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Original Research Article

A COMPARATIVE STUDY TO EVALUATE THE EFFECT OF OPIOIDS (MORPHINE, BUPRENORPHINE OR FENTANYL) AS AN ADJUVANT TO 0.5% ROPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCKADE AND POSTOPERATIVE ANALGESIA"

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Abstract

Introduction:. Peripheral neural blockade like brachial plexus block has brought a new dimension in regional anaesthesia and is now a well accepted component of comprehensive anaesthetic technique as it lack the side effects of general anesthesia. **Aims & Objective:** To compare the onset and duration of sensory , motor blockade and duration of analgesia **Materials and Methods -** This study was carried out in Department of Anaesthesiology, J.A. Group of Hospitals and G.R. Medical College, Gwalior (M.P.) after approval from Institutional Ethics Ccommittee, 90 patients of ASA grade I and II scheduled for upper limb surgeries randomly devided in three groups(Buprenorphine, Fentanyl and Morphine) and compare sensory , motor onset , postoperative analgesia and complications. **Results & Conclusion:** Buprenorphine (0.2mg) when used as an adjuvant with 30 ml ropivacaine in supraclavicular brachial plexus block provides early onset and longer duration of motor and sensory block, more prolonged duration of total analgesia, better relief from postoperative pain with slightly high incidence of nausea and vomiting as compared to Fentanyl and Morphine **.**

Keywords- Buprenorphine, Fentanyl and Morphine

1. Introduction

The word pain is a bitter experience in the lives of the mankind. Surgical pain is an acute pain and is defined as conscious perception of a noxious stimulus

Peripheral neural blockade like brachial plexus block has brought a new dimension in regional anaesthesia and is now a well accepted component of comprehensive anaesthetic technique as it lack the side effects of general anesthesia. Among the various peripheral blockades, Supraclavicular block is the most commonly practicised peripheral neural blockade and is performed at the level of distal trunk and origin of division. [1]

Professor **Halsted**[2]ofJohn Hopkins institute performed the first brachial plexus block in 1985 by directly exposing the nerve root in the neck and blocking than with cocain solution.

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KulanKampff[3] first introduced percutaneous supraclavicular brachial plexus block using novacaine solution with adrenaline.

Ropivacaine is a long-acting amide local anaesthetic agent which produces effects similar to other local anaesthetics via reversible inhibition of sodium ion influx in nerve fibres. Ropivacaine is less lipophilic than bupivacaine and is less likely to penetrate large myelinated motor fibres, resulting in a relatively reduced motor blockade. Thus, ropivacaine has a greater degree of motor sensory differentiation. The reduced lipophilicity is also associated with decreased potential for central nervous system toxicity and cardiotoxicity. The drug displays linear and dose proportional pharmacokinetics (up to 80 mg administered intravenously). It is metabolised extensively in the liver and excreted in urine .[4]

Local anaesthetic alone for supraclavicular brachial plexus block provide adequate analgesia but for a short period due to limited duration of action of local anaesthetics, resulting in the early resolution of block with severe postoperative pain. [5]

Postoperative pain can cause psychological disturbances, distress and anxiety. Less serious autonomic disturbances like sweating and nausea are frequently associated with it. Adequate postoperative pain management can decrease the metabolic response to surgical trauma and can therefore prevent or postpone negative nitrogen balance , promote better morbidity and reduce the incidence of deep vein thrombosis and chest infection. [6]

Various perineural adjuvant including opiates like Morphine[7,8], Buprenorphine[9,10] and Fentanyl[11,12], Dexmedetomidine[13], Clonidine[14], Magnesium Sulphate[15],Dexamethasone[16], Tramadol[17]etc. were added to local anaesthetics in brachial plexus block to achieve quick, dense and prolonged duration of analgesia.[1]

2. Materials and methods

This study was carried out in Department of Anaesthesiology, J.A. Group of Hospitals and G.R. Medical College, Gwalior (M.P.) after approval from Institutional Ethics Committee in 90 patients of ASA grade I and II scheduled for upper limb surgeries.

Inclusion Criteria:

- 90 patients of ASA grade I and II.
- Male and non-pregnant females of age group - 18-60 yr

Exclusion Criteria:

Following patient were not included in the study:

- Age < 18 yr or > 60 yrs.
- History of allergy or sensitivity or any other reaction to local anaesthetic of amide type.
- Hypertensive patient on treatment with beta blocker, methyldopa, MAO inhibitor, tricyclic antidepressants.
- History of significant neurological, psychiatric or neuromuscular disorder.
- Renal dysfunction
- Cardiac disease
- Patient with elevated AST, ALT values.
- Parturient and lactating women
- History of bleeding disorder

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Preoperative assessment of these patients was done with complete history, general examination and systemic examination and following routine investigation

- Urine (Routine and microscopic)
- Haemoglobin
- Total leukocyte count
- Differential leukocyte count
- Blood sugar random
- Blood urea
- Chest x-ray PA view
- ECG

Grouping: 90 patients were randomly divided into three groups(n=30 each) according to study drug used below:

1. Group RM (n=30) -30 ml of 0.5% ropivacaine with 5 mg Morphine (0.5 ml)diluted in 1.5 ml NS.
2. Group RB(n=30)-30 ml of 0.5% ropivacine with 0.2 mg Buprenorphine (0.66 ml) diluted in 1.34ml NS.
3. Group RF(n=30)- 30 ml of 0.5% ropivacaine with 75µg Fentanyl(1.5 ml)diluted in 0.5 ml NS.

Preparation of the patient:

After patients arrival in the operating room 18G IV cannula was placed, RL solution was started @ 10-15 drops/min and placed at the forearm contralateral to the arm to be operated and Inj. Glycopyrolate 0.2 mg half hour before surgery premedication was given I/V.Standard monitoring was done throughout the procedure including NIBP, HR, pulse oximeter.

Position:

Patients were placed in supine position with the head turned to contra lateral side and the arms extended and pulled towards the knee.

Procedure:

After proper explanation of technique and positioning,under all aseptic conditions a mark is made approximately 1.5-2.0 cm posterior to the midclavicular point.external jugular vein and subclavian artery pulsation are to be identified. local infiltration of 1ml 2% Lidocaine at subcutaneous level with 22G.a 5 cm stimuplex needle was introduced 2cm above the midclavicular point directed just lateral to subclavianartery pulsation, caudal and medially until desired muscle twitch is elicited by plexygon nerve stimulator. The current intensity set initially at 2mA and stimulating frequency set at 1Hz then gradually decrease it. The position of needle wasconsidered to be acceptable when output current < 0.5 mA elicited a slight distal motor response in forearm and hand. After negative aspiration of blood, the study drug was injected slowly over a period of 60sec.

Interventions and observations:

After the drug injection, the following parameters were recorded:

1. CARDIO RESPIRATORY MONITORING:

Pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), oxygen saturation (SpO_2), respiratory rate (RR), 3 lead ECG monitoring was done continuously by multiparamonitor (MindrayBene View T5) throughout the operative

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procedure. Recording of parameters was noted at 0, 10, 20, and at 30 min interval up to 90 min and then every hour till 750 min.

2. SENSORY BLOCK

A. Onset of sensory block

Onset of sensory block is defined as the time inerval between injection of drug and complete loss of sensation as analysed by pinprick.

B. Duration of sensory block

The time consumed between the drug injection of the drug and appearance of pain.

C. Duration of analgesia

The time interval from injection of the drug till the time patient complaints of moderate pain and VAS score of >3 is observed .Rescue analgesia was given with tramadol 50 mg iv.

MOTOR BLOCK:

A. Onset of motor block:

Defined as the time consumed from injection of drug to complete motor block. Motor block is evaluated by thumb abduction (radial nerve), thumb adduction (ulnar nerve), thumb opposition (median nerve), and flexion of the elbow in supination and pronation of the forearm (musculocutaneous nerve). Assessment was done using a modification of the Lovett rating scale.[42]

Grade 6	:	Normal muscular force
Grade 5	:	Slightly reduced muscular force
Grade 4	:	Pronounced reduction of muscular force
Grade 3	:	Slightly impaired mobility
Grade 2	:	Pronounced mobility impairment
Grade 1	:	Almost complete paralysis
Grade 0	:	Complete paralysis

Assessment was done at 1 min interval from the time of injection of test drug until the block is established. Only patient with complete motor block (grade 0) were included in study and equal number of new cases were added to complete the study.

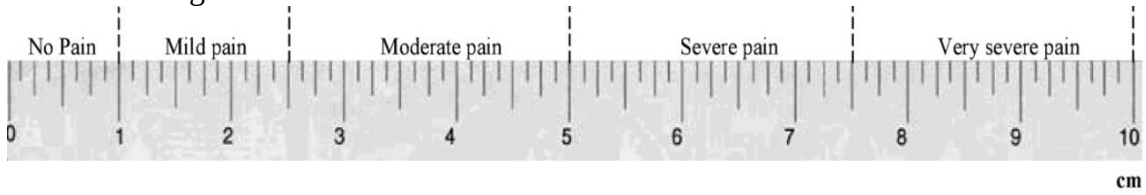
B. Duration of motor block:

Time consumed between injection of the drug to complete return of motor power (grade 6).

ASSESSMENT OF POSTOPERATIVE PAIN :

Postoperative Pain was assessed using a visual analogue score scale which consisted of a 10 cm horizontal scale with gradations marked as 0means no pain at all and 10means unbearable pain.

VAS score rating:[43]



0	=	No pain
1-2.5	=	Mild pain
2.6-5.0	=	moderate pain (uncomfortable but tolerable)
5.1-7.5	=	Severe pain (very uncomfortable)
7.6-10.0	=	very severe pain (unbearable pain)

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VAS score was recorded every 30 min in the postoperative period till the conclusion of study.

SEDATION SCORE: [44]

Sedation was assessed on the basis of **Chernik**Sedation Score.

0 - Completely awake
1 - Sleeping but responding to verbal command
2 - Deep sleep but arousable
3 - Deep sleep not arousable

DURATION OF SURGERY:

It istaken as the time from incision to skin closure.

COMPLICATIONS:

Careful watch was kept for complications such as nausea, vomiting, bradycardia, tachycardia, hypertension, hypotension, haematoma, headache, convulsions, and respiratory distress.

STATISTICAL ANALYSIS:

The observations recorded in the three groups were tabulated using EXCEL.Statistical analysis was carried out using ANOVA test,student "t" test and chi square test by SPSS V.20 software.p-value >0.05 was taken to be statistically insignificant &p-value <0.05 was taken as statistically significant whereas p-value <0.01 was taken to be statistically highly significant.

Data was described as mean±SD and frequency (Percentage) distribution and was presented through suitable statistical graphs.

3. OBSERVATION AND RESULTS

Table 1: Demographic profile of patients in three study groups

S.no.	Parameters	Group RM		Group RB		Group RF	
		Mean	±SD	Mean	±SD	Mean	±SD
1.	Age (yrs)	33.2	12.322	33.53	12.47	36.1	13.573
2.	Weight (kgs)	63	13.7	66	14	59	11
3.	Sex (M:F)	24:6		19:11		23:7	

Above table shows statistical analysis of Demographic data in terms ofMean±SD of Age in yrs, Weight in kgs and gender distribution ratio in three study groups. All the values were statistically insignificant.

Table 2: Intra-group comparison of sensory blockade (min) in three study groups

Parameters	Group RM			Group RB			Group RF		
	Mean	±SD	Range	Mean	±SD	Range	Mean	±SD	Range
Onset time of sensory blockade (min)	13.433	1.59056	11-18	5.3567	1.22014	3.5-8	8.2333	0.98027	7-10

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Duration of Sensory blockade(min)	420.02	60.515	360-540	751.667	109.67	600-960	495.166	71.04495	310-600

Above table shows statistical analysis of Time of onset and duration of sensory blockade(in minutes) among three study groups.

Early onset (RB>RF>RM) and more prolonged (RB>RF>RM) sensory blockade was seen in group RB.

Table 3: Intra-group statistical comparison of motor blockade in three study groups

Parameters	**Group RM**			**Group RB**			**Group RF**		
	Mean	**±SD**	**Range**	**Mean**	**±SD**	**Range**	**Mean**	**±SD**	**Range**
Onset time of motor blockade (min)	21.4	1.938	15-26	7.25	1.388	4.4-10.5	13	0.983	11-14
Duration of motor blockade (min)	360	67.11	260-450	631	95.66	480-870	396.5	61.86	290-540

Above table showing statistical analysis of Time of onset and duration of motor blockade (in minutes) among three study groups.

Early onset (RB>RF>RM) and more prolonged (RB>RF>RM) motor blockade was seen in group RB.

Table 4: Intra-group comparison of duration of analgesia (min) in three study groups

Parameters	**Group RM**			**Group RB**			**Group RF**		
	Mean	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
Duration of analgesia (min)	556	87.4	410-680	885	118.5	720-1110	701.3	113.9	400-820

Above table shows the statistical analysis of Duration of Analgesia (in hours) among three study groups.

Duration of Analgesia was more extended in group RB (RB>RF>R)

Table 5 : Intra-group Changes in Mean(±SD) in Pulse rate (per min) at different time intervals during intra-operative period in three study groups

S. No.	**Time (min)**	**Group RM**			**Group RB**			**Group RF**
		Mean(±SD)	**t value**	**p value**	**Mean(±SD)**	**t value**	**p value**	**Mean(±SD)**
1	**0**	**87.3±12.3**			**88.77±8.834**			**87.10±8.735**
2	**10**	**90.3±11.36**	-2.0	0.055*	**86.77±8.787**	0.814	0.423*	**87.73±8.733**
3	**20**	**91.10±11.41**	-1.7	0.086*	**88.04±10.834**	0.237	0.814*	**89.33±15.096**

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4	**30**	**91.13±14.68**	-1.158	0.256*	**89.73±9.270**	-0.446	0.659*	**88.67±13.578**
5	**60**	**88.63±16.959**	-0.496	0.624*	**90.77±11.178**	-0.965	0.343*	**88.83±16.476**
6	**90**	**91.23±11.530**	-1.824	0.078*	**90.43±10.871**	-0.633	0.532*	**86.40±11.982**
7	**120**	**87.67±12.615**	-0.145	0.886*	**91.57±10.405**	-1.239	0.225*	**87.47±11.602**
8	**180**	**88.03±11.938**	-0.278	0.783*	**91.73±11.212**	-1.265	0.216*	**88.261±14.05**

Above table shows intra- group statistical analysis of Pulse rate at different time intervals during intra-operative period. All the values were statistically insignificant.
* – Not significant(p> 0.05)

Table 6: Intra-group Changes in Mean(±SD) in Systolic Blood Pressure (mmHg) at different time intervals during intra-operative period in three study groups

S. No	Time (min)	Group RM			Group RB			Group R
		Mean(±SD)	t value	p value	Mean(±SD)	t value	p value	Mean(±
1	**0**	**126±10.917**			**124.60±9.856**			**125.87±**
2	**10**	**124.53±11.05**	0.891	0.380*	**127.70±9.458**	-1.920	0.065*	**125.53±**
3	**20**	**122.67±13.187**	1.363	0.183*	**122.87±9.243**	0.893	0.379*	**125.13±**
4	**30**	**122.20±11.78**	1.369	0.182*	**122.27±10.243**	0.789	0.436*	**124.00±**
5	**60**	**123.67±9.098**	0.968	0.341*	**122.03±11.291**	0.929	0.361*	**124.70±**
6	**90**	**122±9.143**	1.673	0.105*	**121.97±12.97**	1.001	0.325*	**124.77±**
7	**120**	**122.97±11.83**	1.208	0.237*	**121.80±10.340**	1.115	0.247*	**124.90±**
8	**180**	**122.77±9.733**	1.260	0.218*	**120.67±9.746**	1.801	0.082*	**124.07±**

Above table shows intra-group statistical analysis of systolic blood pressure at different time intervals during intra-operative period. All the values were statistically insignificant.
* – Not significant(p> 0.05)

Table 7 : Intra-group Changes in Mean(±SD) in Diastolic Blood Pressure(per min) at different time intervals during intra-operative period in three study groups

S. No	Time (min)	Group RM			Group RB			Grou
		Mean(±SD)	t value	p value	Mean(±SD)	t value	p value	Mean
1	**0**	**81.40±9.427**			**80.13±7.29**			**79.86**
2	**10**	**79.67±10.320**	0.93	0.359*	**79.36±7.8**	0.521	0.607*	**79.8±**
3	**20**	**77.60±14.038**	1.679	0.126*	**76.93±8.67**	1.760	0.089*	**79.2±**
4	**30**	**79.07±13.096**	0.935	0.357*	**78.46±8.70**	0.993	0.329*	**78.06**
5	**60**	**78.73±9.105**	1.178	0.248*	**79.4±7.28**	0.387	0.702*	**77.53**
6	**90**	**76.467±8.861**	2.018	0.053*	**77.066±9.09**	1.568	0.128*	**78.26**
7	**120**	**78.7±8.832**	1.297	0.205*	**78±9.54**	0.997	0.327*	**78.8±**
8	**180**	**78.13±9.71**	1.492	0.147*	**78.066±8.99**	1.204	0.238*	**77.2±**

Above table shows intra-group statistical analysis of diastolic blood pressure at different time intervals during intra-operative period. All the values were statistically insignificant.
* – Not significant(p> 0.05)

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Table 8 : VAS scoring among three study groups

S.No.	Time	Group RM			Group RB			Group R
		Mean(±SD)	t value	p value	Mean(±SD)	t value	p value	Mean(±S
1	**PO0**	0	--	--	**0**	--	--	0
2	**PO1**	0	-	-	**0**	-	-	0
3	**PO2**	0	-	-	**0**	-	-	0
4	**PO3**	**0.40±0.80**	-	--	**0**	-	-	**0**
5	**PO4**	**3.19±1.99**	7.14	0.000***	**0**	-	-	**0.468±0.5**
6	**PO5**	**3.1±2.81**	5.06	0.000***	**0.4±0.56**	-	-	**2.63±1.45**
7	**PO6**	**0.4±0.81**	--	1.000*	**2.63±1.58**	7.288	0.000***	**4.4±2.13**
8	**PO7**	**1.51±0.9**	4.98	0.000***	**3.96±2.32**	8.20	0.000***	**0.07±0.37**
9	**PO8**	**1.4±0.49**	5.79	0.000***	**0.167±0.53**	1.66	0.1000*	**1.7±0.6**

Above table shows the intra- group statistical analysis of post operative VAS Score at different time intervals. There was highly significant difference at 8hr, 12hr, 20hr and 24hr in Group RM;16hr and 20hr in Group RB;12hr ,16hr, 20hr and 24hr in Group RF.

* – Not significant($p > 0.05$)

****** – Significant ($p \leq 0.05$)

******* --Highly significant($p < 0.01$).

PO0- 3hr after supraclavicular block
PO1- 4hr after supraclavicular block
PO2- 5hr after supraclavicular block
PO3- 6hr after supraclavicular block
PO4- 8hr after supraclavicular block
PO5- 12hr after supraclavicular block
PO6- 16hr after supraclavicular block
PO7- 20hr after supraclavicular block
PO8- 24hr after supraclavicular block

Table 9 : Intra-group comparison of time for rescue analgesia (min) in three study groups

Parameters	Group RM		Group RB		Group RF	
	Mean	SD	Mean	SD	Mean	SD
Duration of Rescue analgesia (min)	496	70.6	828	108.6	691.3	96.9

Above table shows the statistical analysis of Duration of Analgesia (in hours) among three study groups.

Duration of Analgesia was more prolonged in group RB (RB>RF>RM).

Table 10 : Complications in the three study groups

Complications	Group RM		Group RB		Group RF	
	No.	%	No.	%	No.	%
Nausea/Vomiting	0	0	9	30	0	0
Respiratory depression	0	0	0	0	0	0
Bradycardia	3	10	0	0	1	3.3
Hypotension	2	6.6	1	3.3	1	3.3
Sedation	0	0	0	0	0	0

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Above table shows different side effects and complications among the three study groups during the study period. Incidence of post operative nausea & vomiting were higher in group RB whereas the incidence of hypotension and bradycardia were higher in group RM as compared to group RF and group RB.

4. Discussion

The supraclavicular block is one of the commonest techniques used for brachial plexus block performed at the level of the trunks of brachial plexus where almost the entire sensory, motor, and sympathetic innervation of the upper extremity is arranged compactly,thus providing a predictable and dense block with rapid onset.

The supraclavicular block provides anesthesia and analgesia to the upper extremity below the shoulder. It is an excellent choice for elbow and hand surgery as it is easy to perform,has a high success rate and it includes the blockade of ulnar and musculocutaneous nerve, which can be missed with the interscalene and axillary approach respectively . The current trend of using peripheral nerve stimulator(PNS) and ultrasound guided technique(USG) have considerably increased the success rate hence, preferred over the landmark technique.

Various opioid drugs have been used as adjuvant to local anesthetics in brachial plexus block.On searching the literature we did not find many studies comparing Morphine, Buprenorphine and Fentanyl as adjuvant to local anesthetics to study the quality and duration of block.

DEMOGRAPHIC DATA

,in our study, patients in all three groups are comparable($p>0.05$) with respect to age, weight and gender distribution (Table no.1) which is in accordance with studies conducted by **Jain et al**[5] **, Candido et al**[9] **,Saryazdi et al**[18]**, Sarkar et al**[19].

ONSET AND DURATION OF SENSORY BLOCK

In the present study the mean(±SD) time for onset of sensory block was found to be 13.43±1.59 mins, 5.35±1.22 mins and 8.23±0.98 mins in Group RM, RB and RF respectively(Table no.2).

The onset was rapid in group RB as compared to other study groups (RB>RF>RM)

On comparing the time of onset, there was highly significant difference in between the three groups ($p < 0.01$)

Our results were at accordance with **Sarkar et al**[19] , **Saharia et al**[20] ,**Saryazdi et al**[18] and **Veil et al**[21]

The duration of sensory block was 420 ± 60.5 mins, 751 ± 109.67 mins and 495 ± 71 mins in group RM,RB, and RF respectively(Table no.3). On intergroup comparison highly significant difference($p<0.01$) was observed between the three groups(Table no.2).

The sensory block was more prolonged in group RB as compared to other study groups (RB>RF>RM).

Our results were at accordance with **Sarkaret al**[20] and **Veil et al**[21,]

ONSET AND DURATION OF MOTOR BLOCK

In the present study the mean(±SD) time for onset of motor block was found to be 21.4±1.93 mins, 7.25±1.38 mins and 13±0.98 mins in Group RM,RB and RF respectively(Table no.3).

The onset was rapid in group RB as compared to other study groups (RB>RF>RM)

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On comparing the time of onset,there was highly significant difference in between the three groups ($p < 0.01$) (Table no.3).

Our results were at accordance with **Sarkar et al**[19] **, Saryazdi et al**[18] and **Veil et al**[21]

Duration of block was 360 ± 67.1 mins, 631 ± 95.66 mins and 396 ± 61.86 mins in group RM,RB and RF respectively (Table no.3). On intergroup comparison highly significant difference($p < 0.01$) was observed in between the three groups(Table no.3).

Duration of motor block was more prolonged in group RB as compared to other study groups (RB>RF>RM).

The result of our study were in accordance with **Sarkar et al**[28] who observed that the total duration of motor block was significantly prolonged($p<0.05$) with Buprenorphine (328.32 ± 47.94min) as compared to Fentanyl (294.16 ± 55.69min)

DURATION OF ANALGESIA

In the present study the mean(±SD) Duration of analgesia was 556 ± 87.4 mins, 885 ± 118.5mins and 701 ± 113.9 mins in Group RM,RB and RF respectively(Table.4).

Duration of Analgesia was more prolonged in group RB as compared to Group RM and RF(RB>RF>RM).

On comparing the duration of analgesia,there was highly significant difference in between the three groups($p < 0.01$)(Table 4).

The results in our study are in accordance with study conducted by **Saharia et al**[20] **, Bazinet al**[22] and **Veil et al**[21] .

HEMODYNAMICS

Basal Values:

In our study, the baseline values of mean(±SD) pulse rate(per min) were 87.3±12.3, 88.77±8.83, 87.10±8.35 in group RM , group RB and group RF respectively(Table 5).

The baseline values of mean(±SD) systolic blood pressure (mmHg) were 126.00±10.97, 124.60±9.851, 125.87±9.46 in group RM , group RB and group RF respectively(Table 6).

The baseline values of mean(±SD) diastolic blood pressure (mmHg) were 81.40±9.47, 80.13±7.29, 79.86±8.2 in group RM , group RB and group RF respectively(Table 7).

In our study the hemodynamic parameters like pulse rate , systolic pressure, diastolic pressure, SpO_2 and respiratory rate had no statistically significant difference.

Our observations were supported by studies done by **Saryazdi et al**[18]**, Bazin et al**[22]and **Veil et al**[21.]

VAS score

Initial VAS score was zero until 5hr in group RM, 6hr in group RF and 12hr in group RB as the patients did not complain any pain due to analgesic effect of local anaesthetic agent mixed with the adjuvant opioid.(Table 8).The VAS scores >3 were observed during at 8hr (3.19±1.99) and 12hr (3.1±2.81) in Group RM ; 12hr(2.63±1.45) and 16hr(4.4±2.13) in Group RF, 16hr(2.63±1.58) and 20hr(3.96±2.32) in Group RB ;. VAS score >3 were observed late in group RB as compared to group RF and RM.This also correlates with our observation of more prolonged sensory block in group RB.The VAS scores decreased after administration of rescue analgesia with injection Tramadol 50 mg I/V.(Table 9)

COMPLICATIONS

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Table-10 shows various complications observed during our study.Minimal incidence of hypotension and bradycardia was seen among the three study groups. Other common side effects related to like respiratory depression, sedation were not observed in our study.

High incidence of nausea and vomiting was observed during intra-operative and post-operative period with Buprenorphine(30%) as compared to zero incidence with and Fentanyl and Morphine. (Table 10)

Result of our study are well correlated with **Saharia et al**[20].They also observed that the incidence of nausea and vomiting was more with Buprenorphine (10%) as compared to Fentanyl (6.66%).

The observation of our study are also in accordance with **Sarkar et al**[28] , **Bazin et al**[22],**Veil et al** [21] , **Patilet al**[23]and **Jain et al**[5]**.**

3. Conclusion

We conclude that Buprenorphine (0.2mg)when used as an adjuvant with 30 ml ropivacaine in supraclavicular brachial plexus block provides early onset and longer duration of motor and sensory block, more prolonged duration of total analgesia,better relief from postoperative pain with slightly high incidence of nausea and vomiting as compared to Fentanyl(75µg) and Morphine(5 mg).

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