ISSN: 0975-3583,0976-2833 VOL14, ISSUE2, 2023

Original Research Article

A study on the efficacy of levobupivacaine with buprenorphine in comparision to levobupivacaine Alone in ultrasound guided supraclavicular brachial plexus block

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ABSTRACT

Background & Method: The aim of this study is to study on the efficacy of levobupivacaine with buprenorphine in comparision to levobupivacaine Alone in ultrasound guided supraclavicular brachial plexus block. Eighty ASA Physical status grade 1 and grade 2 patients of either sex between 18 to 60 year of age and bmi 18.5 to 30 under going elective upper limb surgery in anesthesia department of Chirayu Medical College & Hospital Bhopal O.T. CMCH Tertiary Care Center Bhopal, M.P.

Result: It was observed that addition of Buprenorphine as an adjuvant to local anesthetics for brachial plexus makes sensory (8.30±2.40 mins) and motor (12.30±4.02 mins) onset earlier than plain local anesthetic agent (sensory 12.30±2.80 mins and motor 14.50±4.04 mins) used. The duration of sensory (8.12±1.30 hrs. and 14.50±3.20 hrs) and motor (10.80±1.52 hrs. and 16.52±3.36 hrs) block was significantly longer in the Buprenorphine group than in the control group (p-value < 0.001). All patients in both groups remained hemodynamically stable with no significant difference in vital parameters at all times. The postoperative pain score and the number of patients who required rescue analgesics and mean number of supplemental analgesics required were also significantly lower in Buprenorphine group as an Adjuvant to local anesthetics.

Conclusion: It was concluded that the addition of 150µg (0.5 ml.) of Buprenorphine to 0.5% Levobupivacaine effectively and safely shortens the onset of sensory and motor blockade, increases the duration of sensory and motor blockade and increases the duration of postoperative analgesia without any hemodynamic disturbances.

Keywords: levobupivacaine, buprenorphine, ultrasound, supraclavicular & brachial plexus block.

Study Designed: Comparative Observational Study.

1. INTRODUCATION:

Ultrasound guidance provide visualization of anatomical structure hence lowered the block performance time, reduce the number passes, ensuring high nerve block success and improved patient safety, particularly with regard to last (local anesthetic induced systemic toxicity) as dose of local anesthetic required for effective block lower.

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Supra clavicular approach to brachial plexus block is routinely used all over the world for surgeries of upper limb because of the anatomical ease of blocking nerve routes at this level of brachial plexus[1&2].

Buprenorphine is a high molecular weight opioid agonist-antagonist. It is lipophilic and has high affinity for μ receptor and longer duration of action, buprenorphine iseasily available and is cost-effective, side effects like respiratory depression andsedation are less shown by buprenorphine as compare to other opioids[3&4].

Hence, the present study will be undertaken to study the efficacy of addition of Buprenorphine 150 microgram to 0.5 % levobupivacaine in comparison to levobupivacaine alone when used in ultrasound guided Supraclavicular brachial plexus block[5].

AIMS AND OBJECTIVES:

- To Evaluate the effects of Adding Buprenorphine to levobupivacaine in ultrasound guided supraclavicular brachial plexus block for onset duration of block and post operative analgesia
- To Determine the onset time and duration of motor and sensory blockade
- To Asses and compare duration of analgesia in post operative period
- To determine the number and frequency of rescue analgesics during post operative follow up period

2. MATERIAL AND METHODS:

Study setting**:-** Eighty ASA Physical status grade 1 and grade 2 patients of either sex between 18 to 60 year of age and bmi 18.5 to 30 under going elective upper limb surgery in anesthesia department of chirayu medical college & hospital Bhopal O.T. CMCH Tertiary care center Bhopal

Study subjects / Material ;- sample size

sample size Consideration 2 groups of 40 each

Study group A

Injection of 0.5% levobupivacaine 25ml+0.5 ml normal saline

Study Group B

Injection 0.5% levobupivacaine 25ml +inj. Buprenorphine 0.5ml (150 microgram)

Analysis and statistical Aspects:-

We will use following statistical test when required for study →

- Demographic data compared with chi square test
- Other parameter are compared using student t test
- P value < 0.05 considered for statistically significant

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INCLUSION CRITERIA
AGE>18 YRS
AGE<60 YRS
BOTH SEX
ASA I – II UNDERGOING SURGERY
ALL THE PATIENTS WHO WERE SHEDULED FOR VARIOUS ELECTIVE UPPER LIMB SURGERIES

EXCLUSION CRITERIA
AGE<18 YRS
AGE<60 YRS
PREGNANT FEMALES
PATIENT ALLERGIC TO ANY OF TEST DRUG
PSYCHIATRIC DISORDERS
CONTRAINDICATION TO BLOCK
ADDITIONAL SURGICAL PROCEDURE DURING SAME SURGICALTIME.
DURATION OF SURGERY > 3 HRS.

3. RESULTS:-

TABLE 1 DEMOGRAPHIC PROFILE

PARAMETERS	GROUP A (n=40)	GROUP B (n=40)	P-value
Age (years)	35.88+12.20	37.40+14.65	0.255
BMI (kg/m2)	21.58 + 1.54	21.00+1.54	0.102
GENDER (M/F)	30/10	30/10	
ASA (I/II)	34/6	35/6	

TABLE 2: COMPARING THE MEAN DURATION OF POSTOP ANALGESIA BETWEEN A AND B GROUPS

GROUPS	MEAN (IN HRS)	SD	t value	p value
Group A	12.01	1.56	10.173	< 0.00001
Group B	16.88	3.36		

Both the groups are comparable in the terms of age, sex, body mass index, ASA grade, type of surgical procedure and no statistically significant difference was found.
*The mean onset of sensory block in between group A (12.30±2.80 min) and group B (8.30±2.40 min). there was highly significant difference in mean onset of sensory block in between Group A and Group B ($p<0.0001$) showing that the onset of sensory block was late in group A.
*The mean onset of motor block in between group A (14.50±4.04 min) and group B (12.30±4.02 min). there was significant difference in mean onset of motor block in between Group A and Group B ($p<0.05$) showing that the onset of motor block was faster in group B then in group A.

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In comparison of mean duration of sensory blockade between the two groups the mean durationof sensory blockade for group A was 8.12±1.30 hrs and group B was 14.50±3.20 hrs. the sensory blockade is longer in group B and it is statistically significant with A.(p value <0.001)

In case of comparing means of duration of motor blockade between the two groups, the mean duration of motor block in group A (10.80±1.52)hrs and group B was 16.52±3.36 hrs. There was highly statistically significant difference in between group A and group B (p<0.0001) showing that duration of motor block was longer in group B.

The mean duration of analgesia in between group A 12.01±1.52 hrs and group B 16.98±3.32 hrs. there was highly significant difference in mean duration of analgesia in between group A and group B(p<0.0001) showing that the duration of analgesia was longer in group B.

Mean pulse rate and mean artetial blood pressure are also comparable in both groups.

FIGURE 1:- COMPARISON OF DURATION OF SENSORY BLOCKADE BETWEEN

THE A AND B GROUP

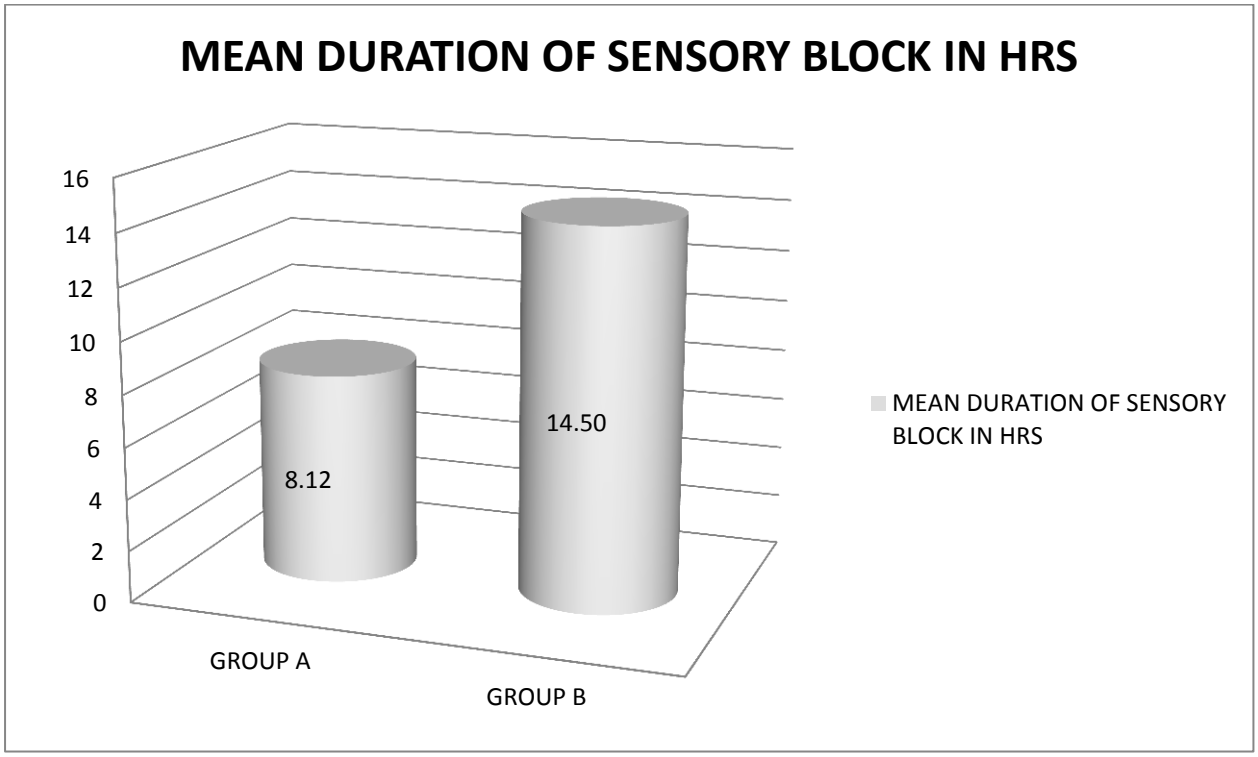

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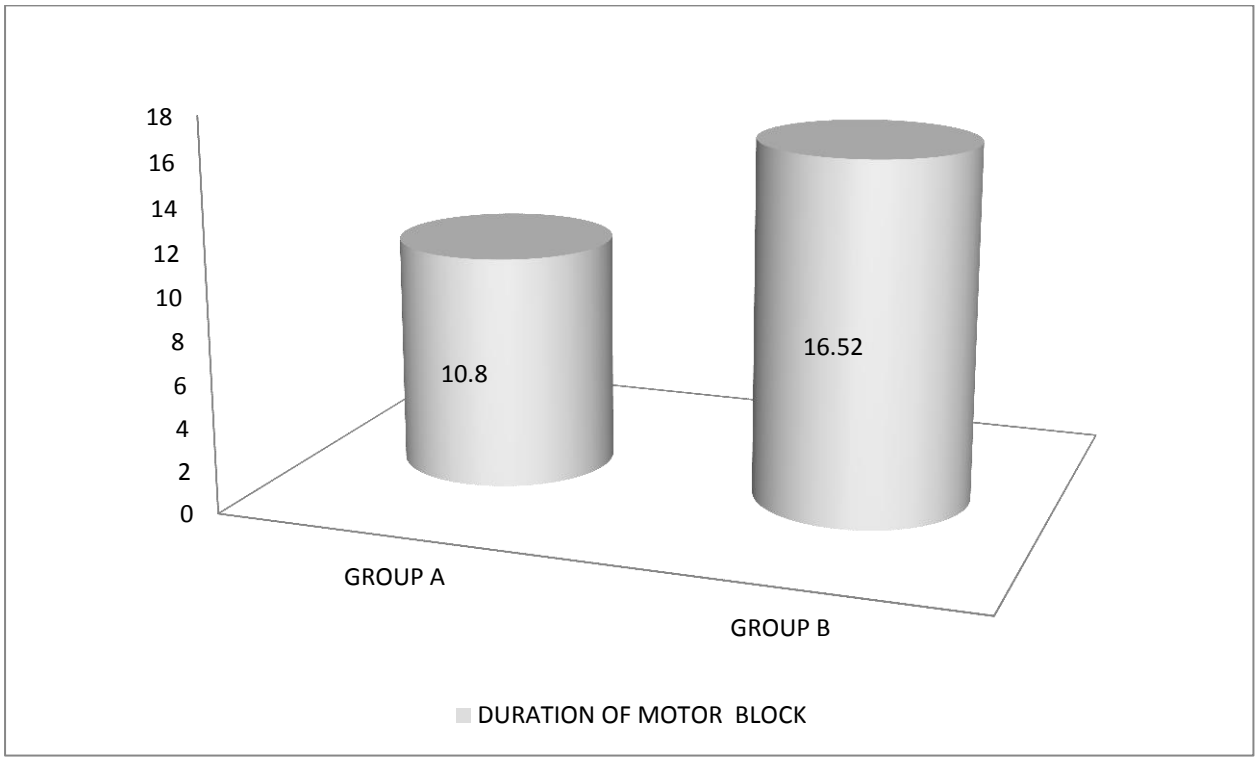
FIGURE 2: COMPARISON OF DURATION OF MOTOR BLOCKADE BETWEEN A AND B GROUPS



- It was observed that addition of Buprenorphine as an adjuvant to local anesthetics for brachial plexus makes sensory (8.30±2.40 mins) and motor (12.30±4.02 mins) onset earlier than plain local anesthetic agent (sensory 12.30±2.80 mins and motor 14.50±4.04 mins) used. The duration of sensory (8.12±1.30 hrs. and 14.50±3.20 hrs) and motor (10.80±1.52 hrs. and 16.52±3.36 hrs) block was significantly longer in the Buprenorphine group than in the control group (p-value < 0.001). All patients in both groups remained hemodynamically stable with no significant difference in vital parameters at all times. The postoperative pain score and the number of patients who required rescue analgesics and mean number of supplemental analgesics required were also significantly lower in Buprenorphine group as an Adjuvant to local anesthetics.

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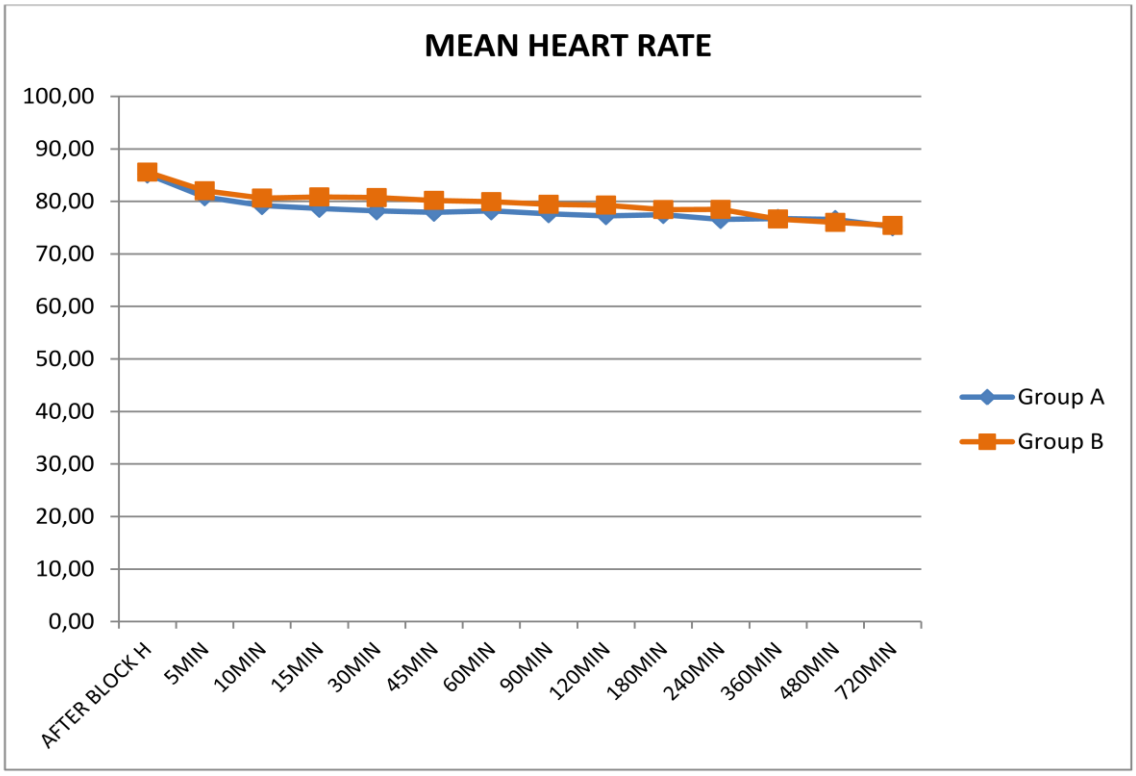

Figure 3: Comparing the mean arterial heart rate between the A and B groups.

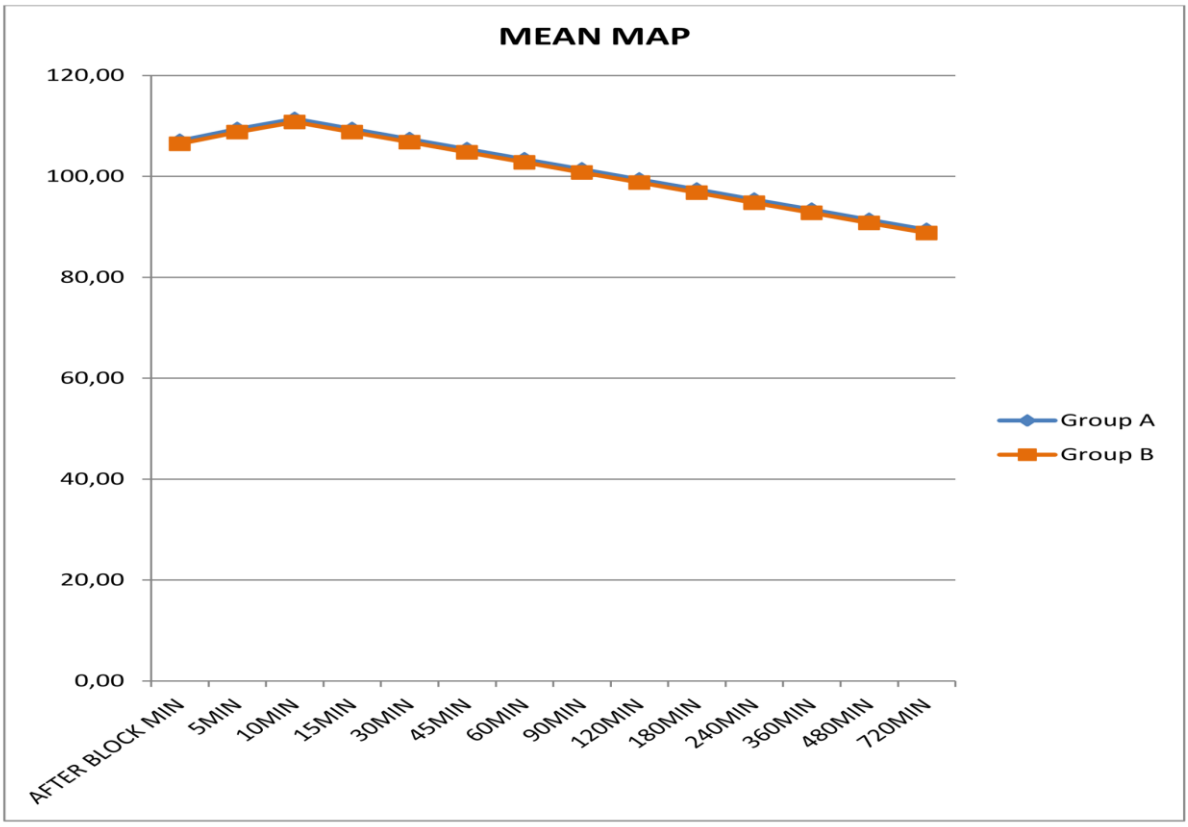

Figure 4: Comparing the mean arterial blood pressure between the A and B groups.

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4. DISCUSSION:

Peripheral nerve blocks are cost effective anaesthetic techniques used to provide superb anaesthesia and analgesia while avoiding airway instrumentation and the hemodynamic consequences of general and neuraxial anaesthesia[6-9]. Of the various local anaesthetics used for the brachial plexus block, Levobupivacaine is the most frequently used local anaesthetic as it has a long duration of action varying from three to eight hours. But Levobupivacaine due to its safer cardiovascular profile is now being preferred[10].

The mean age, gender, ASA and BMI for Group A and for group B was comparable. The gender distribution and ASA grade were also comparable in both the groups. The patient characteristics like gender, age, BMI and ASA in our study groups were similar to that used by Dixit et al. The patient age in our study varied between 18 to 60 years which was similar to their study which had a mean age of 36.2 and 37.4 years[11-14].

Onset of sensory and motor blockade occurred faster in Buprenorphine group as compare to local anaesthetic group. Similar results were also found by Behr A et al and Jain N et al We have noted that onset of sensory block was found to be early in one study that used Levobupivacaine 0.75% and another study which used Ropivacaine 0.5%. whereas it was found to be similar in studies that used other local anaesthetic agents. We have not come across any other study that has used Levobupivacaine Buprenorphine combination in supraclavicular brachial plexus block. There are only few studies that have used ultrasound guided technique for supraclavicular block but none have used Buprenorphine as adjuvant to the local anaesthetic used. Since ultrasound guided is a more precise technique, it may have a bearing on the onset time[15-17]. Levobupivacaine is known to have a short latency for sensory block than Bupivacaine. Duration of sensory blockade is more prolonged in Buprenorphine group. The mean duration of sensory block in Group A is 8.12 hrs as compared to 14.50 hrs in Group B. The duration of motor blockade is also more in the Buprenorphine group. Group A had mean duration of motor block of 10.80 hrs as compared to Group B with 16.52 hrs. the similar results were also found by Dixit et al Thakur D et al and Sanghvi KS et al. Addition of Buprenorphine to local anaesthetic in brachial blocks significantly prolonged the duration of sensory and motor blockade in our study as well as in various studies done previously by others. The mean duration of analgesia for Levobupivacaine + Buprenorphine Group was longer as compare to Levobupivacaine Group[18&19]. It was found to be about two folds longer in Levobupivacaine + Buprenorphine group. Behr Aet al, Dixit et al, Sarkar D et al, Thakur D et al, Vadhanan P et al and Sanghvi KS et al were also found the similar result to our study. Buprenorphine has consistently been used to provide a longer duration of post operative analgesia as evidenced by various studies. Thus, it obviates the need for other systemic analgesics thereby avoiding their side effects and post operative sedation[20-21].

5. CONCLUSION:

It was concluded that the addition of 150µg (0.5 ml.) of Buprenorphine to 0.5% Levobupivacaine effectively and safely shortens the onset of sensory and motor blockade, increases the duration of sensory and motor blockade and increases the duration of postoperative analgesia without any hemodynamic disturbances.

6. REFERENCES:

1.Admir Hadzic, Jerry Vloka. Peripheral nerve blocks: Principles and Practice. New York School of Regional Anesthesia 2004; 4(340).

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2. Hirschel G. Die Anaesthesierung des Plexus Brachialis fuer die Operationen der oberen Extremitaet. Muenchen Med Wochenschr1911; 58.
3. Kulenkampff D (1911)."Zuranasthesierung des plexus brachialis" [On anesthesia of brachial plexus]. 1911; 38: 1337–40.
4. Lund PC, Cwik JC, Vallesteros F. Bupivacaine- a new long-acting local anesthetic agent. A preliminary clinical and laboratory report. Anesth Analg l970; 49:103-104.
5. Miller R, Cohen N, Eriksson L, Fleisher L, Wiener-Kronish J, Young W. Miller's anesthesia. 8th ed. 2015. p. 1697.
6. Stoelting RK, Hillier SC. Pharmacology and physiology in anesthetic practice. Lippincott Williams & Wilkins; 2012 Jan 11. p. 243.
7. Marhofer P, Griffiths W. H. Nerve location in regional anaesthesia: finding what lies beneath the skin. Br J Anaesth, 2011; 106(1): 3–5.
8. Winnie AP: Plexus Anesthesia— Perivascular Techniques of Brachial Plexus Block. Philadelphia, WB Saunders; 1983: 68.
9. El Saied AH, Steyn MP, Ansermino JM. Clonidine prolongs the effect of ropivacaine for axillary brachial plexus blockade. Can J Anaesth 2000 Oct;47(10):962-7.
10. Patrick J. Technique of brachial plexus block anaesthesia. Br J Surg, 1940;27: 734.
11. Popping DM, Elia N, MarretE,Wenk M; Clonidine as an adjuvant to Local Anaesthetics for Peripheral nerve and Plexus Blocks, A Metaanalysis of Randomised Trials. Anesthesiology,2009;111:406-415
12. Murphy DB et al. Noval analgesia adjuncts for brachial plexus block. A systemic review. AnaesthAnalg 2000:2000;1122-
1128.
13. David Johnson, Harold Ellis. Pectoral girdle and upper limb.in: Gray‟s-The anatomical basis of clinical practice.38th edn. Churchill Livingstone;1999.801-941.
14. Collins Vincent J.Editor. Principles of Anaesthesiology.3rd ed. Philadelphia; Lea and Febiger;1993.
15. Martin Berry, Lawrence H. Bemnister Susan M. Standing “Nervous System”. chapter-8,Gray‟s Anatomy,38th Edn,1995;901-1397.
16. Neal JM, Gerancher JC, Hebl JR, Ilfeld BM, McCartney CJ, Franco CD, Hogan QH. Upper extremity regional anesthesia. Reg Anesth Pain Med 2009; 34(2)(Mar- Apr): 134-170.
17. Stein C. Peripheral mechanisms of opioid analgesia. AnesthAnalg. 1993;76:182–91.
18. Fields HL, Emson PC, Leigh BK, Gilbert RF, Iversen LL. Multiple opiate receptor sites on primary afferent fibres. Nature.
1980;284:351–3.
19. Candido KD, Winnie AP, Ghaleb AH, Fattouh MW, Franco CD. Buprenorphine added to the local anesthetic for axillary brachial plexus block prolongs postoperative analgesia. Reg Anesth Pain Med. 2002;27:162–7.
20. Jadon A, Panigrahi MR, Parida SS, Chakraborty S, Agrawal PS, Panda A. Buprenorphine improves the efficacy of bupivacaine in nerve plexus block: A double blind randomized evaluation in subclavian perivascular brachial block. J Anaesth Clin Pharmacol. 2009 Apr 1;25(2):207-10.
21. Sarkar D, Khurana G, Chaudhary A, Sharma JP. A comparative study on the effects of adding fentanyl and buprenorphine to local anaesthetics in brachial plexus block. J Clin Diagn Res. 2010;4:3337–43.