



COMPARISON OF 0.5% BUPIVACAINE AND 0.75% ROPIVACAINE WITH FENTANYL FOR EPIDURAL ANAESTHESIA IN HIGH RISK GERIATRIC PATIENTS UNDERGOING TRANSURETHRAL RESECTION OF PROSTATE

Anaesthesiology

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ABSTRACT

Background: Benign prostatic hypertrophy is a common problem in elderly patients leading to urinary retention, for which they undergo transurethral resection of prostate (TURP). TURP is preferably done under neuraxial anaesthesia as elderly patients having associated systemic illnesses are at increased risk of hemodynamic fluctuations caused by general anaesthesia. The current study was done to compare the efficacy and safety of 0.5% bupivacaine and 0.75% ropivacaine with fentanyl for epidural anaesthesia in high risk elderly patients undergoing transurethral resection of prostate.

Materials and Method: 70 elderly consented male patients of ASA grade II and III, 60-85 yrs, height 150-170cms, undergoing elective TURP for BPH were randomized into 2 groups of 35 patients each. Patients in group BF (n=35) received 15ml 0.5% bupivacaine with 50mcg fentanyl and group RF (n=35) received 15ml 0.75% ropivacaine with 50 mcg fentanyl through epidural route. The onset and duration of sensory and motor block, duration of analgesia and hemodynamic parameters were recorded for the comparison. Any side effect eg. Hypotension, bradycardia, nausea, pruritis etc were recorded.

Results: The demographic profile and duration of surgery were comparable in both the groups. The mean time to onset of sensory block to T10 dermatome and onset of motor block was significantly earlier in group BF (p value <0.05). The duration of sensory and motor block was significantly longer in group BF (p value <0.05). Fluctuation in hemodynamic parameters were minimal in group RF, whereas significant hypotension was observed in patients in group BF. None of the patients in both the groups developed nausea, vomiting, respiratory depression and pruritis.

Conclusion: 0.75% Ropivacaine with fentanyl showed better clinical profile and shorter duration of sensory and motor block than 0.5% bupivacaine with fentanyl.

KEYWORDS:

high risk, geriatric, trans urethral resection of prostate, epidural, fentanyl

Introduction:

Benign prostatic hypertrophy is a common problem in elderly patients which leads to bladder outlet obstruction. To relieve the obstruction patients undergo transurethral resection of prostate as it is considered safe over open prostatectomy as demonstrated by various clinical studies¹. TURP is preferably done under neuraxial anaesthesia as elderly patients have coexisting cardiopulmonary diseases which make them susceptible to intraoperative hemodynamic fluctuations under general anaesthesia and it also helps in early recognition of intraoperative fluid overload, transurethral resection of prostate (TURP) syndrome, bladder perforation etc. Neuraxial anaesthesia helps in early ambulation and decreases the incidence of post operative deep vein thrombosis^{1,2}. Regional anaesthesia is preferred mode of anaesthesia wherever feasible, as it is associated with minimum derangement in cardiorespiratory function. Regional anaesthesia has added advantage of reduced surgical stress, reduces blood loss, early post operative mobility and reduced incidence of deep vein thrombosis in post operative period. But sometimes even the conventional doses of local anaesthetic can cause profound hemodynamic changes in the form of hypotension and bradycardia in elderly patient because of loss of baroreceptor reflexes, loss of vessel wall elasticity etc³

Bupivacaine was the first long acting amide local anaesthetic used for regional anaesthesia and it was very popular for years until its toxic side effects were observed⁴. Ropivacaine, also an amide local anaesthetic, similar to bupivacaine in its physicochemical properties has shown a safety profile over bupivacaine in terms of reduced cardiac and central nervous system toxicity. It is similar in efficacy but with enhanced safety profile compared to bupivacaine which is a major advantage in regional anaesthesia. Ropivacaine due to its low lipid solubility blocks sensory fibers involved in pain transmission more than the motor fibers. This property makes it a suitable agent for providing adequate surgical anaesthesia with the provision of early ambulation⁷

Many adjuvants have been added with local anaesthetics for regional

anaesthesia to speed up the onset of sensory and motor block and prolong the duration of analgesia. Opioids are most commonly used adjuvants for spinal and epidural anaesthesia, as they reduce the dose of local anaesthetic, speed up the onset of anaesthesia and prolong the duration of anaesthesia. But opioids are associated with certain side effects like respiratory depression, nausea, pruritis and urinary retention which can be seen in some patients. The incidence of side effects with intrathecal opioids are low as compared to intravenous opioids^{3,4}.

adequate surgical anaesthesia for TURP requires sensory block upto T10 segment. The onset and duration of sensory and motor block depends upon the concentration and physicochemical properties of local anaesthetic used¹.

We conducted this study with the aim of evaluating the clinical efficacy and safety of 0.75% ropivacaine with 0.5% bupivacaine with fentanyl for epidural anaesthesia in high risk geriatric patients undergoing elective trans urethral resection of prostate.

Aim and objectives: The aim of this study is to assess and compare “the safety and efficacy of 0.5% Bupivacaine and 0.75% Ropivacaine with Fentanyl for epidural anaesthesia in high risk geriatric patients undergoing TURP” in terms of

1. Haemodynamic effects e.g. BP, PR, SpO2
2. Onset and duration of sensory and motor blockade
3. Duration of analgesia
4. Side effects if any eg. Hypotension, bradycardia, sedation etc

Materials and methods:

After obtaining approval from institutional ethical committee, a Hospital Based, randomized, comparative, Observational Study was conducted on 70 consented male patients of ASA grade II and III, Age 60-85 years with Height 150-170cm and Weight 40-90kg, undergoing elective surgery transurethral resection of prostate (TURP) for BPH.

The Sample size was calculated as 31 subjects in each group at alpha error of 0.05 and power 80% assuming minimum difference of mean to be detected in onset of sensory block. For study purpose 35 patients in each group were taken for study. Written informed consent was obtained from all the patients and pre anaesthetic examination was done. Patient having any contraindications for epidural anaesthesia eg. infection at the site of injection, spine deformity, patient receiving antiplatelet drugs such as aspirin, clopidogrel, patient receiving heparin, pre-existing neurological defects, Evidence of gross radiological and anatomical abnormality in lumbar region and history of any previous drug allergy from local anaesthetic drug and fentanyl were excluded from study.

The procedure and methods of sensory and motor assessment. were explained to the Patients undergoing the study. No premedications were given to the patients. The patients were randomized into two groups of 35 patients each by computer based randomisation. Group RF received epidural solution of 15 mL of 0.75% Ropivacaine with 1ml fentanyl(50mcg) and group BF received 15 ml 0.5% Bupivacaine with 1 mL fentanyl (50 µg). The total volume of drug solution was 16 ml in both the groups.

After confirming nil per oral(NPO) status of 6-8 hrs, patient was taken to operation theatre, all routine monitors including ECG, BP monitoring, SPO2 were connected and baseline parameters were recorded. Pre loading with ringer lactate or DNS 15ml/kg was started before giving epidural anaesthesia. under all aseptic precaution Epidural anaesthesia was performed with 18G tuohy needle in sitting position at L3-L4 space with loss of resistance technique. A test dose of 3 ml lignocaine with adrenaline(1:200000) was given and patient was observed for any side effect for 3 minutes. After 3 min the patients received either 15 mL of 0.75% Ropivacaine (112.5 mg) or 0.5%Bupivacaine (75 mg) along with 1 mL fentanyl (50 µg) at the rate of 0.5ml/sec according to the group assigned to the patient.

The onset of sensory block was assessed by bilateral pin prick with 27G hypodermic needle along the midclavicular line every minute till the onset of sensory block, which was defined as the time from epidural injection to sensory block at T10 dermatome level.

The onset of motor blockade was assessed using a modified Bromage scale (0-3):

- 0 = no power impairment and able to raise straight leg against resistance
- 1 = unable to raise straight leg but able to flex knee
- 2 = unable to flex knee but able to move ankle joint
- 3 = unable to move hip, knee, or ankle no motor activity.

The onset of motor block was defined as the time from epidural injection to the occurrence of motor block at each scale. Motor blockade of grade 2 or more was considered effective for TURP. The surgical anesthesia was considered effective when T10 dermatome was anaesthetized.

Hemodynamic parameters including BP,PR, And ECG were monitored every 5 minutes for initial 30 minutes then every 10 minutes till completion of surgery. Hypotension was defined as fall in SBP <90mmHg or >20% to baseline BP and was treated with fluids or incremental doses of mephentermine 6mg. Bradycardia was defined as fall in PR<55/min and was treated with atropine. Side effects eg., nausea, vomiting, pruritis, respiratory depression, and post-epidural shivering were recorded and managed accordingly.

At the end of study all the data was collected , compiled and entered on excel sheet. Quantitative data were summarized in form of mean and SD. Statistical analysis was performed with SPSS version 21 for Windows statistical software packages (SPSS inc., Chicago, IL, USA).The difference in mean of two groups was analyzed using Unpaired t- test. Qualitative data were summarized in form of proportions. The difference in proportion was analyzed using Chi2 test. Probability was considered to be significant if less than 0.05.

Results:

There was no significant difference in demographic profile. Both the groups were comparable in age, weight, height and ASA grade(Table 1).Duration of surgery were also comparable in both the groups(table 1). The mean time to onset of sensory block was 10.25±0.885 min in

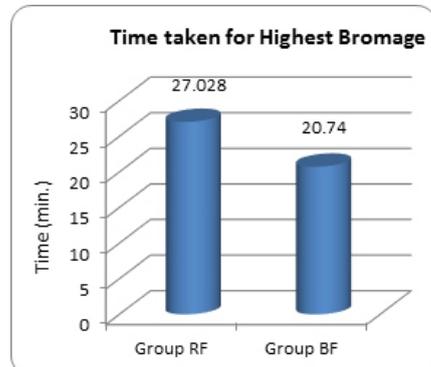
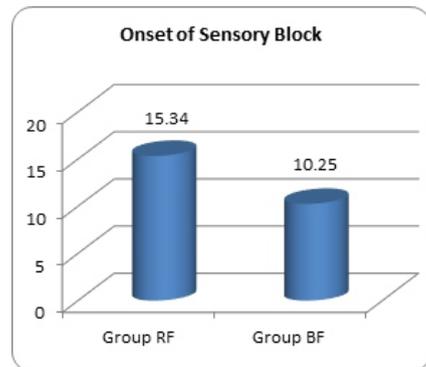
group BF and 15.34±0.683 min in group RF, There was significant difference(p value<0.0001)(table 2,graph 1). There was no significant difference in the mean maximal sensory level reached (table 2)but the time to reach maximal sensory level was earlier in group BF 16.57±1.21min vs 25.54±0.95 min in group RF(table 2). Onset of motor block was also earlier in group BF 14.17±1.12min Vs 17.11±2.11min in RF group, which was statistically significant (p value<0.0001)(table 2,graph 2). The time taken for two-segment regression and regression of sensory block to S1 was earlier in group RF. (127.57±9.68min and 204.29±9.25min in group BF, respectively and 101.14±7.68min and 172.86 ±8.07min in group RF respectively)(table 2,graph 3),There was a statistically significant difference (P value<0.0001). Duration of motor block was significantly longer in BF group (210.29±14.14min v/s 136.14±5.95 min) (table 2,graph 4)

(TABLE 1) Demographic profile

Parameters	Group RF	Group BF	P Value
Age(yrs)	68.60±4.43	69.77±5.53	0.331(NS)
Weight(kgs)	70.46±6.98	68.23±6.85	0.182(NS)
Height(cms)	165.03±5.23	164.66±4.83	0.758(NS)
Duration of surgery(min)	38.57±6.71	37.86±4.58	0.604(NS)
ASA grade(II/III)	21/14	22/13	0.809 (NS)

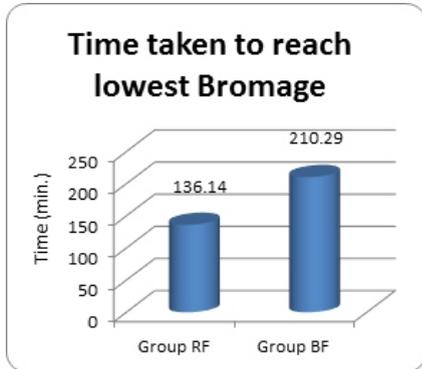
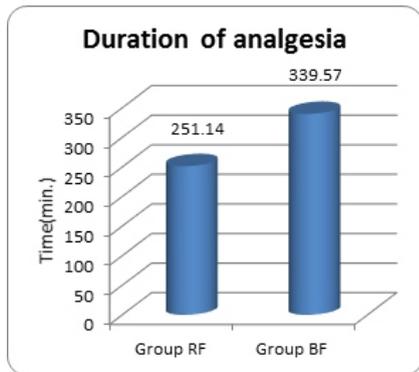
TABLE 2: Sensory and motor block profile

Parameters	Group RF	Group BF	Pvalue
Onset of sensory block(to T10 level)(min)	15.34±0.683	10.25±0.885	0.0001(S)
Median maximum level reached(T6/T8)	16/19	15/20	0.813(NS)
Time to achieve maximum sensory block(min)	25.54±0.95	16.57±1.21	0.0001(S)
Duration of sensory block(min)	172.86±8.07	204.29±9.25	0.0001(S)
Duration of motor block (min)	136.14±5.95	210.29±14.14	0.0001(S)
Duration of analgesia (min)	251.14±15.77	339.57±12.86	0.0001(S)



Graph 1. Onset of sensory block

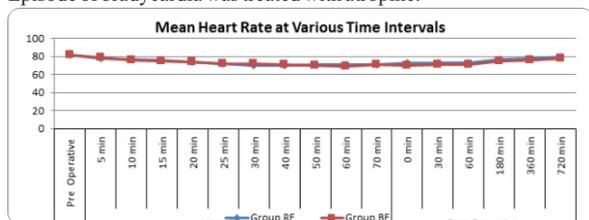
Graph 2. Onset of motor block



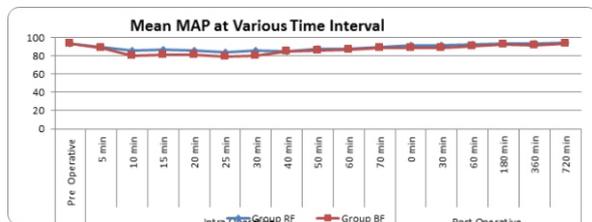
Graph 3. Duration of analgesia

Graph 4. Duration of motor block

Hemodynamic parameters were observed throughout the surgery. There was no significant difference in pulse rate at various time intervals in both the groups (Graph 5). There was no significant decline in the mean values of heart rate and SBP from the baseline values in Group RF, but there was statistically significant variations in Group BF (table 6). 8 Patients in bupivacaine group developed hypotension as compared to only 2 patients in ropivacaine group. Bradycardia was seen in 2-2 patients in both the groups. Hypotension was treated with rapid fluid infusion and inj mephentermine 6 mg bolus as needed. Episode of bradycardia was treated with atropine.



Graph 5. Hemodynamic parameters (heart rate)



Graph 6. Variation in Mean arterial pressure (MAP)

DISCUSSION:

Adequate anaesthesia with better pain control and preservation of hemodynamic stability in high risk elderly patients undergoing surgery is a challenging task for anaesthetist, as these patients are susceptible to intraoperative hemodynamic fluctuations produced by the regional and general anaesthesia because of the reduced cardiorespiratory reserve and concomitant systemic illnesses.

The goal of anaesthesia in such patients is to select a technique and drug which produces least effect on cardiorespiratory system and provide adequate surgical anaesthesia and analgesia. Various studies have been done to compare relative safety and efficacy of different techniques and drugs, to find out the drug which is relatively safer to use in these patients.

Regional anaesthesia is considered relatively safe over general anaesthesia for these patients as their but it has disadvantage of sympathetic blockade which can lead to side effects like hypotension and bradycardia so studies have been done to find a local anaesthetic with least cardiotoxic effects.^{5,6,7}

Various adjuvants have also been added with local anaesthetics to hasten the onset of sensory and motor block and to increase the duration of analgesia. Fentanyl is widely studied opioid as an adjuvant for regional anaesthesia and has shown to hasten the onset of sensory and motor block and prolong the duration of sensory block. It also reduces the dose of local anaesthetic to achieve the desired level of anaesthesia.

We conducted the present study to evaluate the efficacy and safety of 0.75% ropivacaine and 0.5% bupivacaine with fentanyl for epidural anaesthesia in high risk elderly patient undergoing TURP in terms of hemodynamic stability and characteristics of sensory and motor block in terms of onset and duration.

The results of present study showed that epidural 0.75% ropivacaine with fentanyl provided better hemodynamic stability and adequate surgical anaesthesia with sensory and motor block of shorter duration which is similar to the results of study done by bhawna rastogi et al³

Whereas the study done by sonali et al⁸ to compare epidural 0.75% ropivacaine and 0.5% bupivacaine with 50mcg fentanyl reported that epidural ropivacaine produce sensory and motor block of longer duration than bupivacaine. In a study by S Shaikh et al⁹ comparing bupivacaine and ropivacaine for epidural anaesthesia in 60 patients undergoing lower limb orthopaedic surgeries, they did not observe any significant difference in the mean time of onset of sensory block between the groups. Brockway et al¹⁰ showed that motor block produced by ropivacaine was slower in onset, which is in favour of our study. Study conducted by Cekmen et al¹¹ on 40 patients undergoing elective arthroscopic surgery under epidural anaesthesia showed that duration of motor block was significantly longer in the 0.5% bupivacaine group as compared to 0.5% ropivacaine. N. Christelis et al¹² conducted study on 80 women undergoing elective caesarean section under epidural anaesthesia, and found that ropivacaine produced a denser motor block of longer duration (237±84 min) as compared to bupivacaine group (144±76 min). This difference was statistically highly significant (p value <0.0001). But in our study we found that the duration of motor block was more in bupivacaine group which is statistically highly significant (p value <0.0001). Bhawna Rastogi et al¹³ found that intraoperative mean heart rate was comparable in both the groups but decrease in MAP was significantly more in group BF than group RF during initial 15-30 minutes after epidural injection of the drug. MAP remained more stable in group RF throughout the surgery similar to that observed in our study. Sheikh et al⁹ and Shalina Chandran et al¹³ observed no significant difference in changes in heart rate, blood pressure in both the bupivacaine and ropivacaine groups.

Conclusion

The results of our study has shown that epidural ropivacaine with fentanyl provide adequate surgical anaesthesia with better hemodynamic stability in high risk elderly patients so it can be used as an alternative to bupivacaine in patients undergoing TURP.

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