

Research Article

Comparing Different Positions of the Spinal Needle Tip, During Spinal Anesthesia of the Pilonidal Sinus Surgery

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Abstract

Aim: Spinal anesthesia is usually the anesthetic method of choice in pilonidal sinus surgery, which is mostly performed as an outpatient operation. Spinal anesthesia is administered via an injection of local anesthetic agents into subarachnoid space. Throughout history, spinal needles have undergone changed and have greatly reduced in thickness. In this study, we aimed to compare the effects of caudal or cranially oriented spinal needle tips on anesthesia in patients undergoing pilonidal sinus surgery.

Materials and Methods: This study was performed prospectively with 60 patients who underwent pilonidal sinus surgery with spinal anesthesia at Medeniyet University Göztepe Training and Research Hospital between 01.03.2013 - 30.11.2013. Patients were randomly divided into two groups based on the direction of the spinal needle tip. 25 G Quincke tipped spinal needles were oriented caudally in Group A (n=30) and cranially in Group B (n=30). Two groups were compared in terms of anesthesia duration, hemodynamic parameters, and postoperative data.

Results: No difference was found in the comparison of the demographic data of the two groups. Intraoperative mean arterial pressure and heart rate were significantly lower in both groups compared to baseline values. The incidences of postoperative headache, time until mobilization (min) were significantly high and time until first micturition (min) was significantly low in Group B.

Discussion: The data obtained from our study showed that cranial or caudal orientation of the spinal needle tips may have varying intraoperative and postoperative effects. We believe that further randomized controlled studies with larger sample sizes should be conducted to clarify the subject.

Keywords: Spinal Anesthesia; Cranial; Caudal; Pilonidal Sinus

Introduction

Minor anorectal diseases associated with anal and perianal regions such as hemorrhoids, anorectal fistula, anal fissure, pilonidal sinus, and rectocele are quite common [1]. Pilonidal sinus is mostly

encountered in the young male population [2]. Today, surgical treatment is usually planned as an outpatient operation during which spinal anesthesia is usually utilized.

Spinal anesthesia is a widely preferred method due to its high success rate and easy learnability [3,4]. Being a central regional block method, spinal anesthesia is characterized by transient sensory, motor, and sympathetic block which occurs due to the injection of local anesthetic solutions in the subarachnoid space [5,6].

Advantages of spinal anesthesia include maintaining patient consciousness during surgery, protection of spontaneous breathing and cough reflex, suppression of surgical stress response, provision of early postoperative analgesia, low incidence of aspiration pneumonia, rapid mobilization and allowance of early feeding [3,5,6].

Needles used in spinal anesthesia have changed since the first years of use. Needle tips are designed in various forms to prevent post-spinal headache and the thickness of the needles has gradually decreased [7,8].

This study aimed to compare the effects of caudal or cranial orientation of spinal needle tips on anesthesia in patients undergoing spinal anesthesia for pilonidal sinus surgery.

Materials and Methods

The study was performed prospectively with 60 patients who underwent pilonidal sinus surgery with spinal anesthesia at Medeniyet University Göztepe Training and Research Hospital between 01.03.2013 - 30.11.2013. Local ethics committee approval and signed informed consent forms were obtained from all patients prior to research. Patients in the ASA I-II risk group aged between 18-45 years who were scheduled for pilonidal sinus surgery were included in the study. Patients who did not accept regional anesthesia administration, those with cardiovascular, renal, respiratory, hepatic, and metabolic diseases, a history of bleeding disorders, who used anticoagulant agents, who were allergic to local anesthetics and who had an infection in the area of application were excluded from the study.

Intraoperative Procedure

All patients were measured noninvasive arterial blood pressure, heart rate, electrocardiogram, peripheral oxygen saturation (SpO₂). All patients' ages (year), weights (kg), heights (cm), operation times (min), genders (female / male), and American Society of Anesthesiology (ASA)

scores were recorded. Patients were then randomly divided into two groups according to the direction of the spinal needle tip.

Group A (N = 30): 25 G Quincke tipped spinal needle tip facing caudally.

Group B (N = 30): 25 G Quincke-tipped spinal needle tip facing cranially.

Baseline values were recorded before application. Intravenous (IV) fluid replacement was administered to patients at a dose of 20 ml/kg/hour within 30 minutes. In sitting position and under aseptic conditions, the Quincke-tipped 25 G spinal needle was inserted into the subarachnoid space through the midline of the L3-4 interspace with the tip parallel to the dura fibers. The needle tip was positioned according to the study groups (Group A, Group B) and as cerebrospinal fluid (CSF) flow was observed, hyperbaric bupivacaine 0.5% was administered. After maintaining the sitting position for 5 minutes, the patients were placed in supine position. Intraoperative mean arterial pressure (MAP), heart rate (HR), and SpO₂ values were recorded. Decreasing of MAP to 80% below baseline was accepted as hypotension. Patients with bradycardia (HR<50 beats / min) received intravenous atropine.

The motor block was evaluated according to the Bromage Scale (0 = no motor block, 1 = cannot lift the legs, can move the knees and feet, 2 = cannot bend the knee, can move the foot, 3 = full block).

Postoperative Procedure

The patients were transported to their clinics when their compliance and cooperation were complete, vital signs were stable, and the motor block score was 0 according to the Bromage Scale.

Patients were followed up for postoperative analgesic requirement, time until first micturition and first mobilization (min) and complications such as headache and hypotension. The patients who had their first micturition and without complications were considered ready for discharge; this period was recorded as discharge time (hours).

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) was used for statistical analysis of the data obtained from the

study. In addition to descriptive statistical methods (mean standard deviation), repetitive variance analysis was used for multiple groups, the Newman-Keuls multiple comparison test for subgroup comparisons, independent t-test for comparison of binary groups, and the Chi-square and the Fisher reality tests for comparison of qualitative data. A p-value of <0.05 was considered significant.

Results

The study was conducted on 60 patients. There were no statistically significant differences between the mean ages, gender distributions, heights, weights and BMIs of Groups A and B (p>0.05) (Table 1).

Table 1: Comparison of demographic data of the groups

	(Group A) (n=30)	(Group B) (n=30)	p
Age (Years) ± SD	24,77±6,13	27,43±5,58	0,083
Gender			
Females (n, %)	3, %10	1, %3,33	0,301
Males (n, %)	27, %90	29, %96,67	
Height (cm) ± SD	176,63±5,76	176,97±6,65	0,836
Weight (kg) ± SD	81,8±10,71	78,97±9,3	0,278
Body Mass Index	26,19±3,07	25,22±2,65	0,194

p<0,05: statistically significant; S.D: standard deviation; n: number of individuals

No statistically significant difference was found between the groups in terms of operation time (p>0.05). The last measured mean intraoperative arterial pressure and heart rates were significantly lower than baseline values (p <0.05). The comparison between the groups is summarized in Table 2.

Table 2: Comparison of intraoperative hemodynamic parameters between the groups

	(Group A) (n=30)	(Group B) (n=30)	p
Baseline			
MAP (mmHg) ± SD	95,57±11,74	96,17±6,78	0,809
Heart rate (beats/min) ± SD	87,93±18,3	87,1±9,85	0,480
5th minute			
MAP (mmHg) ± SD	95,8±12,67	91,77±9,5	0,168
Heart rate (beats/min) ± SD	84,57±17,12	87,2±10,88	0,480
10th minute			
MAP (mmHg) ± SD	90,9±9,58	84,7±7,58	0,007
Heart rate (beats/min) ± SD	85,2±16,37	86,63±10,19	0,685
20th minute			
MAP (mmHg) ± SD	87,27±8,99	80,77±6,75	0,002
Heart rate (beats/min) ± SD	78,83±14,59	84,93±11,48	0,077
30th minute			
MAP (mmHg) ± SD	87,13±11,59	81,9±6,65	0,036
Heart rate (beats/min) ± SD	74,97±12,47	83,97±10,77	0,004
60th minute			
MAP (mmHg) ± SD	85,63±9,79	87,67±9,23	0,411
Heart rate (beats/min) ± SD	74,6±10,86	83,53±10,53	0,002

p<0,05: statistically significant, S.D: Standard deviation, n: number of individuals, MAP: Mean Arterial Pressure

The number of patients with complaints of a postoperative headache were 13 (43.33%) and 2 (6.67%) in Groups B and A, respectively. The

difference between the two groups was statistically significant ($p < 0.05$).

Table 3: Comparison of postoperative clinical data of the groups

	(Group A) (n=30)	(Group B) (n=30)	p
Time until transfer from the Recovery room (min) ± SD	23,27±6,14	26,77±7,9	0,06
First requirement of analgesic agents (min) ± SD	308±29,7	287,7±116,28	0,818
Time until first mobilization (min) ± SD	352,1±68,25	410,03±73,52	0,002
Time until first micturition (min) ± SD	254,53±77,75	139,45±27,22	0,001
Time until discharge (hours) ± SD	24,13±0,35	24,3±0,47	0,121

$p < 0,05$ statistically significant, SD: Standard deviation, n: number of individuals, min: minutes.

The mean times until first mobilization (min) of Group B were found to be statistically higher than Group A (Table 3), whereas time until first micturition (min) was significantly lower (Table 3).

Discussion

Although spinal anesthesia is a frequently used regional anesthesia technique, the possibility of post-anesthesia infection, spinal neurotoxicity, post-spinal headaches and life-threatening complications have long intimidated clinicians [3].

In the Closed Compensation Project of the American Society of Anesthesiologists, liability cases regarding regional anesthesia performed in the operating room were found to account for some cases in 20 years (1980-1999) [9].

A study comprising a large series of spinal anesthesia complications conducted in France in 1997 showed noteworthy results regarding the frequency of serious complications due to spinal anesthesia. Among 40640 cases who underwent spinal anesthesia, cardiac arrest was seen in 26 individuals, 6 patients died, 5 developed cauda equina syndrome and radiculopathy occurred in 7. Today, however, complications are rarely

encountered due to new needle types, the development of application techniques, taking the necessary precautions and early interventions [8].

Spinal anesthesia has become exceedingly popular in recent years because of its advantages such as protecting mental functions, maintaining consciousness during the operation, a continuation of spontaneous breathing, salvation of protective reflexes, early postoperative mobilization and shortened hospital stay. Studies on this subject have taken place in the literature [3,5,6].

There are also studies about the orientation of the needle tip when performing spinal anesthesia [10,11,12,13]. In their study conducted on 92 ASA I-II group patients aged 18-65 years who underwent lower extremity and inguinal hernia surgery, Wofford et al. randomly divided the patients into 3 groups based on the needle tip direction [10]. The direction of the spinal needle was caudal in the first group, lateral in the second group and cranial in the third group. There was no statistically significant difference between the groups in terms of demographic data, duration of surgery or anesthesia, and time to exit from PACU. A Comparison of our two patient groups yielded no significant differences with regards to demographic data (Table 1). also, no significant difference was found between the operation and recovery time of our patients.

Intraoperative mean arterial pressures of group B patients were found to be statistically significantly lower at the 10th, 20th and 30th minutes compared to group A patients, and pulse rate was significantly higher at the 30th and 60th minutes (Table 2). Studies frequently emphasize complications such as hypotension and bradycardia due to spinal anesthesia [5,8,11]. In our study, it was found that mean arterial pressures and pulse rates decreased in both groups intraoperatively compared to the baseline values. However, in the literature, we did not find any study supporting our hemodynamic result differences due to cranial or caudal orientation of the needle tip and we believe that randomized and larger series studies are needed to clarify the effects of cranial or caudal orientation of the spinal needle tip on hemodynamic parameters.

Bromage Scale is a method used to evaluate motor block after spinal anesthesia [14]. We evaluated the motor block according to the Bromage scale

and did not encounter any problems intraoperatively. All our patients were transferred to their clinics from the recovery room when the Bromage scale value was “0”.

Postspinal headache is a common complication after spinal anesthesia [11,15,16]. In their study on 40 ASA I-II patients aged between 18-60 years who underwent outpatient arthroscopic knee surgery, Urmey et al., divided patients into 2 groups [13]. The whit acre needle tip was cranially oriented in Group 1 caudally oriented in Group 2, and there was no difference in terms of postural headache.

Lybecker et al. [15] investigated the factors affecting postspinal headache in a study conducted on 1021 ASA I-III patients aged between 15-93 years who underwent spinal anesthesia. The age, gender, size of the lumbar puncture needle, bevel needle orientation (longitudinal, dural, parallel to or perpendicular to the fascia), and the position of the patient (sitting or lateral decubitus) were recorded. The patients were questioned in terms of type, duration, and severity of postspinal headache 3 times in total, after being informed about postspinal headache on the 1st postoperative day, before leaving hospital and 2 weeks after the operation. The frequency of headaches was found to be inversely proportional to age, and more common in young patients. The incidence of headache was found to be higher in patients with bevel needle tip inserted perpendicular to longitudinal fascia. No significant correlation was found between the gender of the patients, the height of the needle, the position of the patient and the frequency of headache.

According to the meta-analysis study conducted by Ricman et al., a significant difference was found between parallel or perpendicular insertion of the spinal needle to the dural fibers in terms of headache frequency [16]. In our patients, the subarachnoid space was entered with the needle tip parallel to the dura fibers. We believe that the postspinal headache seen in our patients may be due to the fact that the mean age of our patient group was low (Table 1). In addition, we believe that larger randomized studies are needed.

In various studies, the time until the first urine output was found to be longer in spinal anesthesia where needle tip opening was oriented caudally [10,13]. In our study, the first urine output was

observed later in group A, where the needle tip opening was directed caudally, in accordance with the literature. This result is statistically significant (Table 3).

In terms of patient satisfaction and hospital costs, early mobilization and discharge are crucial factors in outpatient surgery. In their study on spinal anesthesia, Urmey et al. found that the regression time of motor block and discharge time were longer in the group where the needle tip opening was oriented caudally [13]. In contrast, Wofford et al. stated that the discharge time was longer in the patient group where the needle tip was directed cranially [10]. In our study, the mobilization time was significantly longer in group B where the needle tip was directed cranially (Table 3). There was no difference in discharge times. The differences in the results of this study may be due to factors such as age, gender, type of surgery, and the fact that the studies were performed in a limited population.

The narrow age range and the small number of patients constitute the limitations of our study.

Conclusion

In our opinion, the cranial or caudal orientation of the needle tip may affect anesthesia and the patients differently when administering spinal anesthesia. Further randomized controlled studies on more patients with a wider age range are needed on this subject.

Scientific Responsibility Statement

The authors declare that they are responsible for the article’s scientific content including study design, data collection, analysis and interpretation, writing, some of the mainline, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of Interest

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