

MODIFIED CERVICAL APPROACH FOR SUPRACLAVICULAR BRACHIAL PLEXUS BLOCKRouf Bashir¹, Imran Sheikh²¹Assistant Professor, Department of Anaesthesiology, SKIMS Medical College and Hospital, Bemina, Srinagar.²Lecturer, Department of Anaesthesiology, SKIMS Medical College and Hospital, Bemina, Srinagar.**ABSTRACT****BACKGROUND**

There have been several studies on cervical approach for supraclavicular brachial plexus block. It is given in the apical area between the medial and lateral heads of sternocleidomastoid muscle. The technique has lesser complications and higher success rate. I modified the technique slightly, by approaching through the apical area but 0.5 – 1 cm below the apex at the medial border of lateral head of sternocleidomastoid muscle, at the level of cricoid cartilage.

MATERIALS AND METHODS

The study was conducted at SKIMS Medical Collage Hospital, from July 2014 to July 2017. It was a prospective non-randomized open level study. Three hundred patients of both sexes, aged between 18 and 65 years with ASA grade I and II scheduled to undergo elective major surgery of the upper limb from proximal arm to the hand varying from patient to patient, were selected.

RESULTS

The onset, duration of sensory and motor block, any complications, and need for supplement anaesthesia were observed. Success and complication rates were calculated in percentage. Average onset and duration of sensory and motor block was calculated as mean \pm SD and percentage. Out of 300 patients, 260 (86.8%) got successful block with no significant complications.

CONCLUSION

In our study we conclude that performing supraclavicular block of brachial plexus using modified cervical approach is technically more feasible, gives better quality block, has very less chances of complications like pneumothorax and extent and density of block can be better managed. We observed better patient satisfaction.

KEYWORDS

Brachial plexus block, supraclavicular block, ropivacaine, paraesthesia.

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BACKGROUND

The supraclavicular approach to the brachial plexus characteristically is associated with a rapid onset of anaesthesia and a high success rate. The first percutaneous supraclavicular block was performed by Kulenkampff in Germany in 1911.¹ A few months later, Hirschel described a method of brachial plexus block with an axillaries approach. This technique was associated with a risk of pneumothorax.¹ Since then, many modifications to the original technique were proposed to decrease the risk of pneumothorax. Various approaches have been described such as supraclavicular, interscalene, trans-scalene, infraclavicular and axillary, but they all are associated with some technical difficulties, inadequate blocks and significant complications. The rate of conversion or

supplementation with general anaesthesia from brachial block is quite high. A lateral approach was described by Volker Hampel in 1981 and further evaluated and described by Dilip Kothari in 2003 for supraclavicular brachial plexus block associated with minimal complications and higher success rate.² The use of ultrasound guidance to regional anaesthesia in last decade has resulted in renewed interest in clinical application of supraclavicular block, as well as greater understanding of its mechanics.³

Aims and Objectives

To assess the success of our approach for supraclavicular block by observing following parameters-

1. Onset and duration of sensory and motor block and duration of analgesia.
2. Complications if any, and their percentage.

MATERIALS AND METHODS

Three hundred patients of both sexes, aged between 18 and 65 years with ASA grade I & II, scheduled to undergo elective major orthopaedic surgery of the upper limb from proximal arm below the shoulder up to the hand, were selected for this cervical approach for brachial plexus block. A well-explained written consent was obtained from all the

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patients on the hospital consent form, and also before performing the block, the patients were explained about the procedure to ensure cooperation, increase success rate and allay anxiety.

All the patients were kept nil per oral at least 6-8 hours prior to surgery 18G IV cannula was secured and infusion of Ringer lactate was started. Premedication of glycopyrrolate 5 mcg/kg was given IV half an hour before surgery to all patients in the recovery area of operating room.

Owing to non-availability of peripheral nerve stimulator and an ultrasound machine, all the blocks were given blindly using standard paraesthesia technique. The paraesthesias were elicited using 20G * 60 mm needle.

The patient was made to lie supine with arm pulled down gently by the side and head turned to opposite side around 60 degree. A small pillow was placed below the shoulder in the interscapular area to make the area more prominent.

The insertion point of needle for this modified cervical approach is 0.5-1cm below the apex of the triangle formed by the medial and lateral head of the sternocleidomastoid muscle at the level of cricoid cartilage. In line with the medial border of lateral head. The pulsation of the external carotid artery was felt by rolling the fingers in the triangle, to ensure we stay away from it. After cleaning and skin disinfection, a sterile drape was put on the patient. We gave local anaesthetic, 2% inj. lignocaine at the entry point 1-2 ml with the anaesthesiologist at the head end of the patient and slightly towards the operative side.

The needle was inserted with entry point at an angle of 30-60 degrees pointing towards midpoint of clavicle an eliciting a depending on the part to be operated. If surgery was to be performed on the proximal part of upper limb, paraesthesias were elicited from shoulder up to slightly below the elbow. And if distal part or hand was to be

operated paraesthesias were elicited more in the hand and forearm but also proximal part, so as to allow for tourniquet use. Needle was redirected in nearby area eliciting paraesthesias in the required areas of the upper limb. We would feel for comparatively less resistance while injecting the local anaesthetic in the sheath close proximity of nerve plexus, so as to prevent nerve damage. if the local anaesthetic is injected close on the nerve, one could feel some resistance and also pressure paraesthesias and pain during drug deposition, requiring slight withdrawal of needle and injection of the drug of course after negative aspiration, every time the drug is injected. We would inject 20-25 ml of 0.5% Ropivacaine. A gentle pressure was kept on the area for ½ minute to ensure uniform spread. All the patients were given Inj. Midazolam 1 mg 1/V after successful block. The onset of sensory and motor block was observed.

A successful block was defined as the absence of cold perception and response to pinch (sensory block) and inability to the arm or forearm (motor block). Also, the upper limb had to be free of pain during passive movement for positioning and surgical preparation. Onset of sensory block and motor block was observed every 2 minutes. Time of onset of block and duration of block was observed. If the patient would complain of pain requiring stopping the surgery, the block was considered inadequate and the patient was given general anaesthesia. Or if the patient had a slight pain in the beginning after successful block was confirmed, we would give him/her Inj. Fentanyl 1 mcg/kg. Oxygen via facemask was given in patients above the age of 50 years at 3-4 L/Min. Success and complication rates were calculated in percentage. Average onset and duration of sensory and motor block were calculated as mean ± SD and percentage.

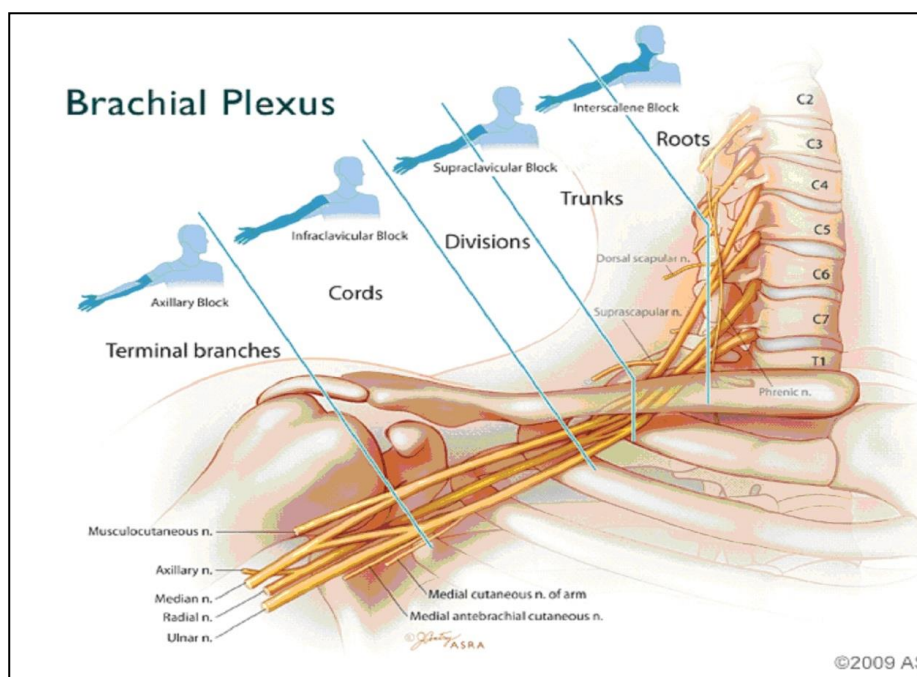


Figure 1. Brachial Plexus Schematic and Block Locations⁴

RESULTS

The 300 patients in whom the study was conducted were having age range of 18 years to 65 years, ASA I – II. Different indications for the surgeries were fracture both bones forearm (80), fracture radial head (15) fracture lateral epicondyle (12), supracondylar fracture (36), fracture of either radius or ulna alone (26), carpal tunnel syndrome (15), metatarsal fracture (18), fracture of humerus (38), fracture proximal humerus (32) among other surgical procedures.

In 260 out of 300 patients, the block resulted in successful intraoperative anaesthesia and 200 patients did not require any supplemental analgesia. But 60 patients had to be give IV Fentanyl. In 40 patients out of 300 patients, we had to give general anaesthesia with LMA placement and spontaneous breathing maintained on volatile anaesthetic, isoflurane.

Onset time of sensory block(min)	11.20 ± 2.18
Onset time of motor block(min)	15.65± 2.50
Duration of sensory block(min)	291.25± 42.82
Duration of motor block(min)	292.67±59.13
Duration of analgesia(min)	298.65± 59.46

Table 1. Onset Time and Duration of Sensory and Motor Block and Duration of Analgesia (Minutes)

Sensory Block

Most of the patients had complete pain relief about 10-12 min after injection the drug. Average time for complete analgesia was 11.20 ± 2.18 min (mean ± SD). Average sensory block duration was 291.25 ± 42.82 min. 20 patients (7.69%) complained of tourniquet pressure pain before 120 minutes but surgery could be performed after cuff deflation.

Motor Block

Average onset time for motor loss was 15.65± 2.50 minutes (mean± SD). Complete motor loss was present in 202 patients (77.69%). Average duration of motor block was 292.67± 59.13 minutes or 6.4± 0.30 hours.

Duration of Analgesia

Average duration of analgesia was 298.65±59.46 Minutes. Duration of analgesia was 4-12 hours as observed by patients' first call for supplemental analgesia.

Grade of Block

Out of the 260 patients who had a successful block and in whom surgery was performed under the block, 170 patients (65.38%) had Modified Bromage Grade of 3 and 58 patients (22.3%) had a Grade 2 and the rest 32 patients (12.3%) had a Bromage Grade of 1.

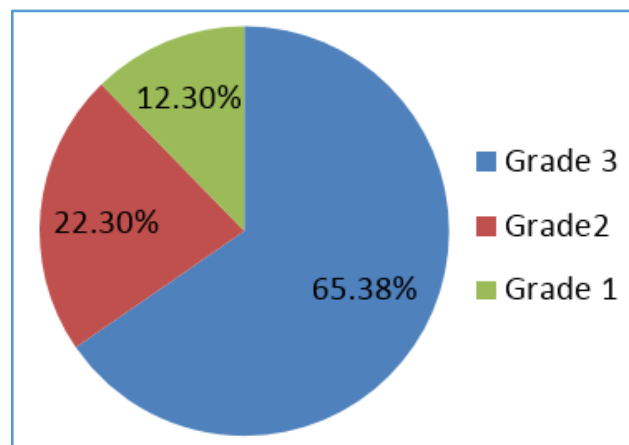


Figure 2. Pie Chart Showing Percentage of Modified Bromage Grade of the Patients

Grade 3=65.38%, Grade 2=22.30% and Grade 1=12.30%.

Complication

Vessel puncture was encountered in 12% of cases, but block could be successfully be performed after redirecting the needle. 4 patients out of 260 patients (1.53%) developed Horner’s syndrome which resolved on its own within 48 hours of the procedure. None of the patients experienced respiratory distress or destruction or pneumothorax or any other cardio - respiratory side effects after the block.

DISCUSSION

There have been various approaches described for brachial plexus block like supraclavicular, infraclavicular, interscalene, axillary and trans scalene, in search of better success rate, more dense block and less complication rate.⁵ Usually, supraclavicular technique is considered technically easy with less serious complications and better success rates. We block the trunks and division of the brachial plexus during the supraclavicular block. The division of the brachial plexus lie posterior, cephalic, and lateral to the subclavian artery, as they cross over the first rib.⁶

In our study, we performed the block of the brachial plexus at trunk and division level, and more so blocked the parts where surgery was to be performed in a better way. Once the needle meets the plexus it elicits paraesthesias and hence we could deliver the drug at its respective location.⁷

The incidence of vessel puncture was 12% in our study. Dr DK Sahu² has described 15% incidence and Dr Kothar⁵ 8% incidence of vessel puncture. Brand and Papper⁸ injected local anaesthetic by Murphy’s supraclavicular route but had 6.1% incidence of pneumothorax. Moore⁹ described 1.5% incidence of pneumothorax. We did not get any pneumothorax. 4 of our patients developed Horner’s syndrome (1.53%); while Pham Dang¹⁰ observed Horner’s syndrome (10%), asymptomatic phrenic nerve paralysis (60%) and transient recurrent nerve paralysis (1.5%). Dupre¹¹ et al and Horner’s syndrome in 9 and 47% cases in their respective studies.

In our modified cervical approach, we achieved a success rate of 86.8% using blind paraesthesia eliciting technique. The block was denser in the area of surgery. DK Sahu² had a success rate of 92% in his lateral approach using peripheral nerve stimulator. Dr Kothari⁵ achieved a success of 98%. Brand and Papper⁸ had a success rate of 84.4% of course; the success rate with our technique will be quite high using peripheral nerve stimulator and/or ultrasound guidance.

CONCLUSION

We conclude in our study that performing supraclavicular brachial plexus block using modified cervical technique gives an excellent pain relief, high success rate, minimal adverse effects and better patient compliance and satisfaction. The block is better in quality and there is more control. The pain relief is for prolonged period and we used relatively lesser amount of the drug as compared to some other studies. Some patients who were previously operated under this block requested for the same block when they were operated for the second time.

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