

Research Article

Effects of Different Routes of Local Anesthetic Administration in Epidural Anesthesia for Transurethral Resection of the Prostate

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Abstract

The aim of this study is to assess the effects of different routes of local anesthetic administration in epidural anesthesia applied to patients undergoing transurethral resection of the prostate (TUR-P).

ASA I-III 60 patients were enrolled in the study. Patients were randomized into the following three groups: in Group N (needle), total volume of local anesthetic (16 mL) was administered through the Tuohy needle (n=20), in Group C (catheter), local anesthetic was administered through the epidural catheter (n=20) and in Group N/C (needle/catheter), local anesthetic was administered through both the needle (8mL) and the catheter (8mL) (n=20). Hemodynamic parameters (MAP, HR), times to reach sensory block T10 (block levels), side effects, patient and surgeon satisfaction were evaluated.

In group C, the patients were hemodynamically more stable at the time of surgery compared to the other two groups ($p < 0.05$). Times to reach sufficient block level were similar in all three groups and side effects were neglectable. Patient and surgeon satisfaction were high and similar in all groups.

As a result, all three techniques can be used in TUR-P patients undergoing epidural anesthesia; however local anesthetic administration through the epidural catheter seems to be more effective in providing rapid and sufficient block levels and hemodynamic stability.

INTRODUCTION

In urologic procedures, topical, regional and general anesthesia may be preferred. The anesthesiologists take patient's age, clinical status and surgical procedure to be performed into account when making a decision about the type of anesthesia [1]. Transurethral urological procedures are common in geriatric male patients which are more likely to have comorbidities. In this setting, epidural anesthesia may be the anesthesia of choice for this population [1].

In this study, we used different paths to administer local anesthetic to achieve epidural anesthesia in patients scheduled for transurethral resection of the prostate (TUR-P) due to benign

prostatic hyperplasia and evaluated hemodynamic stability, times to reach sensory block T10, side effects as well as patient and surgeon satisfaction.

MATERIALS AND METHODS

After the approval of the hospital ethics committee, 60 ASA class I-III male patients aged 40-75, scheduled for elective TUR-P surgery was enrolled in the study. According to the route of administration, patients were randomly divided into three groups:

Group N (needle); local anesthetic was administered through the Tuohy needle,

Group C (catheter); local anesthetic was administered through the epidural catheter,

Group NC (needle/catheter); local anesthetic was administered both through the needle and the catheter.

Patients underwent standard monitoring at the operating room. Each patient received 0.03 mg/kg midazolam intravenously following catheterization with 20-gauge intravenous cannula. Before starting epidural block, patients were preloaded with 10 ml/kg 0.9% isotonic saline infused in 30 minutes. Mean arterial pressure (MAP) and heart rate (HR) were recorded before and after the premedication, following epidural block and every 5 minutes until the patient's sensory block level regressed to L1 dermatome.

In all groups, epidural anesthesia was attempted in patients placed on right lateral decubitus position with thighs flexed up and neck flexed forward (fetal position) with an 18 gauge Tuohy needle at L3-4 interspinal level using loss of resistance technique following skin infiltration with 2% lidocaine. Patients in Group N received 8ml 2% prilocaine, 7ml 0.5% levo bupivacaine and 50mcgr fentanyl mixture (a total of 16 mL) through the epidural space using Tuohy needle. The patients in Group C received the (local anesthetic) same drug combination through the epidural catheter. The patients in Group NC received 8 mL through the needle and 8 mL through the epidural catheter.

In all groups, time "0" was considered as the time of drug administration.

In all patients; sensory and motor block levels, heart rates and mean arterial blood pressure values, times to reach sensory block level T10, side effects as well as patient and surgeon satisfaction using a 3 step satisfaction scale (Table 1) were recorded by an observer blinded to the study.

Surgeon satisfaction was evaluated at the end of the operation and patient satisfaction was evaluated in the recovery room before going to their service bed.

After the operation, patients were admitted to the recovery room, the epidural catheter was removed following sensory block regression to T10 dermatome and the patients were sent to the service.

For statistical analysis Statistical Package for Social Sciences (SPSS) for Windows 15.0 program was used. Anova and Kruskal-Wallis tests were used for between-group comparisons, Wilcoxon Signed Ranks tests were used for evaluation within groups, the friedman test General Linear Model was used for the difference between times (analysis of variance for repeated measures). $p < 0.05$ level was assumed significant. Sample size was estimated based on an average SD of 0.025% determined by a pilot study that a minimum of 12 patients for each group to reach power of 0.80 for a 10 % difference of 1 SD (0.025%) at $p < 0.05$ were needed.

RESULTS AND DISCUSSION

No significant difference in variables such as demographical data and ASA classification were observed among groups. Hypertension was the most common comorbidity among the patients (Table 2).

Table 1: Patient and surgeon satisfaction scale.

0	Not satisfied
1	Satisfied
2	Very satisfied

Table 2: Preoperative comorbidities of the patients.

Comorbidity	Number of patients (%)
None	23/60 (38)
DM	7/60 (11.7)
HT	27/60 (45)
COPD	6/60 (10)
Goitre	3/60 (5)
CAD	6/60 (10)
CVE	1/60 (1.7)

Abbreviations: DM: Diabetes Mellitus; HT: Hypertension; COPD: Chronic Obstructive Pulmonary Disease; CAD: Coronary Artery Disease; CVE: Cerebro Vascular Event

All patients were evaluated between groups in terms of heart rate throughout the study. Though there were statistically significant differences at certain times between Groups NC, N and C the values were not clinically significant in terms of bradycardia or tachycardia (Figure 1).

During the follow up, there was no significant difference in mean arterial pressure among groups. Patients in Group N and Group NC, mean arterial pressures 25 minutes following epidural block were statistically lower ($p < 0.05$) but it was clinically insignificant (in terms of hypotension). In Group C no significant change was observed at any time (Figure 2).

In Groups C and NC times to onset of thoracic T-10 dermatome were significantly shorter than Group N.

Times to reach T10 sensorial lock level were significantly lower in Groups C and NC than Group N (Table 3).

In all groups, motor block was evaluated by Bromage scale (Table 4). The groups were similar according to Bromage scale after surgery; times to L1 regression of sensory block were similar among groups, also no statistically significant difference between the groups in terms of postoperative motor block regression was observed ($p > 0.05$). Patient and surgeon satisfaction was adequate and similar in three groups (Table 5).

Today, regional anesthesia techniques are applied successfully in the majority of surgical procedures.

In prostatectomy patients; advanced age, presence of malignancy, cardiac disease, varicose veins and obesity cause predisposition to deep vein thrombosis. Regional anesthesia reduces the risk of deep vein thrombosis compared to general anesthesia [2,3]. Intraoperative blood loss is also less with regional anesthesia [3]. Low blood pressure that occurs secondary to sympathetic block which causes an increase in the blood flow of deep veins, plays an important role in prevention of deep vein thrombosis [4,5].

For our patients undergoing TUR-P surgery, decision of the

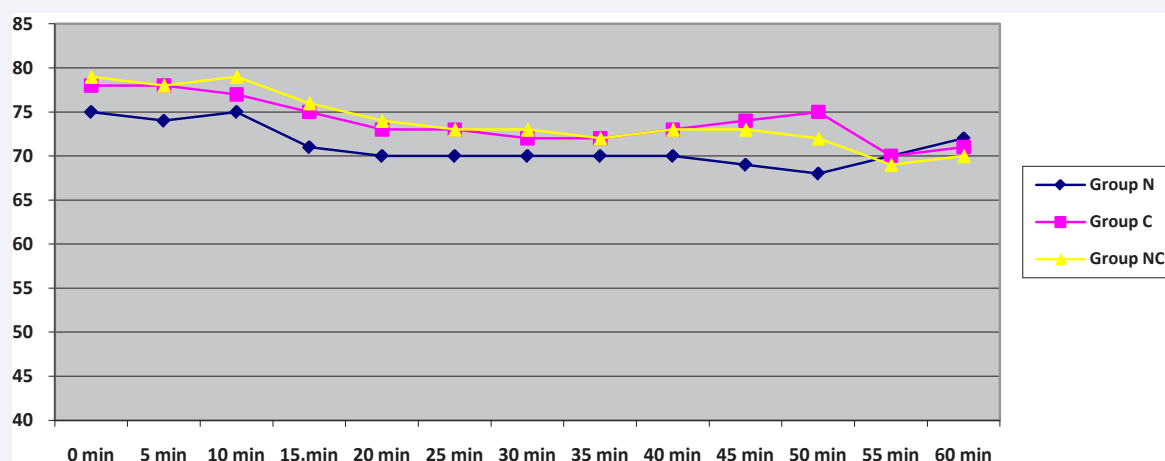


Figure 1 The heart rate values after the epidural block.

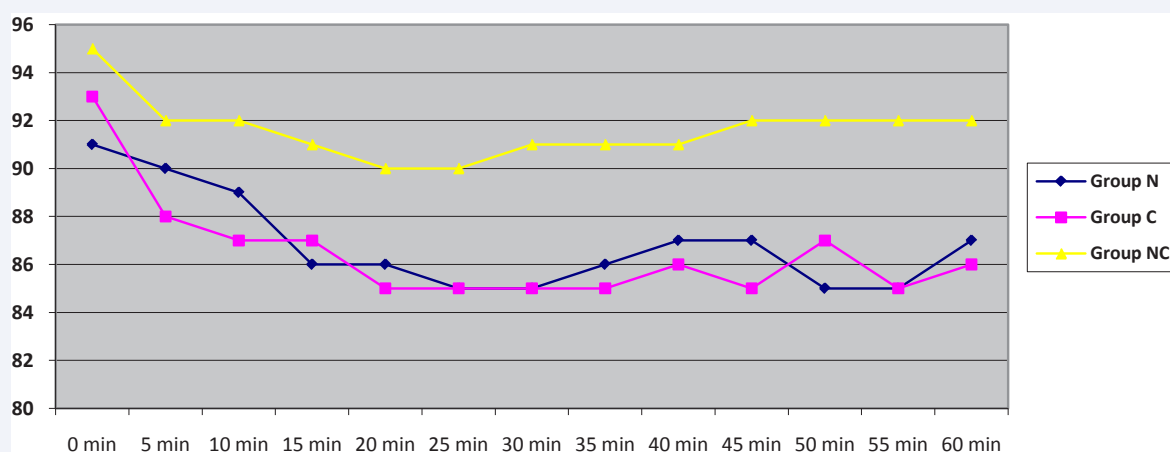


Figure 2 Comparison of mean arterial pressure values following the epidural block.

Table 3: Comparison of times to reach T10 sensorial block levels.

Group	T10 sensorial block time (mean ± SD)	T10 sensorial block time (mean ± SD)	p
N	15.25 ± 1.97	15 (10-20)	0.001
C	10.50 ± 1.54	10 (10-15)	
NC	11.25 ± 2.22	10 (10-15)	

Table 4: Bromage scale.

0	No paralysis
1	Only can move the directory and feet.
2	The directory cannot bend, can play only his feet.
3	Foot and thumb cannot move. There is a total paralysis.

Table 5: Patient and surgeon satisfaction evaluation scores.

GROUP	Patient satisfaction	Surgeon satisfaction
N Median(min-maks)	2(2-2)	2(1-2)
C Median(min-maks)	2(2-2)	2(2-2)
NC Median(min-maks)	2(2-2)	2(2-2)

anesthesia type is made according to the patient's ASA physical status, operation time as well as patient's and the surgeon's preference. Epidural anesthesia through three different routes was examined.

Hemodynamic parameters remained stable in all patients. Although clinically insignificant, statistically significant changes were observed in Groups N and NC, and there was no need for any treatment in any group. Group C was stable both statistically and.

There are different results in literature according to the parameters referred to in our study. Barış Ülker *et al.*, compared local anesthetic delivery through needle vs through catheter for regional anesthesia in transurethral surgery in terms of patient comfort and complications. Similar to our study, patients receiving local anesthetic through the catheter for epidural anesthesia was reported to be more stable hemodynamically than other groups of [6].

Mehmet Cesur *et al.*, administered local anesthetics via needle for epidural anesthesia in 240 patients and reported that better outcome and no catheter-related complications were the advantages of this technique [7] inadequate level of anesthesia and catheter-related complications can vary depending on the anesthesiologist's experience and ability.

In our study, sensory block time to reach the T10 dermatome was shorter in groups C and NC (10 min±5) than Group N (15 min±5).

W.Anton Visser *et al.*, claimed that local anesthetics administered through the epidural catheter caused faster elevation times for desired level of sensory block [8]. Crochetière and friends also compared these two injection techniques applied in pregnant women and reported better outcome with local anesthetics given via epidural catheter injection which are both comparable to our results [9].

Omote K *et al.*, reported that injection of local anesthetics via an epidural catheter in place which is a more convenient procedure achieved higher patient satisfaction as well as surgeon satisfaction than injection through the Tuohy needle [9]. Our study revealed no statistical significant difference between groups in terms of satisfaction.

Yun MJ *et al.*, showed in a study that injection through the Tuohy needle vs epidural catheter showed no remarkable difference in distribution of local anesthetic in the epidural space [11].

In our study, no statistically significant difference was observed between groups. Only 3 patients in Group C and 2 patients in Group N suffered from hypotension, bradycardia, nausea and vomiting 30 and 45 minutes after surgery. No side effects were observed in patients with NC group through the follow up.

Mehmet Cesur and colleagues reported in their study that patients in the catheter group suffered more from hypotension, bradycardia, nausea, vomiting [7]. But because of the different surgery types, ages as well as genders included in the study causes difficulty in making a proper statement [12].

In another study by Jon-Hak Kim *et al.*, neurological complications (paresthesia) related to epidural catheters was observed in geriatric patients undergoing urologic procedures according to positioning of epidural catheter directed cranially or caudally and found no statistically or clinically significant difference [13].

Fabiano Timbo Barbosa *et al.*, compared general anesthesia and neuraxial anesthesia in urologic surgery in terms of mortality, effectively and safety with a systematic meta-analysis. Although there was no statistically significant difference, epidural anesthesia was shown to have cardio protective effects [14]. Our patients were hemodynamically stable throughout the study, and had no complication concerning the cardiovascular system.

CONCLUSION

As a conclusion, although using different routes for epidural injection didn't cause clinically significant difference in terms of hemodynamic parameters, side effects, complications, patient or surgeon satisfaction, patients who received local anesthetic through the catheter were statistically more stable hemodynamically, so this route can be more desirable for hemodynamically unstable patients.

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