

Comparison of Traditional Two Injections Dorsal Digital Block with Volar Block

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ABSTRACT

Objective: To compare the traditional two injections dorsal digital block with volar block in terms of effectiveness of anaesthesia and pain of initial pinprick.

Study Design: Quasi-experimental.

Place and Duration of Study: AVH and casualty operation theatres, Mayo Hospital, KEMU, Lahore, from January to June 2007.

Methodology: Thirty patients requiring surgical procedure distal to proximal phalanx crease on two fingers of same or one finger of both hands were included. Cases with allergy to lignocaine, previous vascular insufficiency, previous digital replantation or peripheral neuropathy were excluded. One finger of every patient received two injection dorsal block whereas the other finger received single subcutaneous injection in the midline of the phalanx with lignocaine and epinephrine (volar block). Patient looked away during the performance of block and wrote the severity of initial pinprick on a visual analogue scale. Effectiveness of anaesthesia was made measurable by the absence of pain during the surgical procedure. Total duration of the anaesthesia and any undesirable numbness of adjacent finger were noted. The t-test was used to compare the means and p-value less than 0.05 was considered significant.

Results: The mean pain scale score were 4.27 ± 0.87 and 5.27 ± 1.05 for volar and dorsal techniques respectively ($p < 0.05$). Volar blocks were 100% effective whereas in dorsal blocks success rate was 80% ($p < 0.05$).

Conclusion: Single subcutaneous injection in the midline of phalanx with lignocaine and epinephrine (volar block) was significantly less painful to administer, is effective and safe technique to achieve digital anaesthesia, compared to the dorsal technique.

Key words: Anaesthesia. Lignocaine. Epinephrine. Phalanx. Volar block. Dorsal block.

INTRODUCTION

Ability of a surgeon to achieve an effective, reliable and safe regional block enables him to perform painless surgery and lessens undue burden on the anaesthetist.¹ Digital nerve block is a commonly used technique to perform painless finger surgery. Knowledge of bilateral sensory nerve supply to the fingers has led to the development of many different techniques of digital nerve blockade with local anaesthesia. Two of the more commonly used techniques today are the classic two injection dorsal approach as originally described by Braun and Harris and the more recently described volar block.^{1,2} Dorsal finger is said to be less painful to puncture with a needle than the volar glabrous skin. Volar approach typically involves a single injection. There are two techniques of achieving volar block.

Intrathecal block as described by Chui involves single volar injection into flexor tendon sheath, which acts as a conduit to deliver local anaesthetic to digit.^{3,4} Harbison described the second volar block variation with midline subcutaneous injection and claimed it to be equally effective but easier to administer. Brutus validated the findings of Harbison.⁵ Low not only authenticated Brutus and Harbison but also found subcutaneous technique to be less painful on initial pinprick.⁶ Jason and Donald compared single injection volar subcutaneous block with two injection dorsal block using 2% lignocaine with 1:100000 epinephrine on volunteers.⁷ It was found that volunteers preferred single injection volar technique over dorsal block if given a chance for any future digital block. As the technique used single injection (containing lignocaine and epinephrine) subcutaneously in the midline of the phalanx, it was called as SIMPLE Block (Single Subcutaneous Injection in the Midline of the Phalanx with Lignocaine and Epinephrine).⁷ There has been no reported complications of the use of epinephrine for digital blocks in a number of studies.⁸⁻¹¹

The volar approach appears to be an attractive alternative to the traditional dorsal digital block. These two techniques have not been compared in any local study.

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The objective of the study was to compare the traditional two injections dorsal digital block with volar block in terms of effectiveness of anaesthesia and pain of initial pinprick.

METHODOLOGY

It was an experimental study conducted at AVH and Casualty Operation Theatres, Mayo Hospital, KEMU, Lahore, from January to June, 2007. Sixty fingers of 30 patients (two fingers of each patient) requiring surgical procedure distal to proximal phalanx crease were included in the study. Patients having history of allergy to the agents, previous vascular insufficiency like Raynaud's disease or phenomenon, severe peripheral vascular disease, peripheral neuropathy or previous digital replantation were excluded from the study.

Informed consent about the procedure was taken from the patients explaining the two techniques and any complications that may occur with the use of epinephrine. One finger of every patient received two injections dorsal block whereas the other finger received SIMPLE block. Either of the blocks was given first on alternate patients followed by the second block. All blocks were given by the same person with a 27 G needle using 2 ml of 2% lignocaine with 1:100000 epinephrine. Dorsal technique involved injecting 1 ml of anaesthetic into web space on either side of the finger from dorsal side. Volar technique was executed by subcutaneously injecting 2 ml of anaesthetic in the midline, just short of proximal flexion crease of the finger. Patients were asked to look away during the performance of block. They wrote the severity of initial pinprick on a visual analogue scale of 0 (no pain) to 10 (greatest pain imaginable). Surgical procedure was started 5 minutes after the block and no tourniquet was used during surgery. Block was considered effective if no pain was experienced by the patient during the procedure. Return of pinprick pain was the end point. Total duration of anaesthesia was noted.

Quantitative data was analyzed using mean, standard deviation, frequency and percentages. Comparison of means was made using unpaired t-test and p-value less than 0.05 was considered significant.

RESULTS

Sixty fingers of 30 patients were studied. Of the 30 patients, 22 were males and 8 were females with a mean age of 29 years. The mean pain scale number was 4.27 for SIMPLE technique (range 3-6, SD 0.87).

The mean pain scale number was 5.27 for dorsal technique (range 4-7, SD 1.05 a t-value 4.0238, $p < 0.001$). Comparison of effectiveness of anaesthesia in the two techniques as determined by absence of pain during surgery, number of adjacent fingers developing

cumbersome numbness, the mean time from complete loss of pain to return of pain on pinprick and mean pain scale number is presented in Table I.

Table I: Comparison of two techniques of digital block.

	SIMPLE Block (n 30)	Dorsal Block (n 30)	p-value
Absence of pain during surgery (effectiveness of block)	30 (100%)	24 (80%)	< 0.05
Number of adjacent numb finger	0	12 (40%)	0.00
Mean duration of anaesthesia	387 min	304 min	< 0.05
Mean pain score	4.27	5.27	< 0.05

DISCUSSION

Two injection dorsal block has long been the technique of choice to achieve effective digital anaesthesia.¹ Chui was the first surgeon to describe a technique of digital block that produced complete finger anaesthesia with a single injection into the flexor tendon sheath at the level of distal palmer crease.³ Compared with traditional dorsal digital block, the advantages of this technique are the use of a single injection and absence of risk of direct trauma to neurovascular bundle. However, Chui's technique did not always provide satisfactory anaesthesia as experience and expertise are required for the technique to be effective.⁶

In this study, comparison has been made between volar subcutaneous single injection digital block as described by Harbison, with the traditional two injections dorsal block. Two injections dorsal block has proven to be more painful to administer (mean pain score 5.12) as compared to single subcutaneous injection finger block (mean pain score 4.12). This difference in pain score was also statistically significant. The two techniques of digital block were also compared in terms of effectiveness of anaesthesia for a variety of surgical procedures distal to proximal phalangeal crease on all the 4 fingers of both hands. Volar injection has proven to be more predictable in producing effective anaesthesia distal to proximal phalangeal crease compared to two injections dorsal block (100% compared to 80%). This is due to the fact that single subcutaneous injection in the midline of phalanx with lignocaine and epinephrine (SIMPLE) technique is more easy to execute as one has to follow more readily identifiable landmarks (subcutaneous injection in the midline of phalanx just short of proximal phalangeal crease). The same has been the observation of various authors that technical failures are more common with the traditional two injections dorsal block and intrathecal block.^{6,7} The only drawback of single subcutaneous injection in the midline of phalanx with lignocaine and epinephrine (SIMPLE), is its inability to anaesthetize dorsum of proximal phalanx which is achieved by two injections block.

In the present study, majority of the effective dorsal digital blocks were complicated by the unnecessary

numbness of adjacent fingers not requiring surgery and probably this is the reason for shorter duration of anaesthesia produced by the dorsal block as anaesthetic solution diffuses into digital nerves of adjacent fingers leaving less solution to anaesthetize the finger being operated. This is the potential drawback of two injection dorsal block.

Another theoretical shortcoming of dorsal block is the increased chances of inflicting direct injury to the nerve or artery because needle is inserted much closer to the neurovascular bundles. In this technique, compared with single subcutaneous injection in the midline of phalanx with lignocaine and epinephrine (SIMPLE) technique in which needle is inserted midway between the neurovascular bundles.

Medical tests continue to perpetuate the belief that the epinephrine should not be injected in fingers because finger is an end artery system and vasospasm will be irreversible.^{12,13} However, there is growing body of evidence favouring regular and safe use of epinephrine in the fingers and epinephrine induced vasoconstriction obviates the need of a tourniquet.^{14,15} In this study, epinephrine was used in all the blocks and no complication of its use was found. This is inconsistency with growing body of international literature validating the safety of epinephrine in fingers. Its two-fold advantages are an increased duration of block and elimination of tourniquet.

CONCLUSION

Single subcutaneous injection in the midline of phalanx with lignocaine and epinephrine (volar block) is less painful to administer, effective, safe and easily reproducible technique to achieve digital anaesthesia.

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