European Journal of Molecular &Clinical Medicine

ISSN2515-8260 Volume 09, Issue 01, 2022

Effect of ropivacaine and bupivacaine on heart rate for supraclavicular brachial plexus

[1]Dr. Shivakumara K C, [2]Dr. Vishal

[1] Senior Resident, Department of Anesthesia and Critical Care, Basaveshwara Medical College, Chitradurga, Karnataka,India

[2] Anesthesiologist GH hospital, Basavakalyankarhfw Karnataka, India

Corresponding Author: Dr. Vishal

Abstract

The brachial plexus is enveloped by a fascial sheath, formed by prevertebral and scalene fascia, extending from the intervertebral foramina to the upper arm. The foramina of a sheath, at any anatomical point, will allow for the spread of local anaesthetics and subsequent blockade. Each approach to the brachial plexus impacts specific anatomical areas of the upper extremity. Patients were kept Nil per orally for 6 hours before the time of surgery and on the previous night premedicated with Diazepam 5 mg and Ranitidine 150mg. 60 patients ASA I and ASA II were randomly allocated with sealed envelope method into two different groups of 30 each. Both observer and participant were blinded. GROUP A- received (n=30) 25 ml of 0.5% bupivacaine, GROUP B-received (n=30) 25 ml of 0.5% ropivacaine. There was no statistically significant difference in heart rate between both groups ($p>0.05$). There is no significant difference of heart rate clinically.

Keywords: Ropivacaine, bupivacaine, heart rate

Introduction

Successful regional anesthesia for upper extremity requires knowledge of brachial plexus anatomy from its origin, where the nerves emerge from intervertebral foramina, to its termination in the peripheral nerves. However it is important to recognize that variations are frequent, and that 'normal anatomy' is only found in 50-70% of cases[1].

Blockade of the brachial plexus (C5-T1) at several locations from the roots to the terminal branches will allow for surgical anesthesia of the upper extremity and shoulder[2].

Brachial plexus is formed by the union of ventral rami of lower cervical (C5,6,7,8) and first thoracic nerve(T1) with frequent contribution from C4 or T2. When contribution is from C4 is large, the plexus is termed prefixed. When contribution from T2 is large, the plexus is termed post fixed.

The fibers as they emerge from under the clavicle recombine to form three cords[3].

The lateral cord is formed by anterior divisions of upper and middle trunks, lateral to the axillary artery. The anterior division of lower trunk descends medial to the axillary artery forming the medial cord. The posterior divisions of all three trunks unite to form the posterior

cord, at first above and then behind the axillary artery.
The medial and lateral cords give rise to nerves that supply the flexor surface of upper extremity, while nerves arising from the posterior cord supply the extensor surface.
The brachial plexus is enveloped by a fascial sheath, formed by prevertebral and scalene fascia, extending from the intervertebral foramina to the upper arm. The foramina of a sheath, at any anatomical point, will allow for the spread of local anaesthetics and subsequent blockade. Each approach to the brachial plexus impacts specific anatomical areas of the upper extremity. Choice of a specific technique should be made based on the surgical procedure[4].

Methodology
Informed and written consent was taken from selected patients. Following approval of institutional ethics committee, 60 patients aged 20-60 years, weighing more than 50 kgs were taken up for the study.
All the patients were evaluated thoroughly on the previous day of the surgery. A detailed history, complete physical examination and routine investigations were done for all patients were explained about procedure.

Sample size: 60.

Inclusion criteria

- Patients between ages 20-60yrs undergoing elective upper limb surgeries.
- ASA class 1 and 2.
- No history of allergy or sensitivity to above mentioned drugs.

Exclusión criteria

- Uncooperative and unwilling patient.
- Hypersensitivity to Drugs.
- History of neurologic or seizure disorder.
- ASA grade III and IV.
- Women with pregnancy.

Informed consent was obtained from all the patients enrolled for the study.
Patients were kept Nil per orally for 6 hours before the time of surgery and on the previous night premedicated with Diazepam 5 mg and Ranitidine 150mg.
60 patients ASA I and ASA II were randomly allocated with sealed envelope method into two different groups of 30 each. Both observer and participant were blinded.
Group A: Received (n=30) 25 ml of 0.5% bupivacaine.
Group B: Received (n=30) 25 ml of 0.5% ropivacaine.

Results

Table 1: Gender distribution

Crosstab					
			Group		total
			Bupivacaine	Ropivacaine	
Gender	F	Count	8	7	15
		% within Group	26.7%	23.3%	25.0%
	M	Count	22	23	45

		% within Group	73.3%	76.7%	75.0%

Total	Count	30	30	60
	% within Group	100.0%	100.0%	100.0%
Chi-Square Tests				
		Value	**Df**	**P Value**
Pearson Chi-Square		.089	1	.766
N of Valid Cases		60		
b. Computed only for a 2x2 table				

Gender distribution in both groups was comparable. There is no statistically significant difference. Two groups were comparable with respect to their age, gender and weight.

Table 2: Heart rate between two groups

	GROUP	N	Mean	Std. Deviation	T	Df	P Value
HR 0MIN	BUPIVACAINE	30	61.0000	1.91185	.791	29	.436
	ROPIVACAINE	30	60.6667	1.39786			
HR 5MIN	BUPIVACAINE	30	61.0333	2.09241	.297	29	.769
	ROPIVACAINE	30	60.9000	1.44676			
HR 10MIN	BUPIVACAINE	30	61.2667	1.85571	1.188	29	.245
	ROPIVACAINE	30	60.7333	1.43679			
HR 15MIN	BUPIVACAINE	30	61.2667	1.68018	-.854	29	.4
	ROPIVACAINE	30	61.6000	1.45270			
HR 30MIN	BUPIVACAINE	30	62.2000	1.74988	1.989	29	.056
	ROPIVACAINE	30	61.4000	1.35443			
HR 45MIN	BUPIVACAINE	30	61.7667	1.61210	1.322	29	.196
	ROPIVACAINE	30	61.1667	1.57750			
HR 60MIN	BUPIVACAINE	30	61.8000	1.88277	.75	29	.459
	ROPIVACAINE	30	61.5333	1.35782			
HR 90MIN	BUPIVACAINE	30	61.6333	1.69143	.149	29	0.882
	ROPIVACAINE	30	61.5667	1.47819			
HR 120MIN	BUPIVACAINE	30	61.8000	1.62735	.425	29	0.674
	ROPIVACAINE	30	61.6000	1.77337			
HR 150MIN	BUPIVACAINE	30	61.6333	1.42595	-1.133	29	.266
	ROPIVACAINE	30	62.1000	1.60495			
HR 180MIN	BUPIVACAINE	30	62.0333	1.62912	1.510	29	.142
	ROPIVACAINE	30	61.4000	1.24845			
HR 240min	BUPIVACAINE	30	62.3667	1.79046	1.211	29	0.236
	ROPIVACAINE	30	61.9333	1.08066			
HR 300min	BUPIVACAINE	30	62.1667	1.46413	1.293	29	.206
	ROPIVACAINE	30	61.7667	1.22287			
HR 360min	BUPIVACAINE	30	62.1000	1.60495	.081	29	.936
	ROPIVACAINE	30	62.0667	1.41259			
HR 420min	BUPIVACAINE	30	62.7000	1.31700	1.417	29	0.167
	ROPIVACAINE	30	62.2667	1.33735			
HR 480min	BUPIVACAINE	30	63.0000	1.72207	.571	29	0.573
	ROPIVACAINE	30	62.7333	1.38796			

There was no statistically significant difference in heart rate between both groups ($p>0.05$). There is no significant difference of heart rate clinically.

Discussion

In 1949, Bonicaand Moore utilized both Kulenkampff's and Patrick's technique; the classical landmarks direction of needle insertion and elicitation of paraesthesia prior to first injection were followed. This was followed by 'laying down' of a wall of anaesthetic solution by 'walking the rib' and making multiple injections during each withdrawal of the needle[5].
In 1964, Winnie showed that the relation of the plexus and the subclavian artery to the midpoint of the first rib is not constant. He showed that there is a constant relationship between the anterior and middle scalene muscles, the plexus and the first rib. He inserted needle between the two muscles in the direction of space between them. Once a paraesthesia is obtained, a single injection is made into the space[6].
In 1955, Pearson demonstrated that motor nerves could be located by electrical stimulation with an insulated needle.
In 1969, Wright reported the block aid monitor for nerve blocks which popularized the technique making it more feasible.
Mohan IR *et al*. (2018) did a study on 60 patients who were scheduled for elective upper limb surgeries. They were divided into two groups. Group B received Bupivacaine 0.5% and group R received Ropivacaine 0.5%.They concludedthat at equalvolumesBupivacaine0.5%hasanadvantageoverRopivacaine0.5%for Supraclavicular Brachial Plexus block in terms of early onset of blockade and prolonged duration of blockade[7].
Kundalwal*et al*. (2018) conducted a prospective randomized double blind study on 100 patients, where group B received bupivacaine and group R received ropivacaine by supraclavicular brachial plexus block. The onset of sensory block was earlier in ropivacaine and the duration of block is more in bupivacaine. In terms of analgesic effect ropivacaine was better[8].
Modak S *et al*. (2016) conducted a prospective double blind randomized study involving 60 patients. They were randomly divided into two groups in which supraclavicular brachial plexus block was done using 30 ml of ropivacaine 0.5% and bupivacaine 0.5%. Ropivacaine had earlier onset of sensory and motor blockade compared to Bupivacaine. The duration of block was longer in ropivacaine. No statistically significant difference between two groups[9].
Gonuguntla SB (2016) conducted a study of total 60 patients between 20 and 60 years age of either sex scheduled for upper limb surgeries. They randomly divided into Group A(Bupivacaine)and group B(Ropivacaine).He concluded that there were no much clinical differences in onset, duration and analgesia among bupivacaine and ropivacaine when injected in equal volumes for brachial plexus block by the supraclavicular approach[10].

Conclusion

There was no statistically significant difference in heart rate between both groups ($p>0.05$). There is no significant difference of heart rate clinically.

References

1. Tripathi D, Shah K, Shah C, DasE. Supraclavicular brachial plexus block for upper limb orthopedic surgery: A Randomised, double blinded comparison between Ropivacaine and Bupivacaine. The Internet Journal of Anesthesiology, 2012, 30(4).
2. Peña-Riveron AA, Zaragoza-Lemus G, Sánchez-Velasco B, López-Ruiz VG. Clinical comparison between ropivacaine and bupivacaine for the blockade of the brachial plexus by axillary approach through neurostimulation. Revista Mexicana de Anestesiología. 2009;32(1):7-13.
3. Dr. AarushiKataria, Dr. Naveen Nandal and Dr. Ritika Malik, Shahnaz Husain -A Successful Indian Woman Entrepreneur, International Journal of Disaster Recovery and Business ContinuityVol.11, No. 2, (2020), pp. 88–93
4. Malik, R., Nandal, Naveen and Gupta, Prakhar. (2021), The Impact of online shoppers to

price and quality: a survey study in Delhi-NCR, Efflatounia, 5 (2), pp. 376 – 389.

5. Mcclellan KJ, Faulds D. Ropivacaine, an update of its use in regional anaesthesia. Drugs. 2000;60:1065-93.
6. Bertini L, Tagariello V, Mancini S, Ciaschi A, Posteraro CM, Di Benedetto P*et al*. 0.75% and 0.5% ropivacaine for axillary brachial plexus block: a clinical comparison with 0.5% bupivacaine. Regional anesthesia and pain medicine. 1999 Nov;24(6):514-8.
7. Klien SM, Greengrass RA, Steele SM. A comparison of 0.5% bupivacaine, 0.5% ropivacaine, 0.75% ropivacaine for interscalene brachial plexus block.Anaesthesia Analgesia. 1998;87:1316-91.
8. Vainionpaa VA, Haavisto ET, Huha TM. A clinical and pharmacokinetic comparison of ropivacaine and bupivacaine in axillary plexus block. AnaesthAnalg. 1995;81:534-8.
9. Kaur A, Singh RB, Tripathi RK, Choubey S. Comparision between bupivacaine and ropivacaine in patients undergoing forearm surgeries under axillary brachial plexus block: a prospective randomized study. J Clin Diagn Res. 2015;9(1):UC01-6.
10. Kooloth RA, Patel SN, Mehta MK. A comparison of 0.5% Ropivacaine and 0,5% Bupivacaine in supraclavicular brachial plexus block. National Journal of Medical Research. 2015;5(1):67-70.
11. Babu N, Sreeraghu GM, Sreeharsha S, Dwideep Chandra P, Dhingra U. A Comparative Study of Bupivacaine 0.5% and Ropivacaine 0.5% for Supraclavicular Brachial Plexus Block (Perivascular Approach). Journal of evolution of medical and dental sciences. 2014;3(43):10722-32.
12. Soni CM, Parikh H. Comparison of motor and sensory block by Ropivacaine and Bupivacaine in combination with Lignocaine in supraclavicular block. National Journal of Medical Research. 2013;3(4):353-57.