligaments and Tendons Journal - Basic principles and recommendations in clinical and field science research: 2016 update. MLTJ. 2016;6(1):1-5.
14. Sahu RL, Gupta P. Experience of percutaneous trigger finger release under local anesthesia in the medical college of Mullana, Ambala, Haryana. Ann Med Sci Res. 2015;4(5):806-809.
15. Elsayed MM. Percutaneous release of trigger finger. Egypt Or-

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thop J. 2013;48(3):277.
16. Diab RA. Percutaneous release of trigger finger. J Orthop Surg (Hong Kong). 2015;23(2):241-242.
17. Ha KI, Park MJ, Ha CW. Percutaneous release of trigger digits. J Bone Joint Surg Br. 2001;83:75-77.
18. Amrani A, Dandane MA, Alami ZF. Percutaneous release of trigger thumb in children: 63 cases. Chir Main. 2011;30:102-104.
19. Bekir YU. Percutaneous Surgery: A Safe Procedure for Trigger Finger?. N Am J Med Sci. 2012 Sep;4(9):401-403.
20. Z Marij, Q Aurangzeb, HR Rizwan, R Haroon, and MH Pervaiz. Outpatient Percutaneous Release of Trigger Finger: A Cost Effective and Safe Procedure. Malays Orthop J. 2017 Mar;11(1):52-56.
21. Weiss ND, Richter MB. Perutaneous Release of Trigger Digits. Am J Orthop. 2017;46(4):E263-7.
22. Guler F, Kose O, Ercan EC, Turan A, Canbora K. Open versus percutaneous release for the treatment of trigger thumb. Orthopedics. 2013;36(10):e1290-e1294.
23. Lange-Riess D, Schuh R, Hönle W, Schuh A. Long-term results of surgical release of trigger finger and trigger thumb in adults. Arch Orthop Trauma Surg. 2009:1617-1619.
24. Will R, Lubahn J. Complications of open trigger finger release. J Hand Surg Am. 2010;35:594-596.
25. Wang HC, Lin GT. Retrospective study of open versus percutaneous surgery for trigger thumb in children. Plast Reconstr Surg. 2005;115:1963-1970.

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