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ORIGINAL RESEARCH ARTICLE

A COMPARASION ON BRACHIAL PLEXUS BLOCK USING LOCAL ANAESTHETIC AGENTS WITH AND WITHOUT MIDAZOLAM

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ABSTRACT

Brachial plexus block provide surgical anesthesia and analgesia of upper extremity. Any adjuvant to brachial plexus block have less systemic side effect as well as reduce the total dose local anaesthetics. The midazolam acts on GABA-A receptors in peripheral nerve. The sensory and motor block was significantly faster in our study who received midazolam. This could be local anesthetic properties of midazolam and synergistic action with local anaesthetics. Total 100 patients between ages 10-77 years of either sex of ASA I-III, underwent upper arm surgery were given supraclavicular brachial block with and without midazolam. The onset and duration of sensory block in Gr I (XB) and Gr II (XBM) were significantly different. The onset time for sensory block was significantly prolong and duration of block significantly less compared to Gr II ($P<0.05$). The onset time for motor block was significantly less and duration significantly higher in Gr II (XBM) as compared to Gr I (XB). Midazolam 50ugm/kg in brachial plexus block speed sensory and motor block with post operative analgesia.

Key Words: *Brachial plexus block, sensory and motor, xylocaine and bupivacaine midazolam.*

INTRODUCTION

An effective brachial plexus block provides a useful alternative to general anesthesia for upper arm surgery producing complete muscular relaxation. It provides surgical anesthesia in upper extremity surgery, post-operative analgesia and chronic pain management. [1] In addition to surgical procedure on conscious patients and early eating after the procedure make regional anesthesia more attractive.

Because of advantage over various analgesic techniques and fewer side effects, new long acting local anaesthetics agent has been also investigated for these purpose. [2] Brachial plexus block also maintains stable intraoperative hemodynamic and associated sympathetic block. [3] The sympathetic block decreases postoperative pain, vasospasm and edema. [3,4] Any adjuvant to brachial block should prolong the analgesic effect without systemic side effect or prolong motor block and reduce the total dose of local anaesthetic. Various studies have been carried out using different adjuvant. Here, we are using midazolam, a water-soluble benzodiazepine, known to produce antinociception, to enhance the effects of local anaesthetic when given in peripheral nerves, as receptors have been found in peripheral nerve. [8,9] The nerve of brachial plexus may be blocked any where along their course. The approach for blocking brachial plexus nerve is interscalene, supraclavicular, infraclavicular and axillary approach. [9] Supraclavicular nerve block is technically easy to perform because of reliable and fixed landmark but association of pneumothorax is a profound complication. [8,10] The extent of blockade following injection into the sheath surrounding the brachial plexus may depend on the volume and concentration of local anaesthetic used. [11] The aims of our study is to observe onset and duration of sensory and motor block, haemodynamic effect with 10 ml 2% xylocaine with adrenaline and 10 ml bupivacaine 0.5% compared to a mixture of 10 ml 2% xylocaine with adrenaline, bupivacaine and 50 ug/kg of midazolam, so as to determine which combination is best for different surgical procedure.

MATERIALS AND METHODS

100 patients of either sex between age 10-77 years with ASA I-III planned for routine or emergency surgery of upper limb were included for study purpose. Exclusion criteria were patients not willing for brachial plexus block, procedure in shoulder joint. Using an 18 G cannula vein was secured and patients were divided into two groups, group I (XB) included patients receiving xylocaine with adrenaline and bupivacaine, while Group II (XBM), patients received a mixture of xylocaine with adrenaline, bupivacaine and midazolam.

Patients were positioned supine on the table with pillow under the shoulder to make the landmark more prominent. Then, injection site was painted and draped, landmark located one finger or 1 cm above the clavicle at the junction of inner 2/3 and outer 1/3 of clavicle for the conduction of blocked. A 3 cm long 22 G needle with 10 cc syringe filled with respective local

anaesthetic agents was inserted directing downward, forward and medially at the angle of 20° to the skin till the parasthesia was elicited in the hand or the 1st rib was hit, then the needle was fixed at that point. After the negative aspiration respective agents were given. A gentle massage over the area was done with an idea of uniform spread. All patients were sedated with ketamine 0.5mg/kg for additive analgesic effect.

Quality of sensory block was assessed by pinprick using 22-gauge needle at every 5 minute interval up to 10 minutes and sedation scored was assessed by using sedation score described by Culebras et a l12' ; 0-sharp, 1-dull and 2-non sensation. The successful sensory block was considered if score 2 was attained. Where as, the active movements of the hand and arm were assessed by asking patient to touch nose to confirm the motor function. [13] Pulse rate and blood pressure was recorded pre-operatively immediately following the block and every 5 minutes intra-operatively. There after, side effects and complications were also recorded. Pain was assessed by Visual analogue scale, where zero (0) represents no pain and 10 stands for worst possible pain. All result was expressed as mean ± standard deviation. A paired student 't' test was used to compare change in two sample different groups. P-value of less than 0.05 was considered significant.

RESULTS

Total of 100 patients underwent brachial plexus block with age range from 10 years to 77 years of ASA I-III of either sex requiring upper arm surgery. The Demographic data of patient and type of surgical procedure are shown in table 1 and table 2.

Table 1 :Demographic data

Demographic data	Group I (n) SD±Mean (XB)	Group II (n) SD±Mean (XBM)
Age (years)	55 ± 4.35	53 ± 3.5
Weight (Kg)	62 ± 2.45	61 ± 4.3
Sex (M:F)	4:2	3:4

Table 2: Types of surgery

Demographic data	Group I N= 50 (XB)	Group II N=50 (XBM)
Debridment	7	12
Plating radius and ulna	15	13
Supracondylar fracture	7	12
Reduction colli's fracture	10	8
Fracture humerous	11	5

Table 3: Score achieve by patients

Group I No (%) (XB)	Group II No (%) (XBM)
5 (2.5%)	2 (1%)
38 (19%)	46 (23%)

Table 4: Onset time of block and duration of block

Type of block	Event	Group I N=50 (XB)	Group II N=50 (XBM)
Sensory	On-set (min)	12 ± 4.2	6 ± 3.1
	Duration (hr)	3 ± 3.2	18 ± 2.4
Motor	On-set (min)	11 ± 2.3	5 ± 4.2
	Duration (hr)	4 ± 3.1	14 ± 3.5

The onset and duration of sensory and motor block is shown in table 4. There was significant difference between the onset time and duration of sensory block in group I and group II. The onset time for sensory block was significantly prolonged and duration of block significantly less compared to group II. The onset time for motor block was significantly less and duration significantly higher in Group II as compared to Group I ($p<0.05$). One patient in each group I and II had incidence of chest pain after receiving block. No significant changes in heart rate or blood pressure was observed from baseline till 60 minute after giving block in the patients of group I (XB) and group II (XBM).

DISCUSSION

Various adjuvant drugs have been used in conjunction with local anaesthetics to prolong the period of analgesia.[14-15] In our study, we found that, the onset of sensory and motor block was significantly faster in patients who received a combination of midazolam, bupivacaine and xylocaine with adrenaline. This could be credited to local anaesthetic property of midazolam and its synergistic action with that of local anaesthetics. [6-7] The onset of motor block was found to be faster than the onset of sensory block in both groups. This could be due to, somatotrophic arrangement of fibers in nerve bundle at the level of the trunks in which motor fibers are located more peripherally than sensory fibers. Hence, a local anaesthetics injected peripherally will begin to block motor fibers before [17] and extent of blockade following injection into the sheath surrounding the brachial plexus may depend on the volume and concentration of local anaesthetic used. [12] The drawback of our study was the disuse of nerve stimulator in addition to, anatomical landmark for identifying the nerves because of its unavailability in our institute.

In our study, we used 2% xylocaine with adrenaline and bupivacaine 0.5% 10ml each, with the idea that onset of block depends on the approximity of drug injected near to nerve where as, on other study done by Raizada et al,[16], used 30ml of drug and stated that concentration and volume of drug affect the extent of block.

In our study, in Group I (XB), 7 patients received general anaesthesia and 5 patients received supplementation of ketamine at the rate of 0.5mg/kg. 38 patients had satisfactory surgical anaesthesia. In contrast to it 2 patients in Group II (XBM) had to undergo general anaesthesia, 2 patients were supplemented with ketamine 0.5 mg/kg while 46 patients had good surgical anaesthesia with sedation. Regarding the sedation score, it differed between the groups ($P<0.05$). In Group I, all

43 patients were awake (Score 1) through out the intraoperative period, while in, BM 4 patients were sedated for 20 minutes and 30 patients were sedated for 30 minutes, responding to verbal command (Score 1-2). The sedation score didn't differ between the groups in the post operative period. With comparison to sedation score achieved in Gr I (XB) and Gr II (XBM), the sedation score were higher in patients of Gr II (XBM). This may be because of partial vascular uptake of midazolam, as it has lipophilic action and is transported to the central nervous system, where it acts and produces sedation. On other hand, midazolam diffuse faster into blood vessel by its rapid clearance (6-11mL/kg/min) and short half life (1.7-2.6 hr). [3] However the study done by Koj et al shows that the onset of sensory and motor blocks was significantly faster than in Gr II (XBM). In various studies, where midazolam was used in central neuaxial block, it was found that the midazolam with bupivacaine improve analgesic characteristics, compared to bupivacaine alone. [6-7] In our study, pain scores were significantly lower in patients who received midazolam in addition to bupivacaine. This combination produce prolonged analgesia and reduce requirement of rescue analgesia. [3]

In our study, the sensory block tended to last longer as compared to motor block which agrees with the observation by de Jong et al. [17] They said that, large fibers required a higher concentration of local anaesthetics than small fibers. Thus, motor function return before pain perception and duration of motor block is shorter than the sensory block. [3] However, in our study the sensory and motor block were not different between the groups.

The heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, arterial oxygen saturation were compared between groups and didn't of patients. Thus, we conclude that, addition of midazolam 50ug/kg in supraclavicular brachial plexus block speeds the onset of sensory and motor block ($P<0.05$).

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