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Original Research Paper

Anesthesiology

COMPARISON BETWEEN BUPIVACAINE AND BUPIVACAINE WITH TRAMADOL IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

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ABSTRACT This study was done to compare the onset of complete sensory block, onset of complete motor block, duration of analgesia and motor block between 30 mL of 0.375% Bupivacaine in Group B and 30 mL of 0.375% Bupivacaine with 2 mg/kg Tramadol in Group BT for Supraclavicular Brachial Plexus Block. Patients with failed block, complications related to block technique or local anaesthetic were excluded from study. Complications related to Tramadol (nausea, vomiting, respiratory depression) were recorded. Onset of complete sensory and motor block were significantly faster in Group BT. In comparison to Group B, duration of analgesia and motor block were significantly more in Group BT. In this study, complications related to Tramadol were not seen. Tramadol as an adjunct to local anaesthetic is effective in brachial plexus block.

KEYWORDS : Adjunct to local anaesthetic, Tramadol, Supraclavicular Brachial Plexus Block

A.Introduction

Pain was 'emphatically the Nemesis by which man is pursued from the cradle to the grave', stated by physician William Dale in articles published in the *Lancet* in 1871.[1] Braun demonstrated that the addition of small amounts of adrenaline to local anaesthetic could act as a "chemical tourniquet" and help in increasing the anaesthesia duration.[2] The Supraclavicular Approach is anesthetically efficient, as the distal trunk–proximal division level of the plexus are blocked. It provides excellent anaesthesia for arm, forearm and hand surgeries.[3,4] Opioid, clonidine, neostigmine, tramadol, epinephrine and bicarbonate have been used as an adjunct to local anaesthetics.[5,6] Tramadol is selected as an adjunct to local anaesthetic in this study because respiratory depression is not a major problem with its use.

B.Materials and Methods

Sixty patients aged between 18 and 60 years, admitted to Indira Gandhi Govt. General Hospital & Post Graduate Institute, Puducherry, undergoing upper limb surgeries were included in the study. A prospective, controlled, randomised double blind study was conducted with the approval of study protocol by the hospital ethical committee. Patients were randomly divided by random number computer table in two groups for Supraclavicular Brachial Plexus Block to compare the onset of complete sensory block, onset of complete motor block, duration of analgesia and duration of motor block between Group B (30 mL of 0.375% Bupivacaine) and Group BT (30 mL of 0.375% Bupivacaine with 2 mg/kg Tramadol).

I.Inclusion criteria

- ASA physical grade I and II patients for upper limb surgeries (arm, elbow, forearm & hand)
- Age 18-60 years, both sex included.

II.Exclusion criteria

- Patient refusal to participate in the study
- ASA physical grade III or more
- History of allergy to local anaesthetic, Tramadol
- Patients with coagulation abnormalities, sepsis and infection at the site of injection
- Patients with compromised cardio- respiratory profile
- Patients with neurological deficit, history of seizures
- Patients with obesity, pregnancy and those with local bony deformities

All the patients underwent thorough pre-anaesthetic evaluation on the day prior to surgery. Written informed consent was obtained from each patient before the procedure. Anaesthesiologist, who performed block, recorded & monitored study parameters was not involved in local anaesthetic solution preparation. Solution was prepared by another anaesthesiologist.

- **GROUP B**

0.375% Bupivacaine was prepared by addition of 10 ml of normal saline to 20 ml of 0.5% Bupivacaine in Group B.

- **GROUP BT**

In Group BT, 2 mg/kg of Tramadol (2 mL = 100 mg) was diluted with normal saline to make it into 10 ml, which was added to 20 ml of 0.5% Bupivacaine. This did not change the colour of prepared solution.

Standard monitoring for regional anaesthesia were applied and equipments were kept ready for procedure and emergency related to procedure. Parameters studied were onset of complete sensory block (time interval between deposition of drug and complete analgesia of upper limb in the different areas innervated and was assessed at every 2 minutes after deposition of drug), onset of complete motor block (assessed every 2 minutes by the time interval between deposition of drug and complete motor block of upper limb, Bromage three point score = 2), duration of analgesia (time elapsed from deposition of the drug to the first demand of analgesic by the patient or Visual Analogue Scale ≥ 4) and duration of motor block (time elapsed from deposition of drug to the complete recovery of motor block, Bromage three point score = 0). Block was considered successful when complete sensory and motor block were obtained within 30 minutes of drug deposition. The technique employed in this study was "Classic Supraclavicular Brachial Plexus Block."

Any complication related to the block technique or local anaesthetic were recorded and treated accordingly. The study parameters were not recorded and analyzed for these patients. The side effects related to tramadol (Nausea, vomiting, respiratory depression) were recorded. The quantitative data were expressed in terms of mean ± standard deviation and comparison was done employing "independent sample t-test". The statistical calculations were done with Statistical Package for Social Science (SPSS) version 19 software. The P values <0.05 were considered significant.

C.Observation and Results

Patient characteristics (age and weight) were similar in both groups (Table 1 and 2) and they were comparable.

Age in years	GROUP-B n=27	GROUP-BT n=28	p value (Independent Samples t Test)
18-28	14	11	
29-38	4	9	
39-48	7	3	p> 0.05*
49-58	2	2	
=60	-	3	
Mean ± SD	32.07±12.43	35.21 ± 12.97	

*p > 0.05 – Not significant

Table - 1

Weight in Kg	GROUP-B n=27	GROUP-BT n=28	p value (Independent Samples t Test)
40-49	4	7	
50-59	12	15	
60-69	10	3	$p > 0.05^*$
70-79	1	3	
Mean ± SD	56.44 ±7.95	54.79 ± 8.52	

Table - 2

1.Onset of complete sensory block

When compared with Group-B (n = 27, 19.56 ± 1.87 minutes), onset of sensory block was faster in Group-BT (n = 28, 11.29 ± 1.56 minutes). Earliest onset of complete sensory block was noted at 16 and 8 minutes in (Figure 1) Group-B and Group-BT respectively.

2.Onset of complete motor block

When compared with Group-B (n = 27, 10.52 ± 1.71 minutes), onset of complete motor block was faster in Group-BT (n = 28, 6.29 ± 1.41 minutes). Earliest onset of complete motor block was noted at 8 and 4 minutes in (Figure 2) Group-B and Group-BT respectively.

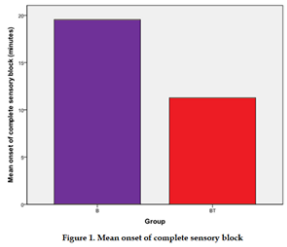

Figure 1. Mean onset of complete sensory block

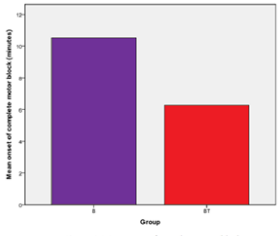

Figure 2. Mean onset of complete motor block

3.Duration of analgesia

In comparison to Group-B (n =27, 137.30 ± 16.26 minutes), duration of analgesia was more (Figure 3) in Group-BT (n = 28, 335.71 ± 24.28 minutes).

4.Duration of motor block

In comparison to Group-B (n = 27, 99.67 ± 13.97 minutes), duration of motor blockade was more (Figure 4) in Group-BT (n = 28, 276.57 ± 19.22 minutes).

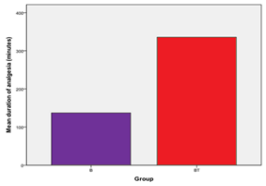

Figure 3. Mean duration of analgesia

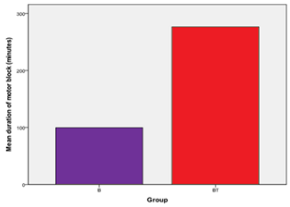

Figure 4. Mean duration of motor block

There was statistically significant ($p < 0.05$) difference in onset of sensory block, onset of motor block, duration of analgesia and duration of motor block between the two groups. Five patients (3 in Group B and 2 in Group BT) had failed block and required general anaesthesia for completion of surgery. The study parameters were not recorded and analyzed for these patients. No complications related to tramadol (nausea, vomiting, respiratory depression) and technique (pneumothorax, intravascular injection) were observed in any of the patients in either group.

D.Discussion

Tramadol is a centrally acting analgesic drug. In addition to μ-opioid receptor agonist effect, it has modulatory effect on central monoaminergic pathways and inhibitory effect on the neuronal uptake of noradrenaline and serotonin.[5]

Tramadol was postulated to have local anaesthetic type effect because it produced a significant reduction of propofol injection pain similar to lidocaine. [7, 8] Stephan Kapral and co-workers (1999) [9] suggested that tramadol might modify the action of local anesthetic at the sodium channel either directly or indirectly.

Yu-Chuan Tsai and co-workers (2001) [10] in their study on male Wistar concluded a local anaesthetic type effect of tramadol on peripheral nerves which is not mediated by receptors.

The effect of tramadol as an adjunct in brachial plexus block has been studied with mepivacaine (1-1.5%), lignocaine (1-2%), ropivacaine (0.75%) and bupivacaine (0.25–0.5%). Suman Chattopadhyay and co-workers [11] used paresthesia for correct needle placement for supraclavicular block. In all studies single injection technique was used for brachial plexus block except by Farnad Imani and co-workers (2005). [12] In our study paresthesia was used for correct needle placement and single injection technique for brachial plexus block.0.375% of bupivacaine was used in our study.

Se´bastien Robaux and co-workers (2004) [13] suggested that tramadol added to1.5% mepivacaine for brachial plexus block enhances duration of analgesia in a dose dependent manner.

The onsets of complete sensory (n = 28, 11.29 ± 1.56 minutes) and motor block (n = 28, 6.29 ± 1.41 minutes) were significantly faster in Group BT in our study. The onset of motor block was faster than sensory block in the study by Suman Chattopadhyay and co-workers. [18] These findings are same in our study. But Olfa Kaabachi and co-workers (2009) [14] found that high dose of tramadol (200 mg) was associated with a delayed onset of anesthesia. There was no significant difference in the duration of onset time among the three groups in the study of Stephan Kapral and co-workers (1999). [9]

The duration of motor block was significantly prolonged in Group BT (n = 28, 276.57 ± 19.22 minutes) than Group B (n = 27, 99.67 ± 13.97 minutes) of our study. Similar finding were noted in the study of Stephan Kapral and co-workers (1999). [9] Higher tramadol (200 mg) dose prolongs motor block more than the lower dose (100 mg). [13]

Antonucci S (2001) [15] compared tramadol with clonidine and sufentanil as an adjunct in axillary brachial plexus block. He concluded in his study that tramadol as an adjunct provides a significant reduction of onset time and prolongs analgesia as in our study. These benefits of tramadol were similar to clonidine and sufentanil with lower incidence of side effects than clonidine and sufentanil. Stephan Kapral and co-workers (1999) [9] observed in their study that tramadol with local anaesthetic did not produce hemodynamic changes, sedation, nausea and vomiting. Nausea and vomiting were reported in intravenous tramadol group only. Findings were similar in our study. No patient in Group BT complaint of nausea and vomiting. Respiratory depression was not found in any patient. This may be because of weak μ receptor affinity of tramadol. Se´bastien Robaux and co-workers (2004) [13] found that incidence of adverse effects increased with higher doses (200 mg).

E.Conclusion

From this study it was concluded that addition of tramadol in brachial plexus block prolongs the duration of analgesia. Onsets of complete sensory and motor block are faster when tramadol is added to local anaesthetic and duration of motor blockade is also prolonged. Tramadol as an adjunct to local anaesthetic is effective in brachial plexus block.

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