Plastic Surgery Original Article
International Journal of Clinical And Diagnostic Research ISSN 2395-3403
Volume 8, Issue 2 , Jan-Feb 2020

ULTRASOUND GUIDED NERVE BLOCK FOR UPPER LIMB SURGERY – OUR EXPERIENCE

Chirra Likhitha Reddy, Ravi Kumar Chittoria, Abhinav Aggarwal, Saurabh Gupta

Padma Lakshmi Bharathi Mohan, Shijina K Imran Pathan

ABSTRACT

There is a recent increase in upper limb surgeries due to increase in industrial trauma. Most of these patients may be operated under nerve blocks. Conventional nerve blocks require skill and expertise and the proximity of the instillation of the local anesthetic drug to the nerve cannot be definitively ascertained. This may lead to inadequate anesthesia. The use of ultrasound for performing regional blocks is rapidly gaining popularity. We like to share our experience with ultrasound-guided nerve blocks for upper limb surgery in a tertiary care centre.

Authors Affiliations:

Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry, India-605006.

Keywords: Nerve block, ultrasound guided, hand surgery, supraclavicular block

***Corresponding Author:**

Dr Ravi Kumar Chittoria
MS, MCh, DNB, MNAMS, PhD, MBA, PGDTM, PDCR, PGDMLS
Professor & Registrar (Academic)
Department of Plastic Surgery & Head of Telemedicine
JIPMER, Pondicherry, India.
Email – drchittoria@yahoo.com
Mobile- 9442285670

INTRODUCTION

Hand surgery is one of the most common procedures done by plastic surgeons and

orthopedicians. It can be acute or chronic trauma, tumors and other corrective procedures for various deformities. The majority of these patients can be treated along with upper limb nerve block; a tourniquet can also be used. This prevents the complications of general anesthesia reduced the post-operative pain. However, earlier nerve blocks were given with taking anatomical landmarks into consideration. This was fraught with risk of various complications dreaded of which are vessel injury and pneumothorax. With the advent of high- resolution ultrasound, it has become easier to visualize the vessels and nerves and to identify the surrounding structures and prevent the various complications associated with a blind block. We have discussed our experience with ultrasound-guided nerve blocks for upper limb surgery in a tertiary care centre for upper limb surgery in a tertiary care centre.

Methodology

This is a retrospective study done in the department of Plastic Surgery in a tertiary care centre. It included 12 patients with hand injuries for whom different local procedures were done (Table 1). Informed consent was taken in all the patients. 10ml of lignocaine and 10ml of bupivacaine diluted in 10ml of distilled water is injected around the nerves targeted for the block (figure 1). The ultrasound probe used is 12Hz with facility for b-scan mode on the machine with the screen (figure1, 2). Post-operative analgesics given was Inj. Paracetamol 1gm TID x 3days which was later changed to oral medications.

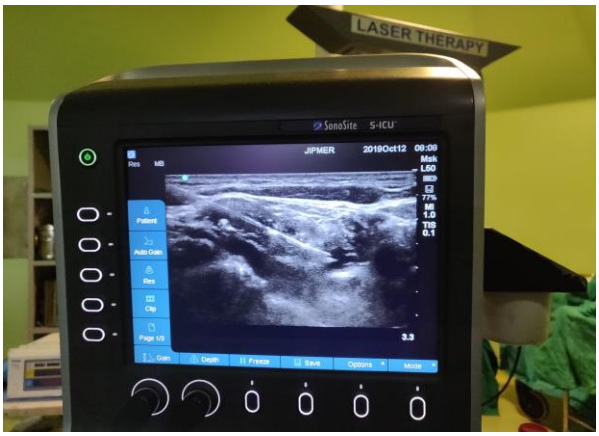

Figure 1: Ultrasound with screen showing the needle tip

Results

All the blocks given were successful. There as was a varying period of post-operative analgesia. No complications were noted in any patients.

Table I : Patients with hand injuries for whom different local procedures were done

S. No	Age	Sex	Diagnosis	Level of block	Post-operative analgesia	Sedation	Complications
1	24	F	PBC Left little and ring finger	Supra clavicular	Yes	Yes	Nil
2	28	M	Giant cell tumor thumb	Nerve block at elbow	Yes	No	Nil
3	48	M	Multiple metacarpal fractures	Supraclavicular	Yes	No	Nil
4	34	M	Zone 2 flexor tendon injury	Axillary	Yes	Yes	Nil
5	38	M	Post burn contracture Multiple fingers	Supraclavicular	Yes	No	Nil
6	51	F	Wrist cut injury with zone 5 flexor tendon injury multiple tendons and nerve injury	Supraclavicular	Yes	No	Nil
7	46	F	Wrist cut with ulnar artery injury	Supraclavicular	Yes	No	Nil
8	22	F	PBC left Elbow	Supraclavicular	Yes	No	Nil
9	36	M	AV malformation wrist	Supraclavicular	Yes	No	Nil
10	48	F	Carpal tunnel syndrome	Axillary	Yes	Yes	Nil
11	52	M	Zone 7 extensor tendon injury	Supraclavicular	Yes	No	Nil
12	28	M	Ulnar claw hand- old wrist cut injury	Supraclavicular	Yes	No	Nil

Figure 2: Ultrasound probe with the drug being injected

Discussion

The peripheral nerve block is a safe alternative to general anesthesia to provide good amount of intra-operative and post-operative analgesia. It utilizes minimal amounts of local anesthetic. Also, no hemodynamic monitoring or prolonged post-procedure observation is required. Adverse outcomes associated with nerve blocks include vessel puncture, hematoma formation, pneumothorax, parenthesis, and localized infection. Ultrasound technology has the potential to address these limiting factors and minimize side effects by allowing for the dynamic visualization of target nerves, needle tip, and the anesthetic as it is infused [1].

However, it requires personal skills, which are not so easy to learn, and high-quality, expensive ultrasound machines. Even if these machines are available, the inter-individual variability in patients' anatomy and the echographic appearance of the nerves can make the ultrasound-guided block a challenge for both the patient and the anesthesiologist/surgeon.

Ultrasound-guided nerve blocks were first described in anesthesiology literature in 1978 when La Grange *et al*. utilized a Doppler device while performing supraclavicular brachial plexus blocks[2]. In 1994 sonographic imaging was used to visualize the precise placement of anesthetic into the area surrounding a nerve[3]. Kapral *et al*. performed ultrasound-guided brachial plexus blocks on 40 patients scheduled for hand or wrist surgery and compared the supraclavicular approach with the axillary approach. They achieved 95% surgical anesthesia in both groups, without any reported adverse reactions. Subsequent studies have[4,5] Chan *et al*. used combined ultrasound imaging with more traditional nerve stimulation devices to successfully block the brachial plexus using a supraclavicular approach in 39 of 40 enrolled patients[5].

Marhofer et al.[6] suggested that ultrasound guidance offers several potential advantages:

Direct visualization of nerves: This may replace other methods of nerve localization, such as electrical stimulation or paraesthesia.

Direct visualization of anatomical structures: vessels, muscles, bones, fascias, tendons: This may help assess individual variations in anatomy and facilitate the the identification of nerves.

Real-time control of needle advancement: This may reduce the number of needle passes, shorten the block performance time and lower the risk of complications caused by a needle e.g., vascular puncture, neuropraxia or pneumothorax.

Assessment of LA spread around the nerves and immediate supplementary injections in case of insufficient spread: This may improve block effectiveness, shorten latency, prolong duration, allow LA dose reduction and lower the risk of overdose.

Avoidance of muscle twitches: This may reduce block discomfort.

We have observed that the effect of the the block given was adequate. There was no need for intraoperative top-ups. Few patients required sedation. All the patients had post-operative analgesia at least for 2 hours after the end of surgery. All patients except one were discharged on the same day ofon the same day of procedure.

Conclusion

Our case series demonstrated that the technique can be used in hand surgery with or without sedation. When successfully performed this procedure achieves adequate regional anesthesia with post-operative analgesia. However, further trials are required to evaluate the efficacy and safety profile of this procedure. And also further trials are required to assess if the procedure can be done by surgeons themselves.

Conflict of Interest Statement-

There is no conflict of interest.

REFERENCES:

1. Koscielniak-Nielsen ZJ. Ultrasound-guided peripheral nerve blocks: what are the benefits?. Acta Anaesthesiologica Scandinavica. 2008 Jul;52(6):727-37.

2. La Grange P, Foster PA, Pretorius LK. Application of the Doppler ultrasound bloodflow detector in supraclavicular brachial plexus block. Br J Anaesth. 1978;50:965- 7.

3. Kapral S, Krafft P, Eibenberger K, Fitzgerald R, Gosch M, Weinstabl C. Ultrasound-guided supraclavicular approach for regional anesthesia of the

brachial plexus. Anesth Analg. 1994; 78:507–13.

4. Perlas A, Chan VW, Simons M. Brachial plexus examination and localization using ultrasound and electrical stimulation: a volunteer study. Anesthesiology. 2003;99:429-35.

5. Chan VW, Perlas A, Rawson R, Odukoya O. Ultrasound-guided supraclavicular brachial plexus block. Anesth Analg. 2003; 97:1514-7.

6. Marhofer P, Greher M, Kapral S. Ultrasound guidance in regional anaesthesia. Br J Anaesth 2005; 94: 7-17.