



SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK: A COMPARISON OF EFFECT ON ONSET, DURATION OF ANESTHESIA BY USING MORPHINE, VERAPAMIL AS ADJUNCTS AND IN COMBINATION WITH LIDOCAINE

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ABSTRACT

Background & Objectives: In the present study we Compared effect of drugs & their combinations on the onset & duration of sensory & motor anesthesia and analgesia in supraclavicular brachial plexus block.

Methods: This was randomized double blind study conducted in 80 ASA I and II patients aged above 18 years with the minimum weight of 40 kgs undergoing surgery of upper limb.

Grouping of Patients: 80 patients were divided into four groups on random basis with each group having 20 each:-

Group 1 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 and diluted up to 30ml in 0.9% saline solution.

Group 2 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with morphine 5mg and diluted up to 30ml in 0.9% saline solution.

Group 3 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with verapamil 2.5mg and diluted up to 30ml in 0.9% saline solution.

Group 4 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with verapamil 2.5mg and morphine 5mg and diluted up to 30ml in 0.9% saline solution.

The relevant data were noted and observed data compiled and analyzed statistically using ANOVA test.

Conclusion: In short the verapamil prolongs the duration of sensory anaesthesia and also analgesia and morphine prolongs the analgesic duration of lidocaine, when these drugs were used as adjuvants to the local anaesthetic with minimal side effects.

KEYWORDS : Lidocaine, Morphine, Verapamil, Anaesthesia, Analgesia, Supraclavicular Block

INTRODUCTION:

One of the most important transformations in health care delivery during the past two decades has been a shift in the trend from the inpatient surgery to outpatient surgery. Apart from this, day stay surgery is becoming increasingly desirable because it is much more comfortable & convenient for the patient; early ambulation is possible; and the fact that it circumvents certain complications associated with the inpatient surgeries such as the possibility of nosocomial infections & deep vein thrombosis. Development of day stay surgery is the rapid evolution of techniques of regional anesthesia, which tremendously aid the cause of ambulatory anesthesia. Brachial plexus blockade is one of the approaches to sensorimotor regional neural blockade by which the surgical anesthesia of the upper limb & shoulder may be achieved. The approach being used in the study was the classical supraclavicular approach. Several drugs have been studied which not only prolong the duration of sensory anesthesia but also prolong the post-operative analgesia. In our study, Opioids & Calcium channel blockers have been used. Calcium ions play an important role in opioid-receptor-mediated analgesia. Calcium ions also have an important role in the analgesia mediated by local anesthetics.

AIM AND OBJECTIVES:

1. Compared effect of drugs & their combinations on the onset & duration of sensory & motor anesthesia.
2. Compared effect of drugs & their combinations on duration of analgesia.

MATERIALS AND METHODS:

Present study was carried out between the period June 2006 to December 2008, randomly divided 80 patients, undergoing an elective or emergency surgery of upper limb belonging to ASA class I or II either sex, aged above 18 years with the minimum weight of 40 Kgs. Exclusion criteria: Uncooperative, have local skin lesion or drug allergy or with severe neurological deficits patients.

Grouping of Patients: 80 patients were divided into four groups on random bases with each group having 20 each:-

Group 1 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 and diluted up to 30ml in 0.9% saline solution.

Group 2 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with morphine 5mg and diluted up to 30ml in 0.9% saline solution.

Group 3 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with verapamil 2.5mg and diluted up to 30ml in 0.9% saline solution.

Group 4 – Received injection lidocaine 2% (5mg/kg) with adrenaline 1 in 2,00,000 with verapamil 2.5mg and morphine 5mg and diluted up to 30ml in 0.9% saline solution.

Prior to giving anesthesia: PAC checked and written informed consent was taken. IV access was secured with RL infusion started and baseline vitals were noted. All patients were sedated using inj. Midazolam (0.04mg/kg) preoperatively.

We have used the Classical approach is Supraclavicular Approach. After positioning, under all aseptic precautions a skin wheal was raised with local anesthetic already prepared. Patient was asked to say “now” whenever he felt tingling or numbness or current running down his upper limb. Then, a 22 G, 2 inch long beveled needle attached with 20 cc syringe filled with freshly prepared local anesthetic solution was kept over the ready marked point. The needle was advanced directed medially, caudally & downwards until paresthesia was elicited. When the paresthesia was noted, the advancement of needle was stopped and after negative aspiration, the prepared local anesthetic solution was injected slowly. The time was recorded soon after completely injecting the drugs. Immediately after injecting the drugs, objective assessment was made using pinprick at the lower 1/3rd of the shoulder movement by abduction and lifting of the upper limb.

The assessment, thereafter, was made after every 5 minute till the patients felt no pain to pin prick and were unable to move the upper limb at the shoulder joint. Both the timings were recorded as the time of onset of sensory anesthesia and the time of onset of motor block respectively. The assessment was made for a maximum of 35minute and if no block was established, it was labeled as a “failed” block and general anesthesia given.

If the patient felt any pain during the procedure, the blocks were supplemented using injection ketamine 1mg/kg and were recorded as partial block.

The sensory and motor blocks were assessed before the commencement of the surgery using scores proposed by Parris and Chambers (1986).¹

Sensory block was assessed by pinprick with a short beveled needle of 26G as follows:

0:- Sharp pain

1 :- Touch only (no appreciation of pain)

2:- Not even touch sensation.

Motor blockade was assessed as:

0:- Able to move the arm

1 :- Inability to move the wrist and elbow against gravity

2 :- Inability to move the wrist and elbow against resistance

3:- Inability to move the arm.

A close watch was kept on the patients throughout the procedure. The patients were asked to note the time when they were able to move the arm and started feeling pain. These observations were made after every 15minute and the time of recovery of the motor functions was noted. Also, the time when VAS > 3 was recorded. Pain scores are to be recorded at 1,6,12 hours after completion of the surgical procedure.

OBSERVATIONS:

The relevant data were noted in the performa and master chart prepared. Observed data compiled and analyzed statistically using ANOVA test. Data was expressed as the number of patients or mean ± SD or percentage and P<0.05 was considered significant. The significant observations were depicted in tables.

There were no significant difference in demographic data, patients vital and onset of sensory or motor anaesthesia among all groups.

Table 1. Comparison of mean duration of sensory anaesthesia in different groups

Comparis on groups	Number of Patient	Mean (Minutes)	S.D.	D.F.	't' Value	'p' Value	Significan ce
Lidocaine	19	190.16	23.959	33	2.014	>0.05	Not Significant
Lidocaine-Morphine	16	205.40	20.150				
Lidocaine	19	190.16	23.959	35	8.112	<0.001	Significant
Lidocaine-Verapamil	18	286.94	45.838				
Lidocaine	19	190.16	23.959	35	9.432	<0.001	Significant
Lidocaine-Morphine-Verapamil	18	288.94	38.467				

Table 2. Comparison of mean duration of sensory analgesia in different groups

Comparis on groups	Numbe r of Patient	Mean (Minutes)	S.D.	D.F.	't' Value	'p' Value	Significan ce
Lidocaine	19	307.79	28.027	33	26.584	<0.001	Significant
Lidocaine-Morphine	16	669.94	51.025				
Lidocaine	19	307.79	28.027	35	27.764	<0.001	Significant
Lidocaine-Verapamil	18	418.17	54.905				
Lidocaine	19	307.79	28.027	35	28.659	<0.001	Significant
Lidocaine-Morphine-Verapamil	18	657.22	44.632				

DISCUSSION:

In an attempt to improve perioperative analgesia, variety of adjuvants such as opioids, clonidine, neostigmine and tramadol have been administered concomitantly with local anesthetics into the brachial plexus sheath. The aim of this study was to evaluate whether additional anesthetic and analgesic effects could be derived from administration of verapamil, a calcium channel blocker, and morphine, an opioid, into brachial plexus sheath. In our study randomly selected eighty patients with the age of 15 – 55 years of either sex undergoing elective or emergency surgeries of the upper limb belonging to ASA grade I or II. There was no significant difference in demographic data and hemodynamic parameters between all groups.

The mean time taken for the onset of sensory anaesthesia in the lidocaine alone group was 19.21±1.14 minutes, it was 19.67±1.54, 19.89±1.61 and 20.00±1.61 minutes in lidocaine-morphine, lidocaine-

verapamil and lidocaine-morphine-verapamil groups but on comparison it was statistically not significant. Similar result were already observed in Reuben et al (2000)² where concentration of lidocaine used was 40ml of 1.5%.

The mean time taken for the onset of motor blockade in the lidocaine alone group was 20.58±1.39 minutes, it was 21.63±1.82, 21.11±1.37 and 21.50±1.38 minutes in lidocaine-morphine, lidocaine-verapamil and lidocaine-morphine-verapamil groups but on comparison it was statistically not significant. Similar result were already observed in Brand and Papper (1961)³ where concentration of lidocaine used was 35ml of 1.5% with adrenaline (1:20,000).

The mean duration of sensory anaesthesia in the lidocaine only, lidocaine-morphine, lidocaine-verapamil and lidocaine-morphine-verapamil groups were 190.16±23.96, 205.40±20.15, 286.95±45.84 and 288.95±38.47 minutes respectively. On comparison among groups the differences in mean duration of sensory anaesthesia were statistically significant in group III and IV in which verapamil was used as adjunct to lidocaine. Choe⁴ et al observed when administered by epidural in humans, the combination of bupivacaine and verapamil resulted in less postoperative analgesic consumption than bupivacaine alone. Reuben et al (2000) found that where verapamil was used as an adjunct, the duration of sensory anesthesia was significantly prolonged as compared to lidocaine alone. But, verapamil and morphine together don't seem to have a synergistic effect on sensory anesthesia. Smith et al (2001)⁵ studied the influence of voltage-sensitive Ca⁺⁺ channel drugs on bupivacaine infiltration anesthesia in mice and concluded that verapamil elicited dose dependent increase in the suration of anesthesia. Thus several studies support this conclusion that verapamil prolongs the duration of sensory anaesthesia.

The mean duration of motor blockade in the lidocaine only, lidocaine-morphine, lidocaine-verapamil and lidocaine-morphine-verapamil groups were 138.16±24.38, 150.81±13.30, 133.39±56.32 and 152.72±20.70 minutes respectively. But on comparison, none of the differences obtained were statistically significant. Nurcan et al (2007)⁶ compared the effect of adding morphine or tramadol to 40ml of lidocaine 1% and concluded that no motor blockade duration and other side effects were seen statistically significant in among groups.

The mean duration of analgesia in the lidocaine only, lidocaine-morphine, lidocaine-verapamil and lidocaine-morphine-verapamil groups were 307.79±28.03, 669.94±51.03, 418.17±54.91 and 657.22±44.63 minutes respectively. That is, the duration of analgesia was prolonged and statistically highly significant in all three groups using either verapamil or morphine or both with lidocaine, but more so in groups where morphine was used. Reuben et al (2000) studied that all patients received 40ml of 1.5% lidocaine with epinephrine 5mg/ml and randomized in five groups either received verapamil or morphine or both in addition to lidocaine in brachial plexus block and concluded that analgesic duration was significantly increased in those patients received morphine.

Mainly two types of complications were seen that those related to the procedure i.e. vascular puncture or pneumothorax and those related to the drugs like nausea or sedation which were insignificant among groups.

SUMMARY AND CONCLUSION:

Regional anaesthesia offers many advantages over general anaesthesia. Several drugs have been studied which not only prolong the duration of sensory anaesthesia but also prolong the post-operative analgesia. We studied the use of morphine and verapamil in supraclavicular brachial plexus block. There was no significant difference in the onset of sensory and motor anaesthesia. The total duration of analgesia was significantly more in groups containing either morphine or verapamil. Morphine prolongs the analgesic duration by about the 5-7 hours over lidocaine whereas verapamil prolongs the analgesic duration by about 1-2 ½ hours.

In short, the verapamil prolongs the duration of sensory anaesthesia and also analgesia and morphine prolongs the analgesic duration of lidocaine, when these drugs were used as adjuvants to the local anaesthetic with minimal side effects. Thus, these can be used as safe adjuvants to local anaesthetic.

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