Original Article

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Effect of Barbotage on Sensory Spread in Spinal Anaesthesia using Hyperbaric 0.5% Bupivacaine

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Abstract

Aims: This study is to observe the effect of barbotage on sensory spread during subarachnoid block with 0.5% of Heavy Racemic mixture Bupivacaine. *Methods and Material:* 50 ASA grade 1 and 2, were randomised to receive 3cc of 0.5% heavy Bupivacaine into subarachnoid space at L3-L4 space with patient in right lateral position using 25 gauze quincke's spinal needle (25 patients with barbotage/25 patients without barbotage). Primary objective of the study included the highest level of analgesia using pin prick, the time taken to achieve the highest level of sensory block and time taken for modified bromage scale 3 motor block. Secondary objective included hemodynamic parameters and the usage of vasopressor. *Statistical Analysis used:* Mean, Standard Deviation, Student 't' test, P Value. *Results:* The highest level of analgesia obtained was similar in both group (mean T5 Dermatome).The time to reach the highest dermatome (9.65 minutes vs. 4.88 minutes with P value <0.001), the modified bromage scale 3 level motor blockade (7.47 minutes vs. 3.35 minutes with P value< 0.001) and the two segment regression of analgesia was faster in barbotage group (65.94 minutes vs. 53.82 minutes with P value <0.001). *Conclusions:* In this study, the quality of analgesia was similar in both groups. There was no incidence of uncontrolled cephalad spread in barbotage group.

Keywords: Spinal Block; Barbotage; Uncontrolled Cephalad Spread.

Introduction

Spinal anaesthesia has the definitive advantage that profound nerve block can be produced in a large part of the body by injection of a small amount of local anaesthetic into CSF. However, the greatest challenge of the technique is to control the spread of that local anaesthetic through the cerebrospinal fluid (CSF), to provide block that is adequate for the proposed surgery but without producing unnecessarily extensive spread and thereby increasing the risk of complications [1].

Barbotage during subarachnoid block is a procedure that involves the repeated aspiration and injection of CSF during spinal drug deposition into the CSF. It is often worried that barbotage technique while giving subarachnoid block leads to abnormal ascent of the sensory block. In barbotage, a certain current in the CSF is produced. The rationale of the barbotage technique is to increase sensory block height using a relatively low dose of local anesthetic drugs, however evidence is lacking [1,2]. This study is to observe the effect of barbotage on sensory spread during subarachnoid block with 0.5% of Heavy Racemic mixture Bupivacaine.

Subjects and Methods

After obtaining institutional ethical committee clearance, 50 ASA 1 0r 2 patients planned for lower

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abdominal and lower limb surgeries were divided into two groups-25 each by computerised random number. The demographic profiles of both the groups were similar. They were premedicated and preloaded with 500 ml of crystalloids. The preoperative BP, HR, Spo2 were recorded. The local anaesthetic solution 3 cc of 0.5% Heavy Bupivacaine was randomly injected into two groups of 25 patients each, with patient in right lateral position at L3-L4 level using 25 gauze Quincke's spinal needle with the table being horizontal and the anaesthetic profile of each solution was then evaluated in a double-blind fashion for the two techniques (barbotage/without barbotage) by an independent observer.

In control group: 3 cc of 0.5% Heavy Bupivacaine at L3-L4 level is injected over 10 to 15 seconds.

In Study group: Before injecting the drug, 0.5 cc of CSF is withdrawn in to the syringe and 1cc is injected. This procedure is repeated 5 times within a space of 15 to 20 seconds.

Primary objective included the highest level of analgesia using pin prick, the time taken to achieve the highest level of sensory block and time taken for modified bromage scale 3 motor block.

Table 1: Modified Bromage score used to assess motor power (Grade Definition) [5].

0 -	No motor block
1 -	Inability to raise extended leg;able to move knees and feet
2 -	Inability to raise extended leg and move knee; able to move feet
3 -	Complete block of motor limb

Results

The highest level of analgesia obtained was similar in both group (mean T5 Dermatome).The time to reach the highest dermatome (9.65 minutes vs 4.88 minutes with P value <0.001), the modified bromage scale 3 level motor blockade (7.47 minutes vs 3.35 minutes with P value< 0.001) and the two segment regression of analgesia was faster in barbotage group (65.94 minutes vs 53.82 minutes with P value <0.001)). The total amount of IV fluid used was similar in both groups. The percentage of blood pressure fall was greater in barbotage group (14% vs 17,78 %) and hence the number of patients in whom vasopressor was used was more in barbotage group (2 vs 5)

Table 2: Comparison of sensory spread in spinal anaesthesia using Hyperbaric 0.5% Bupivacaine with and without Barbotage

S. No	Evaluation of Spinal Anaesthesia	Without Barbotage	With Barbotage	P Value
1.	Highest level of sensory block	T6	T6	
2.	Time to reach highest level of sensory block(Minutes)	9.64	4.88	**<0.001**
3.	Two segement regression(Minutes)	65.94	53.82	**<0.01**
4.	Time for 3+Modified Bromage score Motor block (Minutes)	7.47	3.35	**<0.001**
5.	Total IVF(Litres)	1.8	1.8	
6.	Percentage of BP Fall	14	17.77	**<0.01**
7.	Number of cases -pressor used	2	5	

Table 3: Factors affecting intrathecal spread of local anaesthetics [5]

Factors	Characteristics of the Injected solution	Clinical Technique	Patient Characteristic
1	Baricity	Patient Position	Age,Sex
2	Volume=Dose=Concentration	Level of Injection	Height,Weight
3	Temperature of Injectate	Needle Type &Alignment	Intra-Abdominal Pressure
4	Viscosity	Intrathecal catheters	Spinal Anatomy
5	Additives	Fluid currents	Lumbosacral cerebrospinal fluid volume
6	-	Epidural Injection	Pregnancy

Discussion

The height of a sensory block achieved with a single-shot subarachnoid block depends on various patient factors. Usually, inter-patient variability in the extent and intensity of the intrathecal blockade are observed [3]. The spread of local anaesthesia drug solution is determined by the physical characteristics of CSF and the solution injected, the clinical technique used and the patient's general features. Once bulk spread of the injected solution under the influence of the physical forces outlined above is complete, the final stage is diffusion of the drug through the CSF

and into the nervous tissue [1,5]. The indirect indicators of spread are used for assessment of either afferent (sensory) or efferent (motor or autonomic) function. The afferent function is assessed by Gentle pinprick while the efferent function is assessed by modified bromage scale [1,6].

Currents generated within the CSF by fluid injection are an obvious cause of spread. Many factors can affect the formation of these currents, notably the size, shape and orientation of the bevel and the speed of injection [1]. It is widely believed that barbotage— the intentional creation of such currents by the repeated aspiration and re-injection of CSF and local anaesthetic— increases spread, but previous studies does not support it [2,6,7].

In our study,the highest level of analgesia obtained was similar in both group (mean T5 Dermatome). The time to reach the highest dermatome, (9.65 minutes vs 4.88 minutes with P value <0.001), and the two segment regression of analgesia was faster in barbotage group (65.94 minutes vs 53.82 minutes with P value <0.001)). The modified bromage scale 3 level motor blockade was obtained in less time in barbotage group (7.47 minutes vs 3.35 minutes with P value< 0.001). These findings were similar to previous studies where the maximum dermatomal level of spinal block was similar in both groups but the time taken to reach the maximum dermatomal block and time for two segment regression were shorter in barbotage group. It also states that, barbotage with 0.5% bupivacaine heavy has the advantage of intensifying and shortening the onset of complete motor block [8]. The total amount of IV fluid used in our study was similar in both groups. The percentage of blood pressure fall was greater in barbotage group (14% vs 17, 78%) and hence vasopressor was used more in barbotage group (2 vs 5). Another study also gives similar result and says no uncontrolled cephalad spread of spinal anaesthesia was observed with barbotage while using 0.5% heavy Bupivacaine [9]. Many factors affect the intrathecal spread of injected local anaesthetics. However, the influence of most of them is small, unpredictable and beyond the clinician's control. The major factors are the baricity of the solution injected and the subsequent posture of the patient. The most predictable effects are produced by the slow injection of a small volume of solution that contains glucose into a patient placed supine immediately thereafter. Manipulation of the factors that affect spread may be used to produce different types of block, as long as the clinician has a clear understanding of what is involved [1].

Conclusion

In this study, the quality of analgesia was similar in both groups. The result showed no significant difference between the maximum segmental sensory level but Barbotage group has shortened time for spread to highest dermatome. However, the two segment regression was faster in barbotage group. Barbotage with 0.5% hyperbaric bupivacaine has the advantage of intensifying and shortening the onset time of a complete motor block. Even though the significant blood pressure fall was seen more in barbotage group compared to non barbotage group, it was easily managed with vasopressors. There was no incidence of uncontrolled cephalad spread in barbotage group.

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Key Messages

It is often worried that barbotage technique while giving subarachnoid block leads to abnormal ascent of the sensory block. In barbotage, a certain current in the CSF is produced. The rationale of the barbotage technique is to increase sensory block height using a relatively low dose of local anesthetic drugs, however evidence is lacking.In this study, the quality of analgesia was similar in both groups (Spinal block with and without Barbotage). There was no incidence of uncontrolled cephalad spread in barbotage group.

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