Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL13, ISSUE04, 2022

Original research article

1% 2-Chloroprocaine with ilioinguinal and iliohypogastric nerve block versus 0.5% hyperbaric bupivacaine for spinal anaesthesia in patients undergoing caesarean section: Hemodynamic changes and side effects

[1]Dr.SnehaRajur, [2]Dr.Faraz Ahmed, [3]Dr.Bhagyashri V Kumbar, [4]Dr. Thanuja N Umesh

[1,3]Senior Resident, Department of Anaesthesiology, Gadag Institute of Medical Sciences, Gadag, Karnataka, India

[2]Senior Resident, Department of Anaesthesiology, Chamarajanagar Institute of Medical Sciences, Chamarajanagar, Karnataka, India

[4]Senior Resident, Department of Anaesthesiology, Institute of Gastroenterology Sciences and Organ Transplant, Bengaluru, Karnataka, India

Corresponding Author:
Dr. Thanuja N Umesh

Abstract

Local anaesthetics prevent transmission of nerve impulses (conduction blockade) by inhibiting passage of sodium ions through ion selective sodium channels in nerve membranes. The sodium channel itself is a specific receptor for local anaesthetic molecules. Absorption of local anaesthetic from site of injection into the systemic circulation is influenced by the site of injection and dosage, use of epinephrine, and pharmacologic characteristics of the drug. For better results and anticipating 10% case loss, 35 patients in each group was considered and hence sample size of 70. Seventy patients belonging to ASA I and II scheduled for elective lower segment caesarean section were included in this study.The study population was randomly divided using computer generated randomization numbers into two groups with 35 patients in each group as group CP and group B. In our study, there was no statistically significant difference in the heart rate between the two groups at various time intervals. No patients in either group developed significant bradycardia. Our study showed no statistically significant difference inSBP,DBP,MAP monitored at regular time intervals between the two groups.

Keywords: Hemodynamic changes, side effects, 1% 2-chloroprocaine

Introduction

Spinal anaesthesia with Cocaine was initially produced inadvertently by Leonard J Corning, in 1885 and first used deliberately by August Bier, in 1898. On August 16, 1898, August Bier (1861-1949) performed the first operation with spinal anaesthesia at the Royal Surgical Hospital of the University of Kiel, Germany[1]. The original paper written by August Bier (1899) contains detailed descriptions of the first six patients operated under spinal anaesthesia.

Spinal neural blockade is defined as subarachnoid injection of alocalanaesthetic agent into the CSF, producing a temporary interruption of nerve transmission. Physiologic responses after subarachnoid blockade originate from actions of the anaesthetic agents on the nerve fibres contained within the subarachnoid space[2].

Chloroprocaine is an amino ester local anaesthetic with a faster onset and short duration of action. It is available as 10mg/ml solution, which was recently approved for intrathecal use.

Local anaesthetics prevent transmission of nerve impulses (conduction blockade) by inhibiting passage of sodium ions through ion selective sodium channels in nerve membranes. The sodium channel itself is a specific receptor for local anaesthetic molecules[3].

Absorption of local anaesthetic from site of injection into the systemic circulation is influenced by the site of injection and dosage, use of epinephrine and pharmacologic characteristics of the drug[4].

The alpha half-life in plasma of bupivacaine, after attaining levels of 1.0 to 2.0 µg/ml, is approximately 2.5 hours. The beta half-life is about 4 to 5 hours.

High doses or unintended intravascular injection, may lead to high plasma levels and related depression of the myocardium, hypotension, bradycardia, ventricular arrhythmias and possibly cardiac arrest.

Selective cardiac toxicity of bupivacaine: After accidental IV injection of bupivacaine, the protein binding sites (alpha1 acid glycoprotein and albumin) are quickly saturated, leaving a significant mass of unbound drug available for diffusion into the conducting tissue of the heart. This results in precipitous hypotension, cardiac dysrhythmias and atrioventricular heart block. Cardiotoxic plasma concentration of

ISSN:0975-3583,0976-2833 VOL13, ISSUE04, 2022

bupivacaine is 8 to 10 µg/ml. R enantiomer of bupivacaine is more toxic than the S enantiomer[5]. Both chloroprocaine and bupivacaine are Category C drugs in pregnancy. There are no adequate and well-controlled studies in pregnant women. It is also not known whether chloroprocaine can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity and should be given to a pregnant woman only if clearly needed. This does not preclude the use of drugs at term for the production of obstetrical anaesthesia[6].

Methodology

After substituting the values, sample size of 30 was obtained.

For better results and anticipating 10% case loss, 35 patients in each group was considered and hence sample size of 70.

Seventy patients belonging to ASA I and II scheduled for elective lower segment caesarean section were included in this study.

The study population was randomly divided using computer generated randomization numbers into two groups by using www.random.org., with 35 patients in each group as group CP and group B.

Group CP: received 3ml of 1% 2-chloroprocaine for spinal anaesthesia and Ilioinguinal-Iliohypogastric nerve block at the end of surgery.

Group B: received 2ml of 0.5% hyperbaric bupivacaine for spinal anaesthesia.

Inclusion criteria for the study

ASA I and II pregnant females scheduled for elective singleton lower segment caesarean section.

Exclusion criteria for the study

- Patients on anticoagulants.
- Patients withseverepre-eclampsia,gestationaldiabetesmellitus,placenta previa.
- Patients with uncontrolled chronic hypertension, type 2 diabetes, heart disease.
- Infection at the site of injection.
- Patient's refusal.
- Height of the pregnant females <140cm and >170cm.
- Weighing <50kgs and >90kgs.
- Patients allergic to the drugs containing Para amino benzoic acid.

Results

Table 1: Comparison of heart rate between two groups

Heart Rate	Group		P Value
	Group CP (n=35)Mean (SD)	Group B (n=35)(Mean(SD)	
Basal	99.34 (13.69)	102.09 (15.26)	0.431
At 1 min	100.34 (14.61)	105.74 (17.09)	0.160
At 3 min	95.26 (14.22)	100.23 (17.98)	0.204
At 6 min	94.09 (15.35)	97.89 (20.50)	0.383
At 9 min	92.17 (13.78)	98.43 (20.35)	0.137
At 12 min	90.89 (11.32)	92.91 (17.12)	0.561
At 15 min	88.77 (9.29)	92.60 (15.32)	0.211
At 20 min	89.20 (13.39)	94.49 (16.20)	0.142
At 25 min	88.34 (12.33)	89.20 (13.39)	0.094
At 30 min	86.84 (10.42)	91.03 (12.01)	0.136
At 40 min	92.00 (7.61)	89.67 (10.18)	0.653

Unpaired t Test, P value not significant.

There was no statistically significant difference in the heart rate between the groups.

Table 2: Comparison of SBP between two Groups

SBP	Group		P Value
	Group CP (n=35)Mean (SD)	Group B (n=35)(Mean (SD)	
Basal	120.0 (11.69)	121.43 (13.85)	0.639
At 1 min	111.51 (11.02)	114.49 (14.91)	0.347
At 3 min	108.94 (11.23)	105.23 (19.52)	0.333
At 6 min	108.00 (12.22)	106.83 (12.95)	0.698
At 9 min	107.86 (11.94)	102.26 (15.20)	0.091
At 12 min	102.83 (10.14)	104.74 (13.25)	0.500

ISSN:0975-3583,0976-2833 VOL13, ISSUE04, 2022

At 15 min	106.66 (10.89)	107.00 (11.71)	0.899
At 20 min	109.89 (7.12)	105.29 (12.07)	0.056
At 25 min	109.11 (9.34)	109.54 (12.38)	0.871
At 30 min	110.22 (10.74)	108.44 (9.26)	0.474
At 40 min	109.80 (6.76)	105.58 (10.13)	0.410

Unpaired t Test, P value not significant

There was no statistically significant difference in systolic blood pressure between the groups.

Table 3: Comparison of DBP between two Groups

DBP	Group		P Value
	Group CP (n=35)Mean (SD)	Group B (n=35)(Mean (SD)	
Basal	74.80 (11.81)	76.83 (11.80)	0.475
At 1 min	68.34 (11.22)	69.26 (10.70)	0.728
At 3 min	62.49 (12.73)	62.66 (13.81)	0.957
At 6 min	61.91 (15.41)	62.14 (10.64)	0.943
At 9 min	61.31 (15.49)	58.71 (14.02)	0.464
At 12 min	56.91 (11.37)	58.43 (11.62)	0.584
At 15 min	60.63 (10.60)	61.14 (12.43)	0.853
At 20 min	61.51 (11.64)	58.06 (12.14)	0.228
At 25 min	62.51 (9.65)	60.94 (12.60)	0.560
At 30 min	65.66 (13.95)	60.03 (10.52)	0.068
At 40 min	64.00 (11.66)	58.50 (6.64)	0.231

Unpaired t Test, P Value Not Significant.

There wasno statistically significant difference in diastolic blood pressure between the groups.

Table 4: Comparison of MAP between two Groups

MAP	Group		P Value
	Group CP (n=35)Mean (SD)	Group B (n=35)(Mean (SD)	
Basal	91.80 (12.04)	94.11 (12.05)	0.424
At 1 min	85.74 (9.05)	86.57 (11.49)	0.739
At 3 min	81.31 (12.22)	79.91 (16.52)	0.688
At 6 min	80.43 (14.99)	81.34 (11.35)	0.775
At 9 min	79.86 (14.91)	76.57 (14.27)	0.350
At 12 min	74.40 (11.04)	76.37 (12.70)	0.491
At 15 min	78.71 (11.12)	78.80 (11.76)	0.975
At 20 min	79.86 (9.63)	76.71 (11.36)	0.216
At 25 min	80.37 (9.71)	79.91 (12.30)	0.864
At 30 min	82.66 (12.14)	77.50 (9.48)	0.058
At 40 min	80.00 (9.35)	78.92 (8.39)	0.817

Unpaired t Test, P Value Not Significant.

Therewasno statistically significant difference in mean arterial pressure between the groups.

Table 5: Comparison of SPO_2 between two Groups

SPO_2	Group		P Value
	Group CP (n=35)Mean (SD)	Group B (n=35)(Mean (SD)	
Basal	99.83 (0.51)	99.91 (0.28)	0.391
At 1 min	99.89 (0.32)	99.69 (0.53)	0.061
At 3 min	99.69 (0.58)	99.71 (0.57)	0.837
At 6 min	99.66 (0.68)	99.77 (0.59)	0.459
At 9 min	99.80 (0.53)	99.71 (0.62)	0.537
At 12 min	99.91 (0.28)	99.71 (0.57)	0.068
At 15 min	99.94 (0.23)	99.86 (0.35)	0.238
At 20 min	99.89 (0.32)	99.97 (0.16)	0.169
At 25 min	99.89 (0.40)	99.94 (0.23)	0.472
At 30 min	99.94 (0.24)	99.94 (0.23)	0.951
At 40 min	100.00 (0.00)	100.00 (0.00)	NA

Unpaired t Test, P Value Not Significant.

Therewasnostatistically significant difference in Spo2 between the groups.

Discussion

In our study, the drugs selected for spinal anaesthesia for lower segment caesarean section were

ISSN:0975-3583,0976-2833 VOL13, ISSUE04, 2022

bupivacaine and chloroprocaine. Bupivacaine is being regularly used for caesarean section under spinal anaesthesia was used as control drug. Chloroprocaine is a short acting drug producing excellent sensory and motor analgesia was taken as the study drug. Since it is short acting drug, the study group was supplemented with ilioinguinal-iliohypogastric nerve block using 0.25% bupivacaine at the end of the surgery to provide post-operative analgesia.

Group CP: received 3ml of 1% 2-chloroprocaine for spinal anaesthesia. At the end of surgery, bilateral IL-IH nerve block was given using 0.25% bupivacaine 15 ml to each side by anatomical landmark technique.

Group B: received 2ml of 0.5% hyperbaric bupivacaine for spinal anaesthesia.

Demographic data comparing age, weight, height, BMI showed no statistically significant difference among both the groups.

In our study, there was no statistically significant difference in the heart rate between the two groups at various time intervals. No patients in either group developed significant bradycardia.

Our study showed no statistically significant differenceinSBP,DBP and MAP monitored at regular time intervals between the two groups.

Study conducted by Ben Gys*et al*.[7], M. A. Lacasse*et al*.[8]and Ashwini S *et al*.[9]showed hypotension.

The above studies showed hypotension in few patients in both the groups but none of the patients in our study developed significant hypotension during the intra operative period.

In our study, there was no statistically significant difference in SpO_2 at various time intervals between the two groups. Study conducted by Ben Gys*et al*[7], 5 patients in group CP and one patient in group[10]. B developed desaturation but the reason for desaturation has not been mentioned.

Conclusion

There was no statistically significant difference in the heart rate, SBP, DBP, MAP and SpO2 monitored at various time intervals between the two groups. No patients in either groups developed any side effects.

References

1. Kolawole IK, Fawole AA. Postoperative pain management following caesarean section in University of Ilorin Teaching Hospital (UITH), Ilorin, Nigeria. West African journal of medicine. 2003;22(4):305-9.
2. Masip N, Roberts S. abdominal wall blocks. Special edition, 2015, 93.
3. David JBirbach, Ingrid MBrowne.Anaesthesia for obstetrics.In:Ronald D Miller(Ed). Miller's Anaesthesia, 5th edition. Philadelphia, Churchill Livingstone Elsevier Inc. 2010;2:2210-2217, 126.
4. DuttaDC.Physiological Changes during Pregnancy.In:DC Dutta's Textbook of Obstetrics. 8th edition.2015;5:52-65.
5. Robert Gaiser.Physiologic changes in Pregnancy.In: David H.Chestnut. Chestnuts obstetrics Anaesthesia principles and practise. 4th edition. Mosby,2009, 15-30.
6. Foldes FF, McNall PG. 2-Chloroprocaine: a new local anesthetic agent. Anesthesiology: The Journal of the American SocietyofAnesthesiologists. 1952 May;13(3):287-96.
7. Ben Gys,*et al*. Intrathecal prilocaine, 2-chloroprocaine and bupivacaine for ambulatory abdominal wall herniorrhaphy: a prospective observational study, Acta ChirurgicaBelgica. 2013;I13(3):192-5.
8. LacasseMA, *et al*. Comparision of bupivacaine and 2-chloroprocaine for spinal anaesthesia for outpatient surgery: a double- blind randomized trial. Can Janesth/J Can Anesth. 2011;58:384-391.
9. Ashwini S, Kumara AB. comparison of2-chloroprocaine1%versus hyperbaric bupivacaine 0.5% for subarachnoid block inpregnantfemales posted for caesarean section. Indian J Clin Anaesth. 2019;6(4):532-537.
10. Nógrádi A, Vrbová G. Anatomy and physiology of the spinal cord. InTransplantation of neural tissue into the spinal cord. Springer, Boston, MA,2006, 1-23.