ORIGINAL ARTICLE

Efficacy of low dose hyperbaric bupivacaine in spinal anaesthesia for LUCS

MS Islam[1], S Nahar[2], SS Haq[3]

Abstract

Spinal Anaesthesia (SAB) is a popular anaesthetic technique in LUCS. SAB is performed in sitting and lateral position. The aim of this study is to explore the efficacy of spinal anaesthesia ie, height of block and haemodynamic changes with low dose hyperbaric bupivacaine in different position in LUCS. Total 80 of ASA grade I & II elective LUCS patient preloaded with 800-1000 ml of isotonic fluid were allocated randomly to receive different doses (10 mg, 12 mg,) of 5% Hyperbaric bupivacaine at L4-L5 interspaces in sitting (S group) and in lateral (L group) position to compare the height of block and haemodynamic changes. In sitting position in 10 mg dose group (S 10) adequate block developed in 7 patients out of 20 (35%) with no fall of systolic BP, in 12 mg dose group (S12) adequate block developed in 14 patients out of 20 (70%) with fall of systolic BP>1/3rd in 2 patients (10%). In lateral position groups (L group) with 10 mg dose ((L 10 group), 17 patients out of 20 got adequate block (85%) with fall of systolic BP>1/3rd in 2 patients out of 20 (10%) and in 12 mg dose group (L 12) adequate block in 20 patients out of 20 (100%) with fall of systolic BP>1/3rd in 5 patients out of 20 (25%). So block height with low dose of Hyperbaric Bupivacaine for caesarean section is more predictable and haemodynamically stable in lateral position.

Bang Med J (Khulna) 2012; 45 : 15-18

Introduction :

Professor August Bier performed the first surgical operation using spinal Anesthesia at the Royal Surgical Hospital of the University of Kiel, Germany on August 16, 1898.1 In 1927 Gaston Labat performed spinal anesthesia at The Mount Siani Hospital.2 Since then of course it has been well incorporated into the practice of anesthesiology. Spinal anesthesia is a term which denotes all form of central block, although it usually refers to sub arachnoid administration of local anesthetic agent termed Sub Arachnoid Block (SAB) to avoid the ambiguity. SAB is employed to the surgery of lower limbs, buttock anal region, perineum and lower abdomen mostly.

SAB is easier to perform, has a more rapid predictable onset and may produce more intense block and does not have potential for serious systemic drug toxicity, because of smaller dose of local anesthetic employed.3,4 Though spinal anesthetic have proved extremely safe, but it is not without complications. Complications are haemodynamic changes i.e. - hypotension, bradycardia, shock, cardiac arrest, shivering, backache, post dural puncture headache, meningism, cauda equina syndrome, radiculopathy.5

Degree of arterial hypotension correlate with the level of sympathetic block which is 2-4 segment higher than level of anesthesia.6-7 Again spread of LA in Subarachnoid space depends on dose, volume, position of patient, site of injection, speed of injection, baricity of the drug, direction of needle and barbotage.8 Pregnancy is known to cause higher cephalad spread of analgesia.9

Level of anesthesia and haemodynamic instability are more in LUCS due to more sensitivity of nerve fibre to local anesthetic for hormonal influence of pregnancy.10 There is also an increased risk due to compression of the aorta and inferior vena cava by gravid uterus often leads to decreased cardiac out put, which may precipitate hypotension. In sitting position, uteroplacental blood flow is decreased, orthostatic hypotension may occur to mother, while in lateral position these will not happen.

During operation peritoneal traction and swabbing of paracolic gutters are most stimulating parts of operation and the times when pain and discomfort are most likely to be expected. But exteriorization of the uterus is to be challenging even in case of most adequate and perfect block.11 Exteriorization of uterus is discouraged.

Surgical anesthesia upto T6 is sufficient for lower uterine caesarian section.12 Surgical anesthesia to T4 – T6 obtained within 5-15 minutes with hyperbaric bupivacaine 15-20 mg in non pregnant patient.13 In LUCS required dose reduced to 30% of normal patient. 9-12 mg of Hyperbaric bupivacaine is the required dose.14 Hyperbaric bupivacaine is recommended because of its reliability of spread to the mid thoracic level and appropriate duration of action. Hyperbaric L.A descend downward when sitting and toward T4 when supine.

The purpose of our study was to compare the level of adequate block with haemodynamic stability in low dose of Hyperbaric bupivacaine in lower uterine caesarian section in sitting and lateral position.

Material and Methods:

Eighty ASA grade I and II patients were scheduled for elective caesarean section included in this study. SAB

1. Md. Saiful Islam DA, Asst. Professor (C.C), Anaesthesiology Department, Khulna Medical College & Hospital.
2. Shamsun Nahar FCPS, MS, Associate Professor, Department of Gynaecology & Obstetrics, Khulna Medical College.
3. Sk. Syedul Huq FCPS, FRCS, Deparment of General Surgery, Associate Professor, Khulna Medical College & Hospital.

was performed in each patient with hyperbaric 5% bupivacine (5mg/ml) 0.5 in L4 and L5 inter space. Twenty patients were taken in each group randomly. In first two group SAB were performed in sitting position (S Group). Among S groups, in one group SAB performed with 10 mg (S10 group), in another group SAB performed with 12mg (S12 group). Table (1)

Next two group were selected for SAB in lateral position (L group). In the similar way doses were scheduled and formed sub group L10, L12 Table (2). Pre anesthetic pulse rate, blood pressure and oxygen saturation were recorded. After preloading with 800ml-1000ml of Isotonic I.V. fluid SAB were performed with 25 gauge Quincke spinal needle via midline approach in each patient. 20-30 second were taken to inject the Hyperbaric Bupivacaine, without barbotage. Bevel of the needle were parallel to the dural fibres. Before injecting L.A bevel rotated to direct cephalad. After injecting the LA, patients were kept supine with the wedge under right buttock. The level of sensory block assessed bilaterally in anterior axillary line by pin prick method using a 25 gauge needle. Motor block were assessed by the movement of lower limbs using modified Bromage scale, 0 = Able to rise extended legs, 1 = Inability to flex the knee, 2 = inability to flex the ankle, 3 = Complete block. Upto T6 and upward is taken as adequate block.

Pulse, blood pressure and oxygen saturation was measured just after block and at 5 minutes interval. If systolic BP decreased 1/3rd from pre anesthetic value ephedrine was given 10mg I.V, if again required next 15mg I.V. given. Inj. Adrenaline and Inj. Dopamine were ready in hand to use in severe haemodynamic changes. Other side effects (shivering, nausea, vomiting, headache, breathlessness etc) if found treated accordingly. Comparison of block height and haemodynamic status was made between sitting and lateral position. (Table-3).

Surgical Technique: Pfannestiel incision, Non exteriorization of uterus, gentle paracolic gutter toileting follows in every case by the surgery team), where in minimum height of anaesthesia caesarean section can be performed.

Results:

The height of block in sitting group with 10mg hyperbaric bupivacine (S10 group) at T5 /T6 is 7 out of 20 = 35% and < T6 is 13 out of 20 = 65%. So adequate block is 35%. No patient developed marked hypotension.

Similarly in S12 group adequate height of block achieved in 14 out of 20=70%. Post anesthetic systolic BP fall > 1/3rd of preanaesthetic systolic BP in 2 out of 20 patients = 10% in which in injection ephedrine is not required. Oxygen saturation remains normal (Table-II).

Table I

Height of SAB block & haemodynamic status in LUCS in sitting position (S group)

Patient group (n)	HB=T4	HB<T5	HB<T6	HB=T6	Adequate block (N%)	Fall SBP	Ephed-req
S 10(20)	x	2	5	13	7(35%)	x	x
S12 (20)	x	8	6	6	14(70%)	2(10%)	x

HB=Hight of block

Out of 40 patients of sitting position adequate block achieved in 21 out of 40 = 53%. There was no haemodynamically unstable patient.

Table II

Height of SAB block & haemodynamic status in LUCS in sitting position (L group)

Patient group (n)	HB=T4	HB<T5	HB<T6	HB=T6	Adequate block	Fall SBP	Ephed-req
L 10(20)	T4-1	13	3	3	17(85%)	2(10%)	x
L12 (20)	T4-2	17	1	x	20(100%)	5(25%)	4(20%)

HB=Hight of block

In lateral position group patients (L10 group) adequate block (T4-T6) achieved in 17 out of 20 = 85% (Table-II). Preanesthetic systolic BP fall> 1/3rd after SAB in 2 out of 20 = 10%. No ephedrine, adrenaline, dopamine was required. Oxygen saturation remains normal.

Table III

Comparison of effect of SAB in sitting and lateral position in LUCS

Patient group	Adequate block	Fall of BP>30%	Ephedrine required	Adrenaline & Dopamine req
S10	7-35%	x	x	x
L10	17-85%	2-10%	x	x
S12	14-70%	2-10%	x	x
L12	20-100%	5-25%	4-20%	x

In L12 group adequate block achieved in 20 out of 20 = 100% (Table-2) Preanesthetic systolic BP fall > 1/3rd after SAB in 5 out of 20 = 25%, 4 patients required 5-10mg ephedrine for hypotension. Oxygen saturation remains normal.

Out of 40 patients of lateral position adequete block achieved in 37 (92.5%). In every patient height of block achieved within 5 to 10 minutes from the subarachnoid injection. Comparison made between sitting and

lateral position (Table-III) shows that lateral position and low dose of Hyperbaric bupivacaine and is more effective and haemodynamically stable for caesarean section.

Discussion:

In the study by Rassel and Halm Quinst15 injection of Hyperbaric 0.5% bupivacaine 2.5ml (12.5mg) with the patient in the lateral position produced maximum analgesia greater than in the present study. With block rising to the cervical dermatomes in 25% of patients. In the present study no patient developed the pin prick analgesia above T4.

In the present study we used 10mg and 12mg of Hyperbaric bupivacaine. This study differs from that of Rassel in dose and volume. In the study of MA Karim16 shown that dose, volume and the position of the patient when Hyperbaric local anaesthetic solution was injected is sub arachnoid space for LUCS are significant factor.

Low dose of Hyperbaric bupivacaine is necessary for SAB in case of LUCS (9-12 mg) which is more effective and haemodynamically stable in lateral position. To find out the novel position; reduced haemodynamic instability and unpredictable block for LUCS in SAB oxford position17 is developed in which the woman is placed left lateral following spinal injection the woman is turned to right lateral position and maintained until just before incision. Compared with sitting position shows that in oxford group 2 patient develop unpredictable block out of 30, whereas in sitting group 9 patients developed unpredictable block out of 30 within 5 minutes.

Sitting group required more ephedrine (15.5 ± 12.9 Versus 9.2 ± 7.7 mg) to maintain the haemodynamic stability. Robin Russell18 stated that in LUCS when injected while sitting 10 mg of Hyperbaric bupivacaine produces less satisfactory results than 12.5 mg, while 12 mg in the lateral position is reliable in achieving bilateral spread and than of 15 mg in sitting position.

This study shows that in L10 group adequate block is 85% with no ephedrine required. But in L12 group adequate block in 100% with Ephedrine required in 4 patient out of 20 (20%) which was not harmful. So in LUCS the low dose of Hyperbaric bupivacaine 10 mg to 12 mg and lateral position is better to get the adequate block with less haemodynamic in stability.

Conclusion:

Anaesthesia in LUCS is a double live threatning anesthesia. Height of block and stable haemodynamic condition after anesthesia is a milestone of achieving the good outcome. In low dose of Hyperbaric bupivacaine and lateral position achieve the adequate block height with less haemodynamic instability in LUCS.

Reference:

1. Van Zundert A, Goerig M. August Bier 1861-1949. Reg Anesth Pain Med 2000; 25:26-33
2. Bacon DR. Regional anesthesia and chronic pain therapy: A history. In: Brown DL, editor. Regional Anesthesia and Analgesia. Philadelphia: WB Saunders; 1996:14-15
3. Rawal N, Van Zundert A, Holmastrom B, Crowhurst JA. Combined spinal epidural technique. Reg Anesth 1997; 22:406-23
4. M Zenz, W. Horester, H. Chr. Niesel. Regional Anesthesia. 2nd ed. USA. Mosby Year book 1990:148:149
5. Hyderally H.Complicatios of spinal Anesthesia Mt Sinai J Med, 2002;69(1-2):55-6
6. Arie Koifman, Adiy, Weintraub, David Segal, Idiopathic spontaneous haemoperitonium during pregnancy. Archieves of Gynaecology and obstetrics 2006;276:269-70
7. Wucy, Hwanq JL, Liu YH, Hsieu BC. Spontaneous haemoperitonium in pregnancy from a ruptured superficial uterine vessel. Tiwan J obstret gynaecol. 2007;46:77-80
8. RA Dyer, CC Rent etal, Prevention and treatment of Cardiovascular instability during spinal Anesthesia for Caesarean section: S. Afr. med. J 2004; 94:368
9. Barclay DL, Renegar OJ, Nelson EW. The influence of inferior vena cava compression on the level of spinal anaesthesia. American Journal of obstetrics and gynaecology 1968;101:792-800
10. Robin Russell. Anesthesia for obstetrics and gynaecology 1st ed. BMJ Publishing group. London. 2000:141
11. Aitkenhead AR, Smith G. Text Book of Anesthesia 4th edition UK. Churchill Livinstone, 2002:636
12. MA Karim etal, effect of site of injection on spread of spinal anaesthesia with Hyperbaric Bupivacaine; Bangladesh J of obstete & gynae ; 2008; 23:16
13. Anesthesia and intensive care A-Z, An Encyclopedia of principles and practice, Steven M.Yentis, Nicholas P. Hirsch, Gary B. Smith 2nd edition 2000: Butterworth-Heinemann, member of Reed Elsevier Plc group. Great Britain: P. 503
14. RA Dyer, CC Rent etal, Prevention and treatment of Cardiovascular instability during spinal Anesthesia for Caesarean section, S. Afr. med J 2004; 94: 369

15. Russel IF, Holmquist ELO, Subarachnoid analgesia is caesarean section. A double blind comparison of plain & hyperbaric 0.5% bupivacaine. British Journal of Anaesthesia 1987; 59: 347-353
16. MA Karim etal, effect of site of injection on spread of spinal anaesthesia with Hyperbaric Bupivacaine; Bangladesh J of obstete & gynae ; volume 23, March 2008;16
17. Anaesthesia for elective caesarean section. Mark D.Stonehamma, FRCA etal. Elsevier Publishes Nuffield Department of Anaesthesia, John Radeliffe Hospital Oxford OX39DV, UK, International Journal of obstetric Anaesthesia volume, 8. Issue - 4; 242
18. Robin Russell, Anesthesia for obstetrics and gynaecology (1st ed). BMJ Publishing group. London. 2000:142