

Do peroperative supine and prone positions have an effect on postspinal headache incidence?

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ABSTRACT

Objectives: The study was planned to investigate the possible effects of peroperative prone and supine positions on postspinal headache incidence.

Methods: This prospective study was completed at Demet Hospital, Ankara, Turkey between January-July 2003. Two groups of patients were studied, Group 1 comprised randomly selected male American Society of Anesthesiology Classification grade 1 (ASA 1) patients with an age range of 20-40, who were scheduled for pilonidal sinus operation. Group 2 comprised randomly selected male ASA1 patients with an age range of 20-40 who were planned for knee arthroscopy. After both groups were given spinal anesthesia in the sitting position with a 22-gauge Quincke needle, the patients who were scheduled for pilonidal sinus operation were laid in the prone position, while the patients planned for arthroscopy were laid in the supine position. The patients were then asked about postoperative headache complaints on the postoperative 3rd and 7th days. All patients were

observed postoperatively for 2 days for analgesia. Both groups used only paracetamol 500mg orally for postoperative analgesia and oral fluid intake was permitted 3 hours after operation.

Results: The postoperative headache incidence of Group 2 (patients operated in supine) position was statistically higher than that of Group 1 (patients operated in prone). The higher incidence of post spinal headache in the supine position was attributed to increased cerebrospinal fluid loss due to gravity and increased intra abdominal pressure associated with this position.

Conclusion: Spinal anesthesia can be a safe method for operation in the anal area in the prone position, and the prone position may prove superior to the supine position with respect to post-dural puncture headache development after spinal anesthesia practices.

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Spinal anesthesia is the choice of preference for its facility in application in lower area operations, convenience in various operation conditions, and cost-effectiveness.¹ However, its most common complications are urine retention, back pain, and post-dural puncture headache (PDPH).^{1,2} Post-dural puncture headache after an uneventful operation leads to serious problems for the patient. It is a morbid postoperative

complication to which patients have low tolerance.^{2,3} Pathognomonically, it is alleviated in the horizontal position. In various studies, its incidence rate ranges between 0.2-40%.¹⁻⁶ To prevent PDPH, a highly morbid complication which forces the patient to remain in bed, various methods are investigated; thus aiming to avert its development.^{2,6} To this end, patients are either recommended postoperative prone or supine, or both, bed rest or administered

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intravenous fluid. However, the relevant literature presents a few studies expressing the ineffectiveness of such practices on PDPH incidence rates.⁷⁻⁹ This study aimed to investigate the effects of operational positions, supine or prone, on PDPH incidence rates.

Methods. The study was carried out at Demet Hospital, Ankara, Turkey between January and July 2003. Upon receiving the approval of the ethics committee of our hospital, randomly selected male ASA1 patients aged between 20-40 years, who were planned for knee arthroscopy and pilonidal sinus operations under elective conditions, were included in this prospective study. There were 60 patients in the group (Group 1) scheduled for pilonidal sinus and 60 patients in the group scheduled for knee arthroscopy operation (Group 2). A peripheral cut-down was performed on all patients with an 18-gauge peripheric intravenous catheter one hour before the operation; thus, 500 ml Isolyte-S (an isotonic solution, product of Eczacibasi-Baxter Company) solution was administered preoperatively. In the operating room, the pulse rates (ECG 3 derivation), non-invasive arterial pressures, peripheric oxygen saturations (pulse oximeter) of all the patients were monitored (Datex-Ohmeda Instrumontorium Corp., Helsinki, Finland). A lumbar puncture was inflicted with a 22-gauge needle, the tip of which was advanced parallel to the spinous process through intervertebral L3-4 space with patients in the sitting position. The patients who required puncture multiple times were excluded from the study. All the patients received intrathecal 6 mg (1.2 ml) bupivacaine (5% hyperbaric). The leakage of cerebrospinal fluid (CSF) was checked before and after bupivacaine injection by aspirating 0.1 ml of CSF. Intrathecal injection was performed by pulling the opening of the needle tip to the caudal. Following intrathecal injection, the patients undergoing pilonidal sinus operation were laid in the prone position, and those who were planned for arthroscopy of the knee were laid in the supine position. Sensory blockade starting time was determined at one-minute intervals by skin prick tests. Motor block was evaluated based on Bromage motor block scale.¹⁰ Throughout the operation, 7ml/kg/h dose of Isolyte-S solution was infused. A mean arterial pressure below 100 mm Hg, or control value which was lower than 30% of initial blood pressure, was considered hypotensive. Thus, a treatment with 5mg intravenous ephedrine HCl boluses was planned. In cases of a pulse below 50 beat/min, 0.5 mg atropine sulfate administration was considered. The total amount of fluid and ephedrine HCl administered during the operation, the duration of the operation, sensory blockade starting time, and postoperative to urinate time was recorded. The patients who

developed postspinal headache, back pain, or both, were recorded. Pain that was described as occipital, frontal or cervical and reflecting on the shoulders, which resolved while lying, was evaluated as PDPH. The patients were discharged at the postoperative 48th hour after being informed on how to reach the anesthetist in charge should they develop headaches after going home. The patients were then asked about any headache development on the postoperative 3rd and 7th days. The patients who suffered from PDPH were conservatively treated with nonopioid analgesics, sufficient hydration, and bed-rest, while those who suffered from headache of more than 3 days were planned for epidural patch application with their own blood. The data of the study were analyzed through ANOVA, and $p < 0.05$ was considered significant.

Results. There were no statistically significant differences between the 2 groups for age, body weight, height, and preoperative fluid given at every hour ($p > 0.05$) (Table 1). The difference between the time to onset of sensory blockade of Group 1 (4.28 ± 0.80 min) and Group 2 (4.15 ± 0.86 min) was not statistically significant ($p > 0.05$). The Bromage scale values were 3 for both groups. The mean to urinate times of Group 1 (161.98 ± 10.89 min) and Group 2 (162.33 ± 10.71 min) were not significantly different ($p > 0.05$). None of the patients developed insufficient anesthesia, nausea-vomiting or urine retention. The patients who underwent arthroscopy of the knee did not experience any tourniquet pain. In perioperative and postoperative days, none of the patients developed hypotension or bradycardia, requiring ephedrine HCl or atropine sulphate use. Post-dural puncture headache was observed in 3 (5%) patients of Group 1 and 18 (30%) patients in Group 2. The difference was statistically significant ($p < 0.05$). All except one patient in Group 2 positively responded to conservative treatment. One of the patients whose headache continued for more than 48 hours with an unbearable severity was treated by epidural patch using his own blood, and his condition dramatically improved. Two patients in both groups developed back pain.

Table 1 - The physical and operational features of the patients.

Features	Group 1	Group 2
Age (years)	30.65 \pm 5.78	30.75 \pm 5.62
Height (cm)	171.3 \pm 9.53	171.233 \pm 8.69
Body weight (kg)	75.76 \pm 11.59	73.71 \pm 13.35
Operation time (min)	53.58 \pm 13.99	53.08 \pm 13.43
Amount of preoperative fluid (ml)	879.83 \pm 102.94	870.25 \pm 95.04

Discussion. The fluid loss through the puncture inflicted on the dura matter to the surrounding tissue has been held responsible for the development of post spinal headache.¹¹⁻¹³ Any fluid loss faster than CSF production (0.3 ml/min)¹ brings on intracranial hypotension, which leads to traction on cranial structures.¹³ The pressure that is formed on the pain-sensitive structures that surround the meninges and large vessels creates a headache sensation.¹³ A PDPH may be accompanied by cranial symptoms such as vomiting, nausea, diplopia, tinnitus, and decreased hearing.^{10,14-16} The radiological findings defined in MR for cranial hypotension syndrome have also been defined for PDPH patients, which are in conformity with the hypothesis that pain is associated with fluid loss.¹⁷ In PDPH, young age, being a female, and use of needles with sharp tips or large diameters constitute risk factors.^{1,2-18} However, our patient group was comprised only of males. Therefore, a comparison of the 2 groups for gender and age variables was not possible. Alternately, when the type and the thickness of the needle used are studied, literature reveals various results. Some studies have concluded that various needle types with 25, 26, 27 gauge thickness do not change PDPH incidence.¹⁹⁻²² This may be accounted for by lower flow rate of CSF loss than CSF production in practices with needles under a certain diameter; thus, not creating intracranial hypotension. The needles of 22 gauge or thicker have higher incidence of PDPH, which is in conformity with higher PDPH incidence (30-40%) in diagnostic LPs which require the use of thicker needles as part of the procedure.²³⁻²⁶ Increased CSF loss with needles of larger diameters has also been observed in in vitro studies.²⁷⁻³⁰ It is also widely agreed that when thick needles are used, pinpoint needles should be preferred over sharp tipped ones.³¹⁻³³ Since pinpoint needles inflict lesser fluid loss, the use of such needles has been claimed to decrease PDPH incidence.^{2,11,18,31-33}

In this study, the PDPH incidence rate (30%) in the supine position was relatively high. This could be attributed to the use of 22-gauge Quincke needle.²³⁻²⁶ The significant difference between the incidence rate of the study of Pippa et al³³ (8%) who performed arthroscopy while the patients were in the supine position and the incidence rate of this study (30%) may be accounted for by the younger population and thicker needles, despite being of the same type as used in this study.

Literature presents no studies investigating the effects of perioperative prone or supine positions on PDPH incidence rates. However, there are reports of no differences in PDPH incidence rate in postoperative prone position.⁷⁻⁹ In our study, although there was no significant difference between the operation times (mean 53 min) ($p < 0.05$), there was a significant difference between

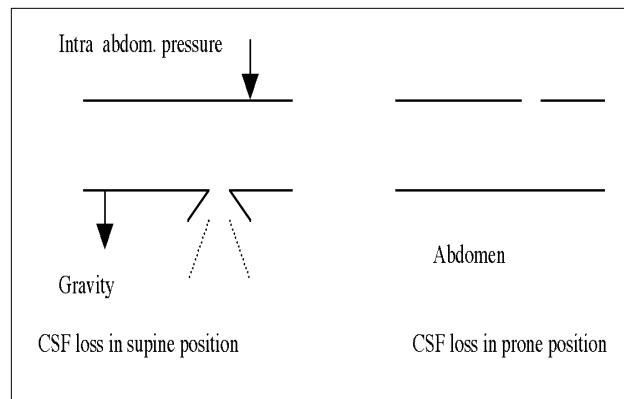


Figure 1 - Cerebrospinal fluid (CSF) loss in the supine and prone positions. Abdom - abdominal

the PDPH incidence rates of Group 1 and Group 2. The elevated CSF loss within the first hour of dural puncture may account for the higher incidence of PDPH in the patients in the supine position. The incidence rate of PDPH (5%) was lower in the prone position when a 22-gauge Quincke needle was used than that in the supine position (30%). It was attributed to increased CSF leakage in the supine position with the effect of gravity through the puncture on the dura matter and increased intra-abdominal pressure. In the prone position, however, the puncture on the dura matter would be facing upward; thus, the fluid loss could not be affected by gravity or intra-abdominal pressure (Figure 1).

In conclusion, spinal anesthesia can be a safe method for operations in the anal area in the prone position, and the prone position may prove superior to the supine position for PDPH development after spinal anesthesia practices. Furthermore, for operations performed while the patient is in the supine position, a 22-gauge Quincke needle may not be a suitable choice.

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