Percutaneous release of trigger finger

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Background
Trigger finger, stenosing tenosynovitis, is caused by nodular thickening of the flexor tendon, which catches on the proximal edge of the first A1 pulley; although the natural history indicates a self-limiting disease, prompt treatment is often required. Although a local steroid injection is simple and safe, it sometimes fails to relieve the triggering; then, open surgery is needed. To reduce the morbidity and cost of open release and also to enable outpatient surgery, percutaneous release was introduced.

Patients and material
In a prospective study, we report on 40 trigger fingers in 37 patients using either an 18 G needle or the sharp tip of scalpel No. 11. The age of the patients ranged from 23 to 56 years, with no age limit for the procedure; there were 28 women and 12 men, 20 thumb fingers, 15 ring fingers, four middle fingers, and one index finger.

Results
In the first week, all the patients were seen; only one complained of pain and recurrent triggering, for whom we performed open release, and two patients had minor asymptomatic triggering and were satisfied. The other 37 patients were completely relieved with no pain and no more triggering. Those who reported complete relief were ranked as showing an excellent result and those with asymptomatic mild triggering as a good result, and there was one failure. Thus, we had 97% excellent and good results. There was no single case of digital nerve or tendon injury and no infection.

Conclusion
Percutaneous A1 pulley release is a safe method in patients with trigger finger, being advantageous in terms of ease of application, and it is an outpatient procedure with low complication rates and high patient satisfaction.

Keywords:
finger, percutaneous, release, trigger

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Introduction

Stenosing tenosynovitis or trigger finger is generally characterized by pain, swelling, the limitation of finger motion, and a triggering sensation. It generally involves the thumb or ring finger, but can be seen in any other finger [1]. The primary pathology is thickening of the A1 pulley, with resultant entrapment of the flexor tendon, thus forming a triggering mechanism [2].

The success of conservative treatment is reported to be 50–92% in the literature; it includes steroid injection, anti-inflammatory drugs, and splinting of the finger [3,4]. When conservative treatment fails, the surgical option of releasing the A1 pulley remains, which has success rates reported up to 100% [1]. The reported complications of surgical release are infection, digital nerve injury, scar tenderness, and joint contractures [5].

Percutaneous release was first performed in 1958 by Lorthioir [6], and success rates of up to 100% without any complications have been reported.

Nowadays, percutaneous A1 pulley release is the method of choice in patients unresponsive to conservative treatment, with the advantages of ease of application, low complication rates, and high patient satisfaction [7].

Anatomical review

The average length of an A1 pulley is 1 cm; the proximal edge of the first annular pulley lies about 2 cm from the proximal finger crease; the distal edge of A1 pulley lies about 1 cm from the proximal finger crease, which lies over the mid portion of the proximal phalanx, and the A2 pulley begins and ends in the proximal half of the proximal phalanx. Hence, a tendon sheath incision that extends past the level of the proximal finger crease will probably incise the A2 pulley the most [8], (Fig. 1).

The longitudinal axis of the neurovascular bundles follows the line of the digit in the ring finger and middle finger; those for the index and little fingers lie in a more diagonal axis, as they are situated beyond the medial and lateral edges of the distal end of the carpal tunnel. Consequently, the neurovascular bundles

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for these digits may cross over the A1 pulley (Fig. 2), placing them at risk of inadvertent damage during release of the pulley [9].

Patients and methods

For the last 2 years, the percutaneous technique for release trigger finger has been our preferable surgical treatment, and we use it either in the outpatient clinic or operating room.

In a prospective study, we report on 40 trigger fingers in 37 patients using either an 18 G needle or the sharp tip of scalpel No. 11.

The indications for the surgery were unresponsive medical treatment including one injection of local cortisone (eight patients), trigger finger more than 3 months (11 patients), frequent triggering and locking during the day (four patients), if associated with carpal tunnel release (two), if more than one trigger finger either in the same (one) or both hands (two), and finally, if the patient was convinced in the first visit to undergo the percutaneous release (12 patients) (Table 1).

The age of the patients ranged from 23 to 56 years, with no age limit for the procedure; there were 28 women and 12 men, 20 thumb fingers, 15 ring fingers, four middle fingers, and one index finger (Table 2).

Two methods were used: No. 11 pointed blade or an 18\19 G needle. The procedures were performed either under local infiltration anesthesia or a local digital nerve block.

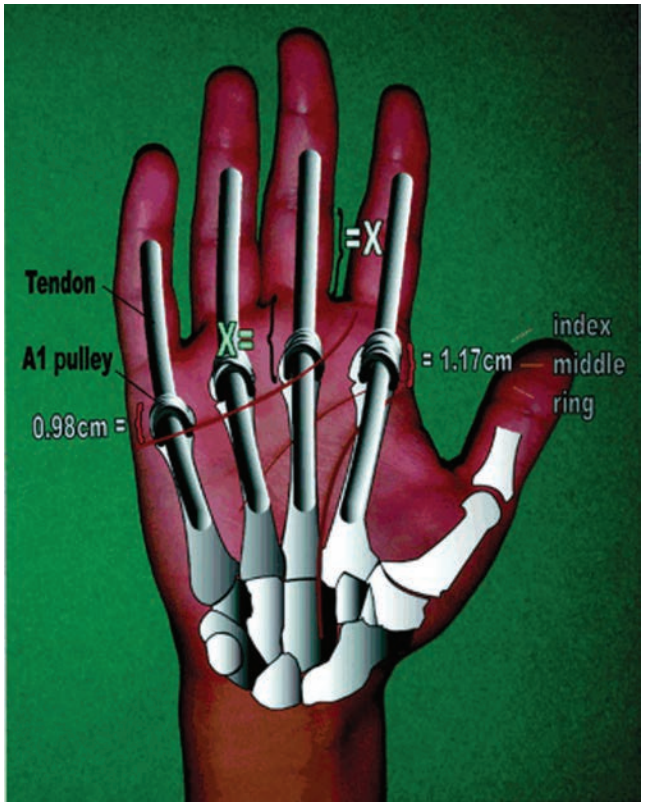
Table 1 Indication for the procedure

Indications	Number of patients
One cortisone injection	8
Trigger finger more than 3 months	11
Frequent triggering and locking during the day	4
Associated with carpal tunnel	2
More than one trigger finger in two hands	2
More than one trigger finger in one hand	1
Patient was convinced in the first visit	12

Table 2 Number of digits released

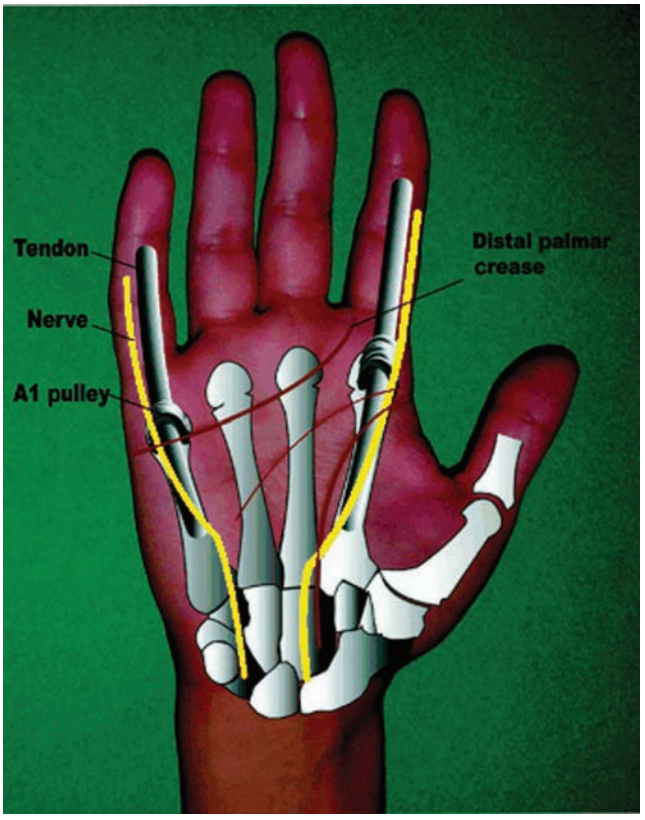
Finger	Number of patients	Result of release
Thumb	20	19 completely released, one minor asymptomatic triggering
Ring finger	15	13 completely released, one minor asymptomatic triggering, one failed
Middle finger	4	All completely released
Index finger	1	Completely released

Figure 1



Relation of the A1 pulley to the palmar and finger creases (lengths *x* are equal).

Figure 2



Relation of the digital nerve to the A pulley.

With routine sterilization and the finger hyperextended, the tip of No. 11 blade is introduced through the skin just in the middle axes of the finger, just distal to the nodule (Figs 3 and 4), and cutting is performed with gentle advancement with movement of the finger and feeling the grating sensation while cutting through the A1 pulley until resistance is suddenly released, then asking the patient to flex and extend the finger and check whether locking is still present and if so, the procedure is repeated.

In the case of using an 18 G needle, the finger is also hyperextended and the needle is introduced into the midline of the sheath at the level of the middle of the A1 pulley, and then the needle is swiveled forward and backward through the pulley while feeling the resistance when releasing the pulley till the resistance stops and then asking the patient to actively flex and extend the finger as before.

Figure 3

Locked finger.

Figure 5

Finger released; bleeding at the puncture site.

The average operative time was 8.5 min, with a range from 7 to 13 min, including the local anesthesia.

After the release, pressing with sterile dressing for 3 min for homeostasis (Figs 5 and 6) and bandage was applied for only 1 day and the patient was allowed to mobilize the finger and asked to report for review within 1 week to check the result and to determine whether there was still pain or locking. Follow-up was only for 1 month.

Results

In the first week, all the patients were seen, and only one complained of pain and recurrent triggering, for whom we performed open release and during surgery,

Figure 4

Number 11 scalpel entry.

Figure 6

Press for 2 min for homeostasis.

we found the distal half of the A1 pulley was still thick and not released; two patients had minor asymptomatic triggering and were satisfied, and the other 37 patients were completely relieved, with no pain and no more triggering. Those who achieved complete relief were ranked as showing excellent result and those with asymptomatic mild triggering as good result; there was one failure. Thus, we had 97% excellent and good results. There was no single case of digital nerve or tendon injury and no infection.

Discussion

Trigger finger, stenosing tenosynovitis, is caused by nodular thickening of the flexor tendon which catches on the proximal edge of the first A1 pulley; although the natural history indicates a self-limiting disease, prompt treatment is often required. Although a local steroid injection is simple and safe, sometimes, it fails to relieve the triggering; then, open surgery is needed. To reduce the morbidity and cost of open release and also to enable outpatient surgery, percutaneous release was introduced.

Percutaneous release was first performed in 1958 by Lorthioir [6], and success rates of up to 100% without any complications have been reported. Eastwood *et al.* [10] used a 21 G hypodermic needle to release the A1 pulley; 33 of the 35 procedures performed (94%) led to complete relief of symptoms, and in the remaining two digits, partial symptomatic relief was achieved, with no significant complications. They reported that the technique is effective, convenient, safe, and well tolerated by patients and advised percutaneous release as the treatment of choice for the established trigger finger with symptoms of more than 4 months' duration. However, Joy *et al.* [11] used 11 blades to release the A1 pulley and reported 84% complete relief and 19.5% partial release, and Ha and Park [12] used an especially designed knife to release the A1 pulley, with 93% excellent results.

Akhtar *et al.* [13] also reported his technique, which also involved the use of the sharp tip of a 16/18 G needle to incise the A1 pulley, placing it with the metacarpophalangeal joints in a hyperextended position; he explained that the extended position facilitates access and ensures that the A2 pulley is held out to length and at maximal distance from the A1 pulley and that the A1 pulley is stretched out and held stable in extension in a more superficial position, with the neurovascular bundles drawn medially and laterally away from the sheath. His success rates were over 90%, and complications were rare but included digital nerve injury, bowstringing (if release extends into the A2 pulley), infection, hematoma, and persistent pain.

In a report by Gilberts [14] the authors compared the results of an open surgical technique with those of a percutaneous technique for the treatment of trigger digits; successful results were reported in 98% of the cases using the open surgical technique and 100% in the cases using the percutaneous technique. Operation time was significantly longer using the open technique; the mean duration of postoperative pain and time to recovery of motor function were significantly shorter for patients treated with the percutaneous method, with no serious complications observed in either group.

Another report by Cebesoy *et al.* [15] showed 84% excellent result using an 18 G needle to release trigger thumb; the mean operative time was 9.5 min (8–14 min), including the local anesthesia. Uras and Yavuz [16] recommended percutaneous release as it is a safe and effective technique with cost savings, but advised caution in thumb release because of the proximity of the digital nerve to the pulley. Calleja *et al.* [17] pointed out that in percutaneous release although complete anatomic release of the A1 pulley is not always adequately achieved, even though clinically patients experience relief of triggering and the procedure is safe. They reported excellent postoperative pain relief with no triggering in all the cases. Adhav [18] reported the advantages of percutaneous trigger finger release as an outpatient clinic procedure, such as being cost effective, leading to less postoperative morbidity, better esthetic appearance, less risk of recurrence, no blood loss, no fibrosis, and no requirement of a tourniquet. However, the disadvantage includes the fact that it is a blind procedure; thus, there is a risk of digital neurovascular damage and incomplete release if performed by less experienced surgeons.

In our study, we showed 97% excellent results, with an average operative time of 8.5 min, no tourniquet was used, there was no infection or scaring, with rapid return of function, and limited cost and patient satisfaction in all, except the one in whom we performed revision surgery.

Conclusion

Percutaneous A1 pulley release is a safe method in patients with trigger finger, with the advantages of ease of application and the fact that it is an outpatient procedure with low complication rates and high patient satisfaction.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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