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Original Research Article

A Clinical Evaluation of Bilateral Brachial Plexus Block Using Different Approaches for Upper Limb Orthopaedic Surgeries

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Abstract: Surgical anesthesia and analgesia both can be achieved by brachial plexus block for upper limb orthopaedic surgeries. Adjuvant used to block brachial plexus has fewer side effects and also decrease the total dose of local anaesthetics being used. To compare the effectiveness of addition of xylocaine with 2% adrenaline mixture versus bupivacaine 0.5% plane for brachial plexus block in providing perioperative analgesia. The study included 25 patients scheduled for bilateral upper limb orthopedic surgeries at Gandhi Medical College, Bhopal. Xylocaine and adrenaline mixture was injected using supraclavicular approach for brachial blockade in first upper limb to be operated, then after the completion of surgery or after minimum duration of 1 hr other upper limb was blocked using 20 ml of injection bupivacaine 0.5% plane via axillary approach. Onset and duration of sensory and motor blockade was recorded. Mean age and weight of patients was 34 ± 10.12 years. Mean onset of sensory block was faster with xylocaine and adrenaline mixture (3.4±1.5 min) as compared to plain bupivacaine (10.5±2.6 min) whereas mean duration of sensory blockage was shorter in xylocaine and adrenaline mixture (120±20.5min) as compared to plain bupivacaine (180±50.6 min). Mean onset of motor block was faster with xylocaine and adrenaline mixture (5.4±3.2min) as compared to plain bupivacaine (18.2±3.5min) whereas mean duration of sensory blockage was shorter in xylocaine and adrenaline mixture (110.3±30.8min) as compared to plain bupivacaine (150.2±15.7min). Most common side effect observed was nausea and vomiting (32%). In bilateral brachial blockade adrenalized xylocaine provided quick onset of sensory and motor block whereas bupivacaine resulted in to longer duration of sensory and motor block.
Keywords: bilateral brachial blockade, xylocaine and adrenaline mixture, orthopaedic surgeries.

INTRODUCTION

For upper arm surgery, brachial plexus block can be an alternative to general anesthesia for obtaining complete muscular relaxation. Brachial plexus block allows anesthesia in upper extremity surgery along with post-operative analgesia and hence managing chronic pain [1].

As newer long acting local anaesthetics results in fewer side effects, different such agents are being investigated for this purpose [2]. Brachial plexus block is also reported to maintain intraoperative hemodynamic and required block [3].

Block in sympathetic nervous system reduces vasospasm, postoperative pain and associated edema [4].

Use of any adjuvant in brachial block will sustain the analgesic effect without causing many side effects. It will also lead to lengthen motor block and also minimizes the use of local anaesthetic. Different studies have used different agents as an adjuvant [5].

In preset study we compared the effectiveness of addition of xylocaine with 2% adrenaline mixture versus bupivacaine 0.5% plane for Brachial plexus block in order to provide perioperative analgesia.

MATERIALS AND METHODS

The present prospective study was performed on 25 patients scheduled for bilateral upper limb orthopedic surgeries at Department of Anesthesiology and Department of Orthopedics, Gandhi Medical College, Bhopal (MP).

A Written informed consent from all the patients and Ethical Committee approval was obtained before starting the study.

Patients within the age from 20-40 years and belonging to ASA grade I or II physical status were included in the present study.

Patients having local infection, coagulopathy, those who had not given consent and in whom block was failed were excluded from the present study.

All patients underwent thorough pre anesthetic checkup and received preliminary information about the anesthetic technique. Baseline Blood pressure, pulse rate, oxygen saturation, ECG and Respiratory rate was recorded. Peripheral venous access in lower limb was established.

For upper limb which was operated first, 20 ml of injection xylocaine + adrenaline 2% was given using supraclavicular approach for brachial blockade, then after the completion of surgery or after minimum duration of 1 hr other upper limb was blocked using 20 ml of injection bupivacaine 0.5% plane via axillary approach.

Sensory blockade was evaluated 20 mins after the blockade & graded as Zero (sharp pain on pin prick), 1 (touch sensation on pin prick) and 2 (not even touch sensation on pin prick).

Motor blockade was evaluated 30 mins after blockade and graded as 1 (Ability to flex & extend the forearm), 2 (Ability to flex & extend only wrist/fingers), 3 (Ability to flex & extend only finger) and 4 (Inability to move forearm/wrist/fingers).

Failure of blockade was considered as failure, if shoulder abduction present after 30 mins of blockade. After the block was performed, the patient were enquired about discomfort during the procedure (due to positioning/ needle prick) as None, Mild, Moderate and Severe.

The patient were monitored throughout the surgery (every 15 mins) and post operative by pulse oximetry, ECG, HR, RR & non invasive BP (every 30 mins) till the effect of blockade persist.

Other observations including onset and duration of sensory blockade, motor blockade, duration of surgery and any complication due to procedure were recorded.

All statistical analysis was done using IBM SPSS ver. 20. Two sample paired t-test was used to find out significance between two samples. Data was reported as mean value ±SD. A P-value of < 0.05 was considered statistically significant.

RESULTS

Mean age and weight of patients was 34 ± 10.12 years 63 ± 3.57 kgs respectively.

In present study, 15 (60%), 8 (32%) and 2 (8%) patients showed mild, moderate and severe type discomfort during the procedure.

Table 1: Showing the onset and duration of blockage in two different treatments arms

Parameters (min)		Adrenalized xylocaine	Bupivacaine plain
Sensory block	Onset of action	3.4±1.5	10.5±2.6
	Duration of block	120±20.5	180±50.6
Motor blockade	Onset of action	5.4±3.2	18.2±3.5
	Duration of block	110.3±30.8	150.2±15.7

Data is expressed as mean±SD (mins)

In present study, most of the patients [8(32%)] suffered from nausea and vomiting as complication, 4 (16%) had vascular puncture and 2 (8%) showed respiratory discomfort. None of the patients were found to have pneumothorax and horner's syndrome.

DISCUSSION

For upper limb surgeries, brachial plexus block is one of the safe and easy procedures. Different approaches are adopted for the block, out of that supraclavicular approach is most widely used and consistent method used for anaesthesia and pain management in peri-operative period for upper limb surgeries [6].

It consist of injecting the drugs in (local analgesic drugs) fascial spaces which surrounds the nerve plexus, hence autonomic system is blocked along with motor and sensory nerve of upper extremity.

The brachial plexus block consists of injecting local analgesic drugs in the fascial spaces surrounding the nerve plexus, thereby blocking the autonomic, sensory and motor fibers supplying the upper extremity [7].

Yadav et al. performed a study on 90 patients to compare the effectiveness of mixture of lignocaine, and adrenaline, neostigmine to dexamethasone for Brachial plexus block in providing perioperative analgesia and reported better onsets of action (3.8±1.8

min) and duration of analgesia (454.2±110.7 mins) in dexamethasone group[6].

Mean onset of sensory block was faster with xylocaine and adrenaline mixture (3.4±1.5 min) as compared to plain bupivacaine (10.5±2.6 min) whereas mean duration of sensory blockage was shorter in xylocaine and adrenaline mixture (120±20.5min) as compared to plain bupivacaine (180±50.6 min).

Gautam et al. did a similar study on 100 patients to compare xylocaine, bupivacaine mixture with midazolam as an adjuvant and reported longer onset of sensory block with xylocain and bupivacaine mixture as compared to midazolam. But duration of block was longer in midazolam group [3].

In present study, mean onset of motor block was faster with xylocaine and adrenaline mixture (5.4±3.2min) as compared to plain bupivacaine (18.2±3.5min) whereas mean duration of sensory blockage was shorter in xylocaine and adrenaline mixture (110.3±30.8min) as compared to plain bupivacaine (150.2±15.7min).

Gautam et al. also reported longer onset and shorter duration of motor block with xylocaine and bupivacaine group as compared to midazolam group.[3] just opposite result were found in present study, the possible reason for this may be due to synergistic action of midazolam with bupivacaine as used by Gautam et al. [3].

In present study we used bupivacaine 0.5% 10ml each and 2% xylocaine with adrenaline, the thought was that onset of block mainly depends on, how close the drug is being injected to the nerve, but other study done by Raizada et al used higher volume of drug and they gave the reason that magnitude of block depends on the concentration and volume of the drug used [8].

In present study, sensory block was longer as compared to motor block, which is accordance with the findings of study done by Jong et al. [9]. They reported the reason for that; the big fibers need higher concentration of anaesthetics as compared to fibers which are small. Hence, function of motor nerve return before pain perception and motor block duration is shorter as compared to sensory block [10, 11].

Pathak et al. did a similar study on 50 patients to observe the effect of dexamethasone as an adjuvant to adrenalized xylocaine. They reported no difference in onset of either of the block ($p>0.05$) but duration of both block was longer in dexamethasone group [7].

In our study, we observed that patient were slight uncomfortable during the procedure but they were satisfied post operatively due to adequate analgesia.

CONCLUSION

Whenever it is required; bilateral brachial blockade can be used in place of general anesthesia with special attention for better perioperative outcome.

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