

*Original Article***A revisit of transthecal digital block and traditional digital block for anesthesia of the finger***Mohammad Dehghani*, Arsalan Mahmoodian*****Abstract**

BACKGROUND: Finger injuries are very common and the majority can be treated under digital block anesthesia. Traditional digital block is one of the most commonly performed blocks by care providers in several medical fields. There is another less known method, transthecal (Pulley) block, in which local anesthesia is injected into the flexor tendon sheath.

METHODS: A randomized clinical trial was performed to compare the transthecal (Pulley) and traditional digital block with regard to the length of anesthesia and the need for another anesthetic method (due to insufficient anesthesia) as a supplement. We divided 100 patients who needed digital block due to finger injury, into two groups randomly. In each group the patients were anesthetized either by traditional or transthecal digital block. All blocks were performed by the same investigator.

RESULTS: Mean length of anesthesia was 34.2 minutes in the transthecal digital block method versus 33.8 minutes in the traditional digital block method ($P>0.05$). A repeated injection or local infiltration as a supplement was necessary only in 5 instances in the traditional digital block method ($P<0.05$).

CONCLUSIONS: Regarding fewer injections and reduced amounts of lidocaine, absence of neurovascular bundles damage and comparable length of anesthesia and no need to supplemental anesthesia, transthecal digital block is an appropriate alternative to traditional digital block.

KEY WORDS: Digital block, transthecal, pulley, finger, flexor tendon sheath.

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Finger injuries as a fracture or dislocation or soft tissue damage such as skin, nerve, blood vessels or tendon injury are very common ^{1,2}. Most of these injuries can be evaluated and treated using digital block anesthesia. There are several methods of digital block and traditional digital block is the most commonly performed, in which 4 ml anesthetic solution is injected into both sides of the finger to block both radial and ulnar digital nerves (through separate injection sites) ¹. Disadvantages of this method are the possibility of

neurovascular damage (direct or indirect due to compartment syndrome or arterial spasm) and the need for two separate injection sites. Another less known method is transthecal (Pulley) digital block in which 2 ml of anesthetic solution is injected into the flexor tendon sheath at the level of A1 pulley by a single injection. There are many studies that compare time to onset of anesthesia, pain level and efficacy between these two methods. Also a study has investigated the mechanism of transthecal digital block ². Most of these studies reveal that

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these two techniques are equal with respect to the time and efficacy of anesthesia². This study was designed to compare these two methods with regard to the length of anesthesia and the need to supplemental anesthesia.

Methods

This study was designed as a clinical trial study. Between October 2005 and September 2006, 100 patients who needed digital block due to finger injury (bony or soft tissue) were enrolled in the study and randomly received one of the two methods of anesthesia (traditional or pulley block). All of cases were young and middle age. No cases had connective tissue disorder or steroid usage. No patients had joint subluxation or dislocation. All blocks were performed by a single investigator. For Both techniques, we used a 5 ml syringe and a 27-gauge needle. In the transthecal (Pulley) technique, 2 ml of 2% lidocaine was injected into the flexor tendon sheath at the level of the distal palmar crease or A1 pulley. The needle punctured the skin at a 45 degree angle directed distal and was passed through the flexor tendon. Resistance to injection suggested that the needle tip was against the flexor tendon and careful withdrawal of the needle (1-2 mm) would result in free flow of anesthetic as the potential space between tendon and sheet was entered. Traditional digital block was performed as follows: the needle was inserted toward the side of extensor tendon just proximal to the web and 1 ml of anesthetic solution was injected to block the dorsal nerve. The needle is then advanced toward the palmar digital nerve and again 1 ml of anesthetic solution was injected. An identical injection was made into the other side of the finger. Then, at the end of the proposed procedure or when the patient felt pain, the time of regaining pinprick sensation from the beginning of the block was evaluated. If on completion of each method of digital block enough anesthesia was not achieved, a supplemental anesthesia such as repeated block or another method or injection into the damaged site was performed.

Results

A total of 130 blocks were performed in 100 patients (63 traditional and 67 transthecal blocks). All digital blocks were without any complications. The mean length of anesthesia was 33 minutes and 48 seconds for the traditional block and 34 minutes and 12 seconds for the pulley block, a difference of 24 seconds ($P>0.05$, *t* test). Of the 50 patients who received traditional digital block, 5 blocks failed to achieve enough anesthesia and needed local injection (2 blocks) or repeated digital block (3 blocks) (%8) but no one of the 50 patients who received pulley block needed supplemental anesthesia ($P<0.05$, fisher exact test).

Discussion

The technique of "transthecal digital block" was described by Chiu³ for the first time after he observed that injection of a steroid-lidocaine mixture into the flexor tendon sheath for treatment of trigger finger produced rapid onset of anesthesia of the entire finger. He achieved successful palmar and dorsal digital anesthesia in 416 of 420 patients (99%). Morrison et al and Morros et al^{4,5} and Hill et al⁶ (1995) also obtained high (91-100%) success rates, but Chevaleraud et al⁷ (1993) found that transthecal digital block failed to provide satisfactory anesthesia to the dorsum of the finger and only produced satisfactory palmar anesthesia in his 350 patients. Other authors introduced modifications of the original technique. Harbison⁸ in 1991 described a subcutaneous single injection technique at the level of the A2 pulley. Low et al⁹ in 1997 described a subcutaneous single injection at the level of A1 pulley. Whetzel et al¹⁰ in 1997 injected through the flexor tendon sheath at the level of the proximal digital crease with a 100% success rate. Torok et al¹¹ observed a success rate of 99% for the digits and 98% for the thumbs. Benefits of this method are as follows:

- 1-It needs a single injection.
- 2-It needs smaller volume of lidocaine.
- 3-The risk of direct or indirect damage to neurovascular bundle is minimal.
- 4-It has a quick onset of anesthesia.

A potential disadvantage is flexor tendon sheath infection although it has not been reported so far. Another disadvantage is pain at injection site but reports are controversial so that Hill et al ⁶ in 1995 reported that it was not clinically important although Keramidas et al ¹² in 1997 and Hung et al ¹³ in 2005 showed that it was considerable in comparison to traditional method. These two authors also reported that time to anesthesia was longer in transthecal method than traditional method although it was not clinically important. In our study we compared these two methods in different fingers with different injuries. Length of anesthesia was almost identical in both methods. We didn't compare length of time to achieve anesthesia because it is without clinical

importance (according to previous studies). There was no need for supplemental anesthesia or a repeated injection for patients who received the transthecal block but 5 patients who received traditional block needed a repeated injection or supplemental anesthesia.

Conclusions

Regarding fewer injections and little amounts of lidocaine and less risk of damaging the neurovascular bundles and comparable length of anesthesia and no need to supplemental anesthesia, transthecal digital block is an appropriate alternative to traditional digital block particularly in patients with needle phobia.

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