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"COMPARISON OF UNILATERAL VERSUS BILATERAL SPINAL ANAESTHESIA USING HYPERBARIC BUPIVACAINE WITH CLONIDINE IN INGUINAL HERNIA SURGERY - A RANDOMIZED CONTROL STUDY"

Anaesthesiology

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ABSTRACT

Introduction: Unilateral spinal anaesthesia has advantages over bilateral spinal anaesthesia as it provides a stronger block on the side of surgery and accelerated recovery of the nerve block. There is lower incidence of hypotension and better maintenance of cardiovascular stability and can be a used for high risk patients. Hence this study was done to compare the unilateral versus bilateral spinal anaesthesia with hyperbaric bupivacaine 0.5 % + clonidine in inguinal hernia surgeries with reference to perioperative autonomic, sensory, motor stability, post operative analgesia and minimize hospital stay. **Methodology:** A prospective study was done in 100 patients posted for inguinal hernia surgeries in a tertiary care hospital. After approval from the ethical committee of the institute, Pre anaesthetic checkup was done one day prior to the surgery. Patients were evaluated for any systemic diseases and laboratory investigation recorded. The procedure of SAB was explained to the patients and written consent was obtained. Patients were kept in lateral position (on the side of surgery) for 10min for group U & made supine immediately on the OT table for group B, with 10 degree head down tilt of the table. Chi-square test and t test was used for statistical analysis. Significance level was set at 0.05. **Result** Mean age, mean height, mean weight, ASA physical status classification, Comorbidities and preoperative vitals was comparable in both the groups. Proportion of patients with fall in vitals was significantly more in group B compared to group U. **Conclusions:** Unilateral spinal anaesthesia group had lower incidence of hemodynamic changes with respect to bradycardia and hypotension and lower requirement of Mephentermine and Atropine. So adopting a unilateral spinal block producing minimal hemodynamic fluctuations would prove beneficial.

KEYWORDS

comparison, Unilateral spinal anaesthesia, Bilateral spinal anaesthesia, Hyperbaric Bupivacaine, Clonidine.

INTRODUCTION

Surgical repair of inguinal hernia can be performed under regional anaesthesia, general anaesthesia, nerve blocks etc.[1] Spinal anesthesia is the most preferred regional anaesthesia technique as it is easy to perform, economical and produces rapid onset of anaesthesia and complete muscle relaxation in patients undergoing lower abdominal and lower limb surgeries.[2]

It is obtained by blocking nerves in the subarachnoid space.[3] It is a safe, inexpensive and easy to perform technique which also offers an advantage of post-surgical pain relief and avoid the various physiological and psychological phenomena which are vital for early mobilization and postoperative discharge.[4]

Unilateral spinal anaesthesia has found resurgence in recent years. Conventional bilateral spinal anaesthesia is performed in most cases of inguinal hernia repair however unilateral spinal anaesthesia can be used.[5]

In unilateral spinal anaesthesia nerve block is limited exclusively to the site of surgery. Some of the Important factors important factors affecting successful unilateral subarachnoid block include-baricity and volume of drug, position of the patient, type of needle and its bevel direction and speed of injection.[6] Unilateral spinal anaesthesia has advantages over bilateral spinal anaesthesia as it provides a stronger block on the side of surgery and accelerated recovery of the nerve block. There is lower incidence of hypotension and better maintenance of cardiovascular stability. Hence it can be a valuable technique for high risk patients.[7]

Hence this study was done to compare the unilateral versus bilateral spinal anaesthesia with hyperbaric bupivacaine 0.5 % + clonidine in inguinal hernia surgeries with reference to perioperative autonomic, sensory and motor stability, post operative analgesia and minimize hospital stay.

METHODOLOGY – PATIENTS AND METHODS

A prospective study was done in patients posted for inguinal hernia surgeries in a tertiary care hospital. A total of 100 patients were enrolled in this randomized double-blind study.

Inclusion Criteria:

- ASA physical status class I and II
- Age between 18-60 years of either sex.

Exclusion Criteria:

- Emergency surgeries
- Deformities of the spine and contraindications to spinal anaesthesia
- Hypersensitivity to any of the drugs
- Patient with comorbid diseases
- Patients refusal, bleeding diathesis

METHODOLOGY:

After approval from the ethical committee of the institute, 100 ASA I and II patients scheduled for elective open inguinal hernia surgeries under spinal anaesthesia were chosen for the study.

Pre anaesthetic checkup was done one day prior to the surgery. Patients were evaluated for any systemic diseases and laboratory investigation recorded. The procedure of SAB was explained to the patients and written consent was obtained.

Procedure:

Patients were allocated to either group U (Unilateral) or group B (Bilateral) by computer generated randomization table. Patients were kept nil by mouth overnight prior to surgery and Tab Alprazolam 0.25mg HS was given. In the operating room peri-operative monitoring of vitals was done. Maintenance fluids were started. Inj Ranitidine 50mg & Inj Ondansetron 4mg iv were given as

premedication. Under all aseptic precautions, a midline lumbar puncture was performed with 25 gauge Quincke needle at L2-L3 intrathecal space with patients in lateral position with operative side downwards for both the groups. A pilot study was conducted and arrived at a dose of 2.5ml which provided adequate block in both the groups. Clonidine was used as an adjuvant to improve quality and duration of the block. Inj.Bupivacaine 0.5% hyperbaric 15mg+ Inj Clonidine 15µgm was given over 15seconds, using 5cc syringe, by guiding the tip of the spinal needle to the side to be operated on group U and cephalic in group B. Only after confirming for clear and free flow of CSF drug was injected. Patients were kept in lateral position (on the side of surgery) for 10min for group U & made supine immediately on the OT table for group B, with 10 degree head down tilt of the table. Surgeon was allowed to start the procedure when the level of block reached T8 sensory dermatome. In case of inadequate level of analgesia, patient was given intravenous sedation or general anaesthesia according to our institutional protocol & was labelled as failure.

Sensory block was judged using pinprick method with the help of 23G hypodermic needle in mid clavicular line on both sides; motor block assessed using Modified Bromage Scale. All assessments were performed on both sides simultaneously every 1minute till first 5 minutes and every 5minutes till 30 minutes then every 10 minutes till the end of surgery. Onset of sensory block, defined as time of injection to loss of pinprick at L1dermatome, was recorded. Peak level reached was judged when consecutive assessments showed the same level. Time to achieve peak sensory level was recorded from time of onset of sensory block till peak sensory level achieved. Duration of sensory block, defined as the time taken from loss of pinprick at L1 dermatome till L1 regression was recorded. Duration of analgesia, defined as the time taken from loss of pinprick at L1 to the time patient complained of pain at the surgical site. The onset of motor block defined as the interval from the injection of the drug to Modified Bromage Score of 1 was recorded Maximum bromage score achieved was recorded.[8]

Time to achieve maximum Bromage score was recorded from time to onset of motor block till maximum motor block achieved. Duration of motor block defined as the interval between the onset of motor block and Modified Bromage score 0 was recorded. Heart rate (HR), Systolic BP (SBP), Diastolic BP (DBP), Mean arterial pressure (MAP), peripheral oxygen saturation (SpO2) were recorded at similar intervals. Hypotension (MAP 25% from baseline or systolic pressure <90mmhg) was treated with inj.mephentermine 6mg iv bolus. Bradycardia (pulse rate <25% from baseline or pulserate <50beats \min) was treated with inj .atropine 0.6mg iv. Total doses of Mephentermine and Atropine used were noted.

Postoperative pain was assessed using VAS scale at every 30 minutes.[9] Inj. Diclofenac Na 1.5 mg|kg IM was administered as rescue analgesic at VAS >/= 4 or at request by patient whichever is earlier .Time for rescue analgesia was noted. Side effects like nausea, vomiting, itching, urinary retension, sedation were recorded.

Data analysis:
The qualitative variables were expressed in terms of percentage and difference between two proportions was analyzed using chi square or Fisher exact test. The quantitative variables were expressed in terms of mean and standard deviation and analysed using student t test. All the analysis was 2 tailed and the significance level was set at 0.05.

RESULTS:
Mean age, mean height, mean weight and ASA physical status classification was comparable in both the groups which was not statistically significant. Comorbidities identified were diabetes mellitus and hypertension.

Table 1: Distribution by patient characteristics in Group B versus Group U

PARAMETERS	Sub-group	Group B	Group U	P value
Age (years) Mean±SD		40.84±10.42	39.76±12.41	0.638
Height (cms) Mean±SD		159.8±6.21	161.72±5.22	0.097
Weight (Kg) Mean±SD		59.04±5.86	60.48±5.36	0.203
Diabetes Mellitus (n/%)	Present	12(14%)	8(16%)	0.317
	Absent	38(86%)	42(84%)	
Hypertension (n/%)	Present	16(22%)	12(24%)	0.793
	Absent	34(78%)	38(76%)	
ASA (n/%)	Grade 1	46(92%)	46(92%)	1
	Grade 2	4(8%)	4(8%)	

In Group B the mean onset of sensory block was 7.94minutes whereas in Group U. The mean onset of sensory block was in Group U (4.53minutes) was significantly less than group B (7.94minutes) which was significant statistically. The time taken to reach the highest sensory level in Group U (8.73 minutes) was less than in Group B (18.81 minutes) thus was significant statistically. The mean value of time taken for regression to L1 is less in Group U (117.84 minutes) when compared to group B (211 minutes) which was significant statistically. The two segment regression in group U is less than for group B which was statistically significant. In Group B the mean time for complete regression to S2 is 282.05 minutes where as in Group U it is 151.88 minutes & is statistically significant. In Group B the mean time to eligibility for discharge from hospital is 316.64 minutes. In GroupU, the mean time to eligibility discharge from hospital is 161.711minutes. Duration of motor bloc was significantly less in gtoup B where as time for analgesic requirement was comparable in both the groups (shown in table 2 and figure 1) .

Table 2: Distribution of outcome variables in group B versus group U

Outcome variables	Group B	Group U	P value
Time to readiness for surgery (min) (T10)	7.94±3.2	4.53±2.53	<0.001
Time to peak block height (min)	18.81±4.22	8.73±4.19	<0.001
Time for Regression to L1 (min)	211±39.78	117.84±38.04	<0.001
Time for complete regression to s2 (min)	282.05±56.29	151.88±44.74	<0.001
Time to Eligibility for discharge from hospital (min)	316.64±42.94	161.711±49.8	<0.001
Duration of motor block	209±17.4	192±12.6	<0.001
Time for first analgesic requirement	335±21.9	329±24.9	0.2038

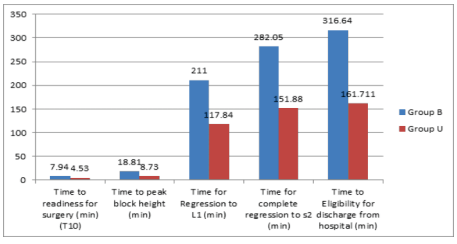

Figure 1: Mean values of Outcome variables in Group B versus Group U

In group B, 28% of cases had fall in pulse rate and in Group U, 6% of cases had fall in pulse rate, which is significant. In group B, 32% of cases had fall in systolic BP and in Group U, 12% of cases had fall in systolic BP, and this difference is significant. In group B, 26% of cases had fall in diastolic BP and in Group U, 8% of cases had fall in diastolic BP, which is significant. Oxygen saturation was comparable in both groups, but was not significant statistically. Atropine was used less in group U (6%) compared to group B (24%) and is statistically significant. Vasopressor was used less in group U (10%) compared to group B (30%) and this was statistically significant.

Table 3: Distribution by Haemodynamic changes in group B versus group U

Outcome variables		Group B	Group U	P value
Fall in pulse rate (n/%)	Yes	14(28%)	3(6%)	0.003
	No	36(72%)	47(94%)	
Fall in systolic BP (n/%)	Yes	16(32%)	6(12%)	0.015
	No	34(68%)	44(88%)	
Fall in diastolic BP (n/%)	Yes	13(26%)	4(8%)	0.016
	No	37(74%)	46(92%)	
Oxygen saturation in % (mean ± SD)		99.14±0.921	99.26±0.664	0.456

Use of Atropine	Yes	12(24%)	3(6%)	0.011
	No	38(76%)	47(94%)	
Use of Vasopressor	Yes	15 (30%)	5 (10%)	0.012
	No	35 (70%)	45 (90%)	

DISCUSSION:

Bilateral SAB is associated with higher incidence of hemodynamic instability and post-op prolonged stay. Unilateral SAB patients are usually eligible for home discharge sooner. So it could be a better alternative to bilateral spinal anaesthesia.[10,11] Maintenance of the lateral decubitus position for a determined length of time is seen to restrict the surgical block the side to be operated. But it is difficult to define the exact time for which the patient to be kept in lateral position. Literature says 10-20 min time is adequate to achieve unilaterality.[1] In our study we kept patients in lateral position for 10 min in U/L group after giving spinal injection.

In our study patients were comparable with respect to age, height, weight and ASA status. In study by Gadkari et al the age, sex, weight, height, ASA status and duration of surgery of the patients were comparable in the two groups.[12] Also in study Manassero A, et al by No differences in demographic variables were observed between the two groups.[13]

In our study patients were comparable with preoperative baseline haemodynamic parameters. Also in study by Gadkari et al The basal haemodynamic parameters i.e. heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and peripheral oxygen saturation of the two groups were comparable.[12]

In this study in group B, 28% of cases had fall in pulse rate and in Group U, 6% of cases had fall in pulse rate, which is significant.

In study by Gadkari et al, at all levels the mean heart rates were higher in group receiving unilateral anaesthesia compared to bilateral anaesthesia.[12] Greater fall in heart rate in bilateral group could result due to local anaesthetic related sympathetic blockade or use of intrathecal Clonidine. With use of 15 micrograms of Clonidine, Thakur et al reported no incidence of bradycardia.[14]

In our study Atropine was used less in group U (6%) compared to group B (24%) and is statistically significant. In study by Gadkari et al the atropine doses required in the patients receiving bilateral anaesthesia were in 37.03% study subjects. But, there were no study subjects who required atropine in the patients receiving unilateral anaesthesia. This difference was statistically significant. ($p<0.05$).[12]

In our study in group B, 32% of cases had fall in systolic BP and in Group U, 12% of cases had fall in systolic BP, and this difference is significant. In group B, 26% of cases had fall in diastolic BP and in Group U, 8% of cases had fall in diastolic BP, which is significant.

In study by Faruk Cicekci et al there was no significant difference between the groups in terms of the pre operative and post operative systolic arterial pressure, diastolic arterial pressure, heart rate and peripheral oxygen saturation.[15]

In our study no complications were recorded in any of the group. In study by Cicekci et al the comparison of postoperative complications (nausea/vomiting, hypotension, bradycardia, itching and urinary retention) did not reveal a significant difference between the two groups.[15]

So we feel that the bradycardia was related to higher sympathetic blockade associated with bilateral spinal anaesthesia in our study Prevention rather than treatment of haemodynamic disturbances is emphasized in patients undergoing spinal anaesthesia.

Prophylactic measures include pre-hydration with intravenous fluids. We gave lactated ringer's solution 10ml/kg for pre-loading Subsequently 4ml/kg intraoperative fluid replacement was done considering hernia as intermediate fluid loss surgery. The systolic diastolic and mean arterial pressures were significantly higher in case of unilateral anaesthesia patients. Our results are in line with those by Nauman Akhtar et al They compared unilateral versus bilateral spinal anaesthesia with respect to haemodynamic changes.[16]

CONCLUSION

Unilateral spinal anaesthesia group had lower incidence of hemodynamic changes with respect to bradycardia and hypotension and lower requirement of Mephentermine and Atropine. So adopting a unilateral spinal block producing minimal hemodynamic fluctuations would prove beneficial.

There was no difference in onset of block and time to attain peak sensory and motor blocks between the groups. Unilateral spinal anaesthesia resulted in lower peak sensory level on operative side but similar grade of motor block on operative side and faster regression of sensory and motor blocks with no immediate side effects. But post-operative analgesia time was significantly prolonged in bilateral spinal anaesthesia. So because of haemodynamic stability and faster recover characteristics of unilateral spinal block, it can be used as a suitable technique in patients with limited cardiovascular reserve and for out - patient anaesthesia.

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