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Effect of the lithotomy position on spinal anesthesia with hyperbaric tetracaine

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Abstract: This study was performed to determine the effects of lithotomy position on the spread of analgesia and hemodynamics following spinal anesthesia with 0.5% hyperbaric tetracaine. Thirty patients who underwent hysterectomy due to myoma uteri were studied. All patients received spinal anesthesia in the left lateral decubitus position and were turned supine immediately after intrathecal administration of the drug. Fifteen patients were then placed in the horizontal lithotomy position within 10 s, and the remaining 15 were kept in the horizontal supine position for 30 min. There were no significant differences between the groups in mean arterial pressure, heart rate, cardiac output, and in the cephalad spread of analgesia. The lithotomy position had no effect on the spread of analgesia or anesthetic course of spinal anesthesia with hyperbaric tetracaine.

Key words: Spinal anesthesia, Lithotomy position, Hyperbaric solution

Gravity is one of the most important factors which determine the spread of anesthetic in spinal anesthesia with hyperbaric solution [1]. The lithotomy position, which decreases lumbar lordosis, may limit the cephalad spread of the anesthetic level in spinal anesthesia with a hyperbaric solution [2]. The position may provide an autotransfusion owing to the redistribution of blood. The effect of posture during the lithotomy on the spread of the anesthetic and hemodynamics following spinal anesthesia with hyperbaric tetracaine was evaluated.

Thirty female patients scheduled for hysterectomy due to myoma uteri under spinal anesthesia were enlisted with approval from our local committee on human research. Before spinal anesthesia all patients were given lactated Ringer's solution intravenously at a rate of 10 ml·min^{-1}. Lumbar puncture was performed with a 25-gauge spinal needle at the L3–L4 intervertebral space while the patients were in the left lateral decubitus position; the median approach was used for the spinal puncture. Once a free flow of clear cerebrospinal fluid was obtained, 2.5 ml of 0.5% hyperbaric tetracaine was administered. Fifteen patients who had been randomly selected (group A; 43.7 ± 6.9 years, 153.8 ± 4.8 cm, 53.9 ± 8.0 kg) were turned supine immediately after intrathecal administration of the drug and then placed in the horizontal lithotomy position within 10 s. The remaining 15 patients (group B; 37.1 ± 10.0 years, 157.1 ± 5.6 cm, 53.6 ± 4.8 kg) were also turned supine immediately after intrathecal administration of the drug but remained in the horizontal supine position for 30 min. The level of sensory block was evaluated with the pin-prick method every 5 min for 30 min after intrathecal administration of the drug. Mean arterial pressure and heart rate were measured automatically (Kolin BP130N, Nippon-Kolin, Tokyo, Japan) and cardiac output was continuously measured by bioimpedance cardiography (NCCOM-3, Biomed Medical Manufacturing, Irvine, Calif.). Hypotension was defined as a systolic pressure less than 80 mmHg or at least 40% lower than the control value; this was treated with intravenous administration of 5 mg ephedrine. The data are expressed as mean ± SD. Data were analyzed statistically by analysis of variance (ANOVA) and Students's *t*-test. A P value less than 0.05 was considered significant.

As shown in Fig. 1, there was no statistically significant difference in the mean cephalad spread of analgesia between groups A and B. No significant differences were also observed in mean arterial pressure, heart rate, and cardiac output between the groups (Table 1).

The effects of the lithotomy position on spinal anesthesia with hyperbaric local anesthetics are variable [2–5]. The difference in results of these studies might be

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Table 1. Hemodynamic changes during spinal anesthesia in lithotomy position and supine position.

	Control	5 min	10 min	15 min	20 min	30 min
Mean arterial pressure (mmHg)						
group A	93.6 ± 8.9	85.7 ± 11.1*	80.8 ± 10.2**	80.6 ± 9.9**	80.5 ± 9.7**	81.3 ± 11.3**
group B	89.2 ± 14.2	74.4 ± 12.8*	70.5 ± 11.7**	72.2 ± 12.5**	73.7 ± 14.8**	73.7 ± 12.0**
Cardiac output (l/min)						
group A	5.45 ± 0.93	5.44 ± 0.97	5.03 ± 0.94*	4.91 ± 0.55*	4.86 ± 0.81*	4.93 ± 0.83*
group B	6.02 ± 1.33	5.95 ± 1.48	5.66 ± 1.23*	5.43 ± 0.98*	5.35 ± 1.21*	5.18 ± 1.06*
Heart rate (beat/min)						
group A	79.7 ± 7.4	78.2 ± 6.2	74.8 ± 7.1*	70.7 ± 6.9*	68.8 ± 7.9*	67.1 ± 7.0*
group B	74.3 ± 8.9	69.6 ± 5.5	65.5 ± 4.9*	64.9 ± 6.6*	60.7 ± 5.7*	61.5 ± 6.2*

Values are mean ± SD.
* $P < 0.05$ *vs* control; ** $P < 0.01$ *vs* control.

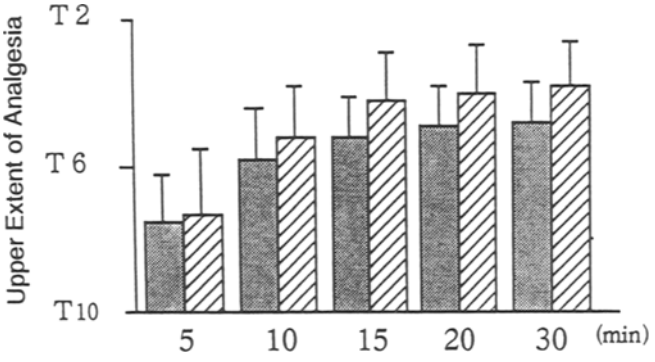

Fig. 1. Time-course of the upper spread of analgesic levels in group A (lithotomy position, $n = 15$, *shaded bars*) and group B (horizontal supine position, $n = 15$, *hatched bars*) after spinal anesthesia. There are no significant differences in the level of spread of analgesia between the groups. *Vertical bars* represent mean ± SD

explained by the position at spinal puncture, the degree of leg flexion to abdomen after spinal block, and the method of assessment of anesthetic level. In the present study, the analgesic level in the group who took the lithotomy position was slightly lower than in the group in the horizontal supine position, although the difference was not significant. The greatest benefit of raising the legs or of the lithotomy position at the early stage of spinal anesthesia would be to obtain acceptable venous return of blood pooled in the vasodilated lower extremities as an autotransfusion to prevent excessive hypotension [5]. However, no significant difference in hemodynamics between lithotomy and horizontal supine position was observed in the course of spinal anesthesia. Therefore, it is suggested that autotransfusion by raising the legs does not increase or compensate cardiac output after hyperbaric spinal anesthesia.

In conclusion, the lithotomy position employed in spinal anesthesia with a hyperbaric solution has no effect on the anesthetic level and hemodynamics.

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