

### “EFFECT OF BUPRENORPHINE ON POST OPERATIVE ANALGESIA IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK USING PERIPHERAL NERVE LOCATOR”

Ritesh Dixit, Vivek Chakole, Gayatri.V. Tadwalkar

1. Assistant Professor, Department of Anesthesiology, R.D.Gardi Medical College, Ujjain (MP).
2. Assistant Professor, Department of Anesthesiology, R.D.Gardi Medical College, Ujjain (MP).
3. Associate Professor, Department of Anesthesiology, Government Medical College, Aurangabad.

#### CORRESPONDING AUTHOR

Dr. Ritesh Dixit,  
B-5/20, R.D.Gardi Medical College,  
Ujjain , Madhya Pradesh,  
E-mail: riteshdixitmd@yahoo.co.in  
Ph: 0091 9424881623.

**ABSTRACT:** Supraclavicular brachial plexus block is known for its simplicity, effectiveness, safety, reliability and being economical for day care and emergency surgery, circumventing problems of full stomach. In our randomized prospective, double blind study, total 60 adult ASA class I and II patients undergoing upper limb surgeries were given supraclavicular brachial plexus block with peripheral nerve locator and studied for effect of addition of buprenorphine on post operative analgesia. 30 Patients received 0.25% bupivacaine 40 ml in group Bupivacaine (B) and added buprenorphine 3 µg/kg in the other group Bupivacaine + Buprenorphine (BB). All the patients were monitored for onset of effect, post op analgesia, time of first analgesic drug and number of analgesic drug require in first 24 hrs. Onset and duration of motor and sensory block were same in both groups. Post operative analgesia was significantly better in BB. Consequently, number of doses of analgesic required in first 24 hours was less in buprenorphine group (BB).

**KEYWORDS:** Supraclavicular Brachial plexus Block, Peripheral Nerve locator, Buprenorphine, Post operative analgesia.

**INTRODUCTION:** Surgical intervention to reduce human suffering is associated with pain and distress to patients. Anesthesiologists try to counter post operative pain by various modalities. Brachial plexus block is one of the most popular peripheral nerve block techniques. Given first by Prof. Halsted in 1884 and improved by Herschel, kulenkampff and Winnie, it became a first choice of anesthesia for upper extremity surgery as it minimally alters systemic physiology, good choice for day care and emergency surgery, even in full stomach patients and in seriously ill patients where general anesthesia is undesirable.

Many techniques are described but supraclavicular approach is more popular and safer as compared to others. Many additives to local anesthetic solutions have been tried for prolonging post operative analgesia. Clinical results have confirmed that opioid receptors on peripheral nerve terminals can mediate potent anti nociceptive effects<sup>5</sup>. This has been proved clinically by use of morphine<sup>3</sup>, fentanyl<sup>8, 10</sup>, sufentanil <sup>2</sup>, tramadol<sup>11</sup>. Due to its greater analgesic potential and longer duration, buprenorphine appears to be a better choice as additive in brachial plexus block. We added buprenorphine to local anesthetic solution and studied its effect on post operative analgesia and various parameters.

## ORIGINAL ARTICLE

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**MATERIALS AND METHODS:** This study was conducted on 60 ASA grade 1/2 patients, of age between 20 to 60 years, undergoing upper limb orthopedic surgeries, after approval of ethical committee. All patients were assessed in detail. All patients with contraindications to brachial block, such as refusal to technique, local infection, fever, chest injuries, hypersensitivity to local anesthetic drugs, coagulopathy or on anti coagulant drugs and sever cardio respiratory or systemic disorders, were excluded out of study. Patients were randomly divided into two groups of 30 each. One group was given 40 ml of bupivacaine 0.25% and named B. Other group was also given buprenorphine 3 micro / kg in addition and was named group BB.

All patients were given supraclavicular brachial plexus block with B Braun peripheral nerve locator, Stimuplex-DIG RC. After raising a wheel, the insulated needle was inserted at mid clavicular point, about one inch above the bone. Nerve locator was started at 2 mili ampere and 1 Hz frequency. We watched out for contractions of muscles below elbow, thus avoiding contractions of pectoral muscles. We reduced the current while introducing the needle caudally and towards ipsilateral nipple. Muscle contractions at 0.5 mili ampere was considered to be indicator of optimum positioning. Needle was fixed and after careful aspiration, any of the two solutions was injected. Disappearance of contractions after giving local anesthetic solution further confirmed correct placement

Following parameters were observed, documented and assessed. 1). Time for onset of sensory block- over skin supplied by median, Ulnar and redial nerve,2). Time for onset of motor block – muscle power grade < 2 were accepted, 3). Total surgical time, 4). Tourniquet discomfort, 5). Duration of sensory block, 6). Duration of motor block, 7). Duration of post operative analgesia- as per VAS score  $\leq 5$ , 8).Number of rescue analgesic drugs in first 24 hours and 9).Pre or post operative complications if any. Vigilant monitoring of patients was done.

General anesthesia was given in case of incomplete block or prolonged surgery and excluded out of study. Inj midazolam 0.02 mg/kg was used for anxiolysis and Inj.diclofenac sodium 3cc IV as a rescue analgesic. Post operative nausea or vomiting if any was treated with inj. Ondansetron 2ml IV. Results obtained were assessed using SPSS.

Observations

**RESULTS:** All the findings were recorded and assessed. The demographic profiles of age, sex and weight were comparable. Similarly, no significant difference was observed in onset of sensory or motor block. Duration of motor and sensory block and durations of surgical procedure were also similar.

There was significant difference in duration of post operative analgesia in both groups. The duration of post operative analgesia in group BB was  $914.10 \pm 64.3$  minutes which was significantly longer than  $398.3 \pm 43.5$  minutes of group B ( $p < 0.0001$ ). Similarly, consumption of analgesics in first 24 hours was also significantly lower in group BB ( $1.3 \pm 0.59$ ) as compared to group B ( $3.8 \pm 0.41$ ). ( $p < 0.005$ )

**DISCUSSION:** Regional anesthesia has come a long way with use of peripheral nerve locators and better local anesthetic solution. We used B Braun's peripheral nerve locator for giving supraclavicular brachial plexus block. It made the block safer with the needle only stimulating the nerve at a distance, not impinging on it directly with the needle as done to elicit paresthesia. Also, the technique becomes free of subjective limitations of anesthesiologist and unpredictable compliance of patient. We found the use of nerve locator to be more objective, helpful in confirmation of correct placement of drug and as an easily reproducible technique. The use of

## ORIGINAL ARTICLE

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opioids as adjuvant has clearly increased the usefulness of brachial block in terms of prolonged post operative analgesia. Buprenorphine is semi synthetic, highly lipophilic opioid agonist-antagonist, which is 25 to 50 times or more potent than morphine thus making it a good choice as an additive to local anesthetic solution.

The demographic profile was similar in both the groups. We did not find any significant differences in onset of sensory and motor block. Also duration of sensory and motor block was similar. Duration and types of surgery were also similar. Various studies using various opioids have also not found any changes in these parameters thus indicating that addition of an opioid doesn't affect them. This supports our use of an agent which will act so as to specifically prolong post operative analgesia without any adverse effects.

Use of a long acting local anesthetic agent like bupivacaine has already increased the duration of analgesia after brachial block. It is further prolonged by use of buprenorphine. Various studies have assessed the effect of buprenorphine on post operative analgesia after brachial block and found that duration of post operative analgesia is increased significantly as compared to local anesthetic agent alone <sup>4,7,9,10,14</sup>. Its use in regional anesthesia helps us to keep the complications especially nausea and vomiting very low as compared to systemic dose. We found the incidence of nausea and vomiting more in group BB as compared to group B but the difference was not significant and all the patients responded well to inj. Ondansetron 4 mg slow IV. The use of only two drugs in brachial block with good success rate and prolonged post operative analgesia makes it a good choice for day care surgery, if discharged after confirming that the patient can be taken care of by a responsible adult with access to medical help.

**CONCLUSIONS:** Use of peripheral nerve locator in block makes it more objective and precise. Use of buprenorphine in brachial plexus block prolongs post operative analgesia by more than 2 fold.

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## ORIGINAL ARTICLE

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### OBSERVATIONS:

Group	Group B	Group BB
Age in years	36.2	37.4
Sex		
Male	86%	76%
Female	14%	24%
Weight in Kg.	57	56
Onset of sensory block in mins	15.03	15.43
Onset of motor block in mins	17.4	17.2
Duration of surgery in mins	94	90
Tourniquet discomfort (no. of cases)	05	03
Duration of sensory block (min)	174	178
Duration of motor block (min)	162	165
Duration of post operative analgesia (VAS >5) in mins	398.3± 43.5 (6.637 hours)	914.10±64.3 (15.235 hours)
Consumption of no. of analgesics in 24 hours	3.8±0.41	1.3±0.59
Complications as nausea(N), vomiting(V), respiratory depression, pruritus	1 (N-1)	3 (N-2,V-1)