Original Article

Effectiveness of Wrist Block in Patients Undergoing Hand Surgery

Siritongtaworn C, MD[1], Limsuvan P, MD[1]

[1] Division of Trauma Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Background: There are many anesthesia options for hand surgery. Wrist block is a procedure involving median, radial, or ulnar nerve block at the wrist level, which surgeons can perform by themselves prior to the operation and it also reduces costs and hospital stay, but there is scarce literature about its effectiveness among various types of operations.

Objective: To evaluate the effectiveness of wrist block at 30 and 120 minutes after injection in patients undergoing hand surgery.

Materials and Methods: A retrospective chart review of 23 patients from the Trauma unit of Siriraj Hospital undergoing hand surgery under anatomical-landmark-based wrist block performed by a single plastic surgeon.

Results: Wrist block was effective in 17 patients (73.9%). Among the block-failure patients, additional digital nerve block and local anesthesia were given and all patients could then tolerate the operation. At the follow-up examination, no hematoma at the puncture site nor neuroma was found.

Conclusion: Wrist block is one of the safest and most effective anesthesia options for various types of hand surgery, but the conventional anatomical-landmark-based technique may be ineffective in some patients due to either anatomical variation or the precision of injection.

Keywords: Wrist block, Hand surgery, Effectiveness

J Med Assoc Thai 2020;103(Suppl.2): 60-3
Website: http://www.jmatonline.com

Currently, hand surgery can be performed under various anesthetic options, including local anesthesia, regional anesthesia, and general anesthesia. Each anesthetic option has different advantages and disadvantages, so the surgeon and the anesthesiologist have to consider which technique is the most appropriate for each situation depending on the patient factors, type of operation, and hospital facilities.

Local anesthesia is easy and safe to perform and is suitable for minor surgery, but it causes tissue swelling around the surgical site.

General anesthesia is applied for major surgery but it requires an anesthesiologist and the need for close monitoring during the operation. Besides, it increases the hospital cost and prolongs the hospital stay.

Wrist block is a peripheral nerve block of the median, radial, or ulnar nerve at the wrist level, which surgeons can perform by themselves prior to an operation. However, using a wrist block is sometimes limited due to arm tourniquet pain. Nowadays, wrist block using the conventional anatomical-landmark-based technique is widely used among hand surgeons, but it can cause complications, including hematoma from vascular injury and nerve injury due to intraneural injection, and there is little literature about its safety and effectiveness among various types of operations[(1)].

Correspondence to:

Siritongtaworn C.

Division of Trauma Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

Phone: +66-2-4197727

E-mail: chidpong.sir@mahidol.ac.th

Materials and Methods

All patients who underwent hand surgery under wrist block between June 2016 to June 2017 at the Trauma unit, Department of Surgery, Faculty of Medicine, Siriraj Hospital, were included in this study. All wrist blocks were administered at the operative theater prior to operation under an anatomical-landmark technique[(2)] by the same plastic surgeon.

Patients' medical records were reviewed retrospectively. There were 21 male and 2 female patients, with an average age of 38 years old (ranging between 21 to 61 years old). Two patients received aspirin prior to the operation due to an underlying disease. The areas of the surgeries are summarized in Table 1.

Wrist block was administered by injecting 5 ml of 1% lidocaine without adrenaline in to each nerve. The next procedure varies depending on the nerve targeted, i.e., the median, ulnar, or radial nerve.

The median nerve block landmark is about 2.5 cm proximal to the wrist crease between the tendons of palmaris longus (PL) and flexor carpi radialis (FCR). The needle is

How to cite this article: Siritongtaworn C, Limsuvan P.Effectiveness of Wrist Block in Patients Undergoing Hand Surgery. J Med Assoc Thai 2020;103(Suppl.2): 60-3.

inserted until it results in a fascial click, then an anesthetic agent should be able to be injected easily.

The ulnar nerve passes medial to the ulnar artery and deep under the tendon of the flexor carpi ulnaris (FCU). To block the ulnar nerve, the needle is inserted from the medial site of the wrist just under the FCU tendon.

The radial nerve (superficial branch) gives rise to multiple small digital branches that pass superficially over the anatomical snuffbox. To block the radial nerve, the wrist is held in slight dorsiflexion, the needle is inserted at 3 cm proximal to the radial styloid, and the anesthetic agent is injected in a field block subcutaneously.

After wrist block was given, patients' analgesia was evaluated and their numeric pain score assessed at 30 and 120 minutes after the injection. Block failure is defined by the patient not being able to tolerate the operation and requiring another modality of analgesia.

Various types of operation were performed, including bony fixation, debridement and suture, tendon repair, nail bed procedure, skin graft, and closed reduction with slab application.

After the operation, all the patients had a follow-up examination at the hand clinic. Postoperative complications were evaluated and the patient's satisfaction was recorded.

Results

There were 59 nerve blocks given to 23 patients in the present study, divided into 20 median nerve blocks, 19 ulnar nerve blocks, and 20 radial nerve blocks. Combinations of median, ulnar, and radial nerve blocks were given in 16 operations. All of the nerve blocks are summarized in Table 2.

The average operative time was 74 minutes (ranging between 15 to 240 minutes). A tourniquet was inflated in one patient at the forearm level to maintain a bloodless operative field, with a tourniquet time of 45 minutes. The association between the nerve block, the procedures, and the block failure are shown in Table 3 and Table 4.

The success rate of the wrist block was 73.9% and the block failure rate was 26.1%. Among the unsuccessful wrist blocks, an additional digital nerve block was given in 4 patients, local anesthesia was given in 1 patient, combined digital nerve block and local anesthesia was used in 1 patient, but no wrist block was repeated. All the patients could tolerate the operation. Neither additional opioid nor general anesthesia were required in this study.

Among the successful blocks, the numeric pain score was assessed and it was found that the pain score was zero at 30 minutes and 2 hours after injection in 17 patients.

At the follow-up examination, there was no hematoma at the puncture site or nerve injury found. In total, 20 patients felt satisfied with the wrist block. Among the 6 failed cases, 3 patients expressed dissatisfaction with the wrist block.

Table 1. Area of surgery

Area of surgery	Number
Thenar	1
Hypothenar	1
Midpalmar	3
Dorsal	2
Finger	10
Wrist	1
Thenar + mindpalmar + finger	1
Dorsal + finger	1
Hypothenar + midpalmar	1
Hypothenar + finger	2

Table 2. Nerve blocks

Nerve block	Number
Median	0
Ulnar	3
Radial	0
All	16
Median + ulnar	1
Median + radial	3

Table 3. Association between the nerve blocks

Nerve	Successful block	Block failure
Median	0	0
Ulnar	2	1
Radial	0	0
All	11	5
Median + ulnar	1	0
Median + radial	3	0

Table 4. Procedure success and failure

Procedures	Successful block	Block failure
Bony fixation	0	0
Repair tendon	2	1
Debride and suture	0	0
Nail and nailbed procedure	11	5
Skin graft	1	0
Close reduction with slab	3	0

Discussion

Wrist block analgesia is very useful among various types of hand surgery, not only for skin and soft tissue but also for bony fixation and tendon repair. In particular for tendon repair, the surgeon can ask for patient cooperation to evaluate the strength of the tendon intraoperatively[3,4].

There were six cases of block failure in this study,

as described in Table 5. One patient underwent flexor tendon reconstruction at the little finger with palmaris longus tendon graft, using ulnar nerve block. Additional local anesthesia at the volar side of the wrist was performed while harvesting the tendon graft, because this area is not supplied by the ulnar nerve.

Most of the failure cases were fingers involved in the median nerve distribution (5 from 6 cases), while one patient had an additional local anesthesia at the superficial radial nerve distribution. The authors hypothesized that such issues arose with these median nerve cases because the median nerve anatomy is in a deeper layer under the flexor retinaculum and the injection is not as precise as with the ulnar nerve landmark, which is located just under the FCU tendon. The radial nerve gives rise to multiple small superficial branches in the subcutaneous layer. The anesthetic agent is injected in a field block fashion, so it is easier to block the ulnar and the radial nerve than the median nerve.

As a result of the anatomical variation and the precision of the injection, the use of ultrasound guidance may increase the success rate of wrist block[5].

The advantages of wrist block include that it provides effective anesthesia of the hand and wrist, facilitates outpatient wide-awake surgery, is an easy method, saves costs, and has low complications.

The present study has several limitations. In general, hand surgery usually requires tourniquet application at the forearm or upper arm level, but only one patient received a tourniquet in the present study. Consequently, from our study, we cannot conclude on whether the patients are able to tolerate the tourniquet discomfort during the operation under wrist block or not[6].

Due to variations in the injection technique among surgeons, the amount and type of anesthetic agent used, and the lack of medical records, we decided to use the data only from one surgeon, which therefore do not represent the overall successful rate with wrist block and resulted in a small sample size.

Conclusion

Wrist block is one of the safest and most effective anesthesia options for various types of hand surgery, but the conventional anatomical-landmark-based technique may be ineffective in some patients due to either anatomical variation or the precision of injection.

What is already known on this topic?

Elective orthopedic hand surgery, such as for De Quervain syndrome, can be perform successfully under wrist block.

What this study adds?

Wrist block provides effective anesthesia of the hand and wrist, facilitates various kinds of outpatient wide-awake hand surgery.

Most of the failure cases were fingers involved in the median nerve distribution because the median nerve is

Table 5. Cases that need additional anesthesia

Case No.	Procedure	Nerve block	Tourniquet time (min)	Operative time (min)	Additional digital nerve block	Additional local anesthesia
5	ORIF with K-wire fixation left little finger Repair FDS, FDP tendon left middle finger Suture wound left ring finger	All	45	135	Middle finger	-
6	Repair FDS, FDP tendon right middle, ring, little fingers	All		240	Middle, ring finger	-
10	Debridement and external fixation right ring finger	All	-	90	index, middle finger	-
19	ORIF with K-wire fixation right index, middle, little fingers Repair FDS, FDP tendon with palmaris longus tendon graft right little finger	Ulnar	-	150	-	Palmaris longus tendon area
21	Repair extensor indicis tendon right hand Debridement and suture wound	All	-	105	Index finger	Dorsum of hand
22	Nail extraction with repair nail bed right ring finger Close stump right index finger Repair central band of EDU right middle finger Suture wound right middle finger and thumb	All	-	100	Middle finger	-

located in a deeper layer under the flexor retinaculum and the injection is not as precise as the ulnar and the radial nerve, thus the use of ultrasound guidance may increase the success rate.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Giri S, Kyi M, Thibbiah M, Krishnamurthy G. Wrist block for Dupuytren's fasciectomies: Is this a viable option of regional anaesthesia? 2009; 17(2). Internet J Orthop Surg 2009;17:1-5.
2. Girolami A, Russon K, Kocheta A. Wrist block – Landmark technique Anaesthesia Tutorial of the Week (ATOTW) 275. London: The Association of Anaesthetists of Great Britain and Ireland (AAGBI); 2012.
3. Porter JM, Inglefield CJ. An audit of peripheral nerve blocks for hand surgery. Ann R Coll Surg Engl 1993;75:325-9.
4. Waikakul W, Waikakul S. Wrist block for surgery of the hand. Songkla Med J 1984;2:347-53.
5. Sohoni A, Nagdev A, Takhar S, Stone M. Forearm ultrasound-guided nerve blocks vs landmark-based wrist blocks for hand anesthesia in healthy volunteers. Am J Emerg Med 2016;34:730-4.
6. Derkash RS, Weaver JK, Berkeley ME, Dawson D. Office carpal tunnel release with wrist block and wrist tourniquet. Orthopedics 1996;19:589-90.

การศึกษาประสิทธิผลของการฉีดยาชาบริเวณข้อมือในผู้ป่วยที่ได้รับการผ่าตัดบริเวณมือ

ชิดพงศ์ ศิริทองถาวร, ปภัสสร ลิ้มสุวรรณ

ภูมิหลัง: การระงับปวดระหว่างผ่าตัดในผู้ป่วยที่ได้รับการผ่าตัดบริเวณมือสามารถทำได้หลายวิธี ปัจจุบันการฉีดยาชาบริเวณข้อมือ (Wrist block) เป็นวิธีการระงับปวดโดยเป็นการยับยั้งการทำงานของเส้นประสาทที่รับความรู้สึกบริเวณนิ้วมือ ฝ่ามือ หลังมือ และข้อมือ ได้แก่ Median nerve, Radial nerve, Ulnar nerve ซึ่งศัลยแพทย์ผู้ทำการผ่าตัดสามารถเป็นผู้ดำเนินการขั้นตอนดังกล่าวได้เอง ก่อนเริ่มการผ่าตัด ทำให้ผู้ป่วยไม่ต้องได้รับความเสี่ยงจากการดมยาสลบ ช่วยลดอัตรา การนอนโรงพยาบาล และลดต้นทุนค่าใช้จ่าย แต่พบว่ายังมีการศึกษาเกี่ยวกับประสิทธิผลโดยภาพรวมของหัตถการดังกล่าวทั้งในประเทศไทยและต่างประเทศที่น้อย

วัตถุประสงค์: เพื่อศึกษาประสิทธิผลของการระงับปวดด้วยวิธีการฉีดยาชาบริเวณข้อมือ (Wrist block) ในผู้ป่วยที่ได้รับการผ่าตัดบริเวณมือหลังฉีดยาชา 30 นาที และ 2 ชั่วโมง

วัสดุและวิธีการ: การศึกษานี้ได้ทำการทบทวนข้อมูลย้อนหลังจากแฟ้มประวัติผู้ป่วยทั้งหมด 23 ราย ที่ได้รับการฉีดยาชาบริเวณข้อมือโดยศัลยแพทย์ผู้ทำการผ่าตัดผู้เดียวที่แผนกศัลยศาสตร์อุบัติเหตุ โรงพยาบาลศิริราช

ผลการศึกษา: การฉีดยาชาบริเวณข้อมือสามารถใช้ในการระงับปวดระหว่างผ่าตัดได้ในผู้ป่วย 17 ราย (73.9%) ส่วนในผู้ป่วยอีก 6 ราย ที่ฉีดยาชาไม่ได้ผล ได้รับการฉีดยาชาเพิ่มเติมบริเวณเส้นประสาทนิ้วมือหรือบริเวณรอบบาดแผล ไม่มีผู้ป่วยรายใดที่ต้องดมยาสลบ และเมื่อผู้ป่วยมาติดตามอาการ พบว่าไม่มีผู้ป่วยรายใดเกิดภาวะแทรกซ้อนหลังฉีดยาชาบริเวณข้อมือ ได้แก่ hematoma และ neuroma

สรุป: การฉีดยาชาบริเวณข้อมือเป็นหัตถการที่ปลอดภัยและให้ประสิทธิผลดีในการผ่าตัดบริเวณมือ อย่างไรก็ตามการฉีดตามจุดอ้างอิงทางกายวิภาค (anatomical-landmark based technique) ที่ไม่ประสบความสำเร็จในบางรายอาจเกิดจากความแตกต่างทางกายวิภาคของผู้ป่วยแต่ละรายหรือเป็นผลมาจากจากความแม่นยำในการฉีด