Percutaneous Trigger Release in Non-Triggering Digits: Infiltration of Normal Saline into Tendon Substance to Induce Triggering

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Abstract Percutaneous trigger release is recognized as an effective minimally invasive procedure with a low complication rate. One prerequisite for percutaneous trigger release is a trigger of Quinell Type II or higher; that is, a digit that is actively triggering. We describe an additional step in percutaneous trigger release, which enables the surgeon to perform the procedure in digits that are not actively triggering at the point of surgery. This step involves the infiltration of normal saline into the tendon substance distal to the A1 pulley in order to induce triggering.

Keywords Percutaneous trigger release · Pulley release · Needle · Normal saline infiltration

Introduction

Percutaneous trigger release has been shown to be an effective procedure in the management of trigger fingers [1]. The complication rate arising from percutaneous trigger release has been shown to be low and comparable to that arising from open releases [2].

Being a blind procedure, complete trigger release can only be ensured if there is active triggering present prior to the procedure. With the absence of triggering and palpable clicking over the A1 pulley following percutaneous division of the pulley, complete trigger release is assumed with good clinical results. For this reason, Quinell Type 0 and I triggers,

where there is no active triggering, are considered unsuitable for percutaneous release [1].

We describe a technique to perform percutaneous trigger release in patients who are not actively triggering – these include patients who are not actively triggering but opt for surgical management due to inadequate symptom relief from non-surgical measures, as well as patients who were actively triggering preoperatively but not during the procedure itself.

Anatomy

Cadaveric studies have established the safety of percutaneous trigger release with respect to risk of injury to adjacent structures such as the neurovascular bundles and underlying flexor tendon [3, 4]. While Schramm et al. [3] suggest the safety of percutaneous trigger release on all digits, other authors have cautioned a possible greater risk of damage to the digital neurovascular bundles in the thumb, index finger and little finger [5, 6]. For this reason, in our center, we restrict percutaneous trigger release to the middle and ring fingers only.

We use surface landmark ratios, described by Wilhelm et al. [7], as a guide to the proximal and distal extent of the A1 pulley. These landmarks serve as a reminder of the extent of percutaneous division required for complete pulley division, apart from the resolution of triggering or palpable clicking intraoperatively.

Indications

As mentioned, percutaneous trigger release has been described as an option for Quinell Type II, III, and IV triggers [1] – these are digits that are actively triggering, gets locked and requires passive correction, or is in a locked position and

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can be extended following A1 pulley release. Using our technique, however, we can also perform percutaneous release on fingers that are not actively triggering. Our contraindications for percutaneous trigger release include patients who may require synovectomy, for instance patients with rheumatoid arthritis [1]. We also do not perform percutaneous release in patients with bleeding disorders or those on anticoagulants.

In our practice, we usually perform percutaneous trigger release in the operating theatre, where we are able to convert to open surgical release of the A1 pulley if we are not able to completely release the pulley percutaneously. We also restrict percutaneous trigger release to the middle and ring fingers only, where the potential risk of injury to the digital nerves is the lowest [5, 6].

Technique

We perform percutaneous trigger release in the operating theatre. An arm tourniquet is set up but not inflated unless a decision for open trigger release is made. Local infiltration of approximately 10 mg of bupivacaine is used as anaesthesia.

The patient is asked to actively flex all the fingers and then to extend. If the affected finger does not trigger or get locked, we then inject normal saline, using a 23G needle, into the flexor tendon just distal to the A1 pulley (Fig. 1). Prior to the injection, we confirm the position of the needle tip within the tendon substance by passively moving the digit and ensuring that the needle moves as well.

The normal saline is injected slowly into the tendon substance; this causes a 'nodule' to form within the tendon. Only a small amount of normal saline can be injected into the flexor tendon substance before significant resistance is felt in the syringe; in our experience, this amount is usually less than 0.5 ml. The syringe is then withdrawn completely and the patient is asked to repeat the flexion-extension movement.

Fig. 1 Injection of normal saline, using a 23G needle, into flexor tendon distal to A1 pulley

Fig. 2 Normal saline infiltration into the tendon substance has resulted in a flexor tendon 'nodule' which causes triggering in a digit that was previously not triggering

The iatrogenic 'nodule' causes the finger to either trigger or get locked, in a manner similar to those seen in higher grade triggers (Fig. 2). If there is still no triggering, more normal saline can be injected into the flexor tendon substance or open trigger release can be proceeded with. After achieving the triggering or locking movement, percutaneous trigger release is performed in a standard manner. We use a 18G needle for our percutaneous releases (Fig. 3).

Outcome

We have used this technique on four patients with one affected digit each. Two of these patients were of Quinell Type II preoperatively while two were of Quinell Type III preoperatively but were no longer actively triggering during surgery. Using our technique of infiltrating the flexor tendon with normal saline, we performed percutaneous release on all four patients successfully with no need to convert to open trigger release.

Fig. 3 Percutaneous trigger release using a 18G needle

Our technique allows minimally invasive trigger release in a bigger pool of patients, with the definite main advantages arising from a much smaller surgical wound. However, due to the possibility of our technique not achieving its intended effect of causing the digit to trigger or to lock, the need for an open trigger release must be catered for.

Complications

In our four cases, we did not encounter any complications. However, incomplete release, tendon rupture, digital nerve injury, and infection are possible complications.

Our intraoperative salvage option, should our technique fail, is to convert the procedure to an open surgical release where a complete division of the A1 pulley can be performed under direct visualization.

Compliance with Ethical Standards All authors declare that they have no conflict of interest.

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