นิพนธ์ต้นฉบับ

Spinal Anesthesia with 0.5% Hyperbaric Bupivacaine

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Spinal anesthesia with bupivacaine was first reported in 1966. Several studies had been carried out using either isobaric or hyperbaric solution of bupivacaine for spinal anesthesia in lower abdominal and lower extremity surgeries. The results were promising and indicated less complications. In our study, 15 mg. of 0.5% hyperbaric bupivacaine was administered intrathecally in 41 Thai patients undergoing lower abdominal, perineal and lower extremity surgeries. It was found that the onset of sensory block was 4.12 ± 2.65 mins. and of motor block 4.71 ± 5.08 mins. (mean ± SEM). The highest level of sensory blockade (T_2 - T_8) was obtained in 11.56 ± 4.32 mins. Durations of sensory and motor block were 128.07 ± 47.78 and 150.44 ± 43.27 mins., respectively. Some complications including urinary retention, post-spinal headache, post-operative psychosis, shivering and nausea were successfully corrected within a short period. No permanent disability was found.

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การทำ spinal anesthesia โดยใช้ bupivacaine (Marcaine) ได้รายงานเป็นครั้งแรกในปี 1966 และใช้กันแพร่หลายในเวลาต่อมา มีผู้รายงานการใช้ทั้ง isobaric และ hyperbaric solution ของ bupivacaine ในการทำผ่าตัดช่องท้องส่วนล่างและการผ่าตัดบริเวณขาซึ่งพบว่าได้ผลดีและมีภาวะแทรกซ้อนน้อย ผู้รายงานได้ศึกษาผลของการทำ spinal block โดยใช้ 0.5% hyperbaric solution ของ bupivacaine ขนาด 15 มิลลิกรัมในผู้ป่วยไทย 41 คน พบว่ามีการออกฤทธิ์ของ sensory block ในเวลา 4.12 ± 2.65 นาที และ motor block ในเวลา 4.71 ± 5.08 นาที ได้ระดับการชาสูงสุดที่ระดับ T_2 ถึง T_8 ภายในเวลา 11.56 ± 4.32 นาที สำหรับระยะเวลาการออกฤทธิ์ของ sensory และ motor block กินเวลานาน 128.07 ± 47.78 และ 150.44 ± 43.27 นาทีตามลำดับ ภาวะแทรกซ้อนที่เกิดขึ้นได้แก่ urinary retention, post-spinal headache, post-operative psychosis, shivering และอาการคลื่นไส้ซึ่งสามารถรักษาหายได้ในเวลาอันสั้น และไม่มีความพิการที่ถาวรเกิดขึ้นเลย

Spinal anesthesia has been popular for lower abdominal surgery including obstetric and gynecological operation and orthopedic procedures, because of the ease and effectiveness, as well as the rapidity, in establishing adequate levels of analgesia. Bupivacaine is one of the local anesthetics widely used for regional anesthesia. Several reports have documented the efficacy and safety of isobaric and hyperbaric solutions of bupivacaine used in spinal anesthesia.[1-12] In addition, bupivacaine has been found to have minimal motor blockade and has a longer duration of action compared to lidocaine and mepivacaine. This study was undertaken to evaluate the clinical effects of 0.5% bupivacaine hydrochloride in 8% glucose monohydrate solution administered for spinal anesthesia to Thai patients undergoing lower abdominal, perineal and lower extremity surgeries.

Materials and Methods

Forty-one patients in ASA class I were studied, who were scheduled for lower abdominal, perineal or lower extremity surgery using spinal anesthesia with 15 mg. of 0.5% bupivacaine hydrochloride in 8% glucose monohydrate solution. Patients with a history of sensitivity to local anesthetic agents were excluded from the study. All patients received an infusion of 5% dextrose in normal saline 300 ml. through a 16-or 18-gauge intravenous cannula over a 10-15 minute period prior to induction. While the patient were placed in the lateral decubitus position, a standard lumbar spinal block was administered with a 24-or 25-gauge spinal needle at the level of L_{2-3} or L_{3-4} interspace. Immediately after the injection, the patient was turned to the supine horizontal position. Blood pressure and heart rate were recorded before and at 5, 10, 15 and 20 minutes after the block. Observations were made on the onset of sensory and motor blockade, duration of block, maximal level of sensory loss, blood pressure and pulse rate changes. Onset of sensory loss was defined as loss of sensation to pinprick up to the level of T_{10}. Motor blockade was arbitrarily defined as the inability to raise the heels off the operating table when keeping the legs straight. Duration of block was the duration from the onset of anesthesia to the time sensation returned to T_{10} and the heels could be raised. Complications were noted and treated as necessary.

Results

The forty-one patients (25 males and 16 females) comprised a group of mean values (±SEM) in age, weight and height of 35.29 years (±13.26) 58.00 kgs. (±11.75) and 163.63 cms. (±7.66), respectively (table 1). In 16 patients, the subarachnoid in-

Table 1 Patient data

Total number	41
- Male	25
- Female	16
Age (yr)	16-77 (35.29±13.26)*
Weight (kg)	40-97 (58.00±11.75)*
Height	151-171 (163.63±7.66)*

*Mean ± SEM

jection was made at the L_{2-3} interspace; in the remaining twenty five, the L_{3-4} interspace was used. There was no correlation between the interspace used and the level of anesthesia. Twenty-one patients had lower abdominal surgery, 3 gynecological procedures, 13 perineal surgery and 4 surgery in the lower extremity (table 2).

Table 2 Types of operation

Lower abdominal	21 (51.2%)
Gynecological	3 (7.3%)
Perineal	13 (31.7%)
Lower extremity	4 (9.8%)

The onset of sensory block was 4.12± 2.65 mins, and of motor block 4.71±5.08 mins. The highest level of sensory block (T_2 - T_8) was obtained in 11.56±4.32 mins. (table 3). Duration of sensory loss was 128.07±47.78 mins., and of motor block 150.44±43.27 mins. (table 4). There was a significant decrease in blood pressure after

Table 3 Onset of sensory and motor block

Sensory loss (min)	4.12±2.65*
Motor block (min)	4.71±5.08*
Highest level of sensory block (T_2 - T_8) obtained in 11.56±4.32* min.	

*Mean ± SEM

Table 4 Duration of sensory and motor block

Sensory block (min)	128.07±74.78*
Motor block (min)	150.44±43.27*

*Mean ± SEM

spinal anesthesia (Fig. 1). However, in most of the patients, blood pressure rapidly returned to normal when the rate of fluid infusion was increased. Only one patient developed severe hypotension and required ephedrine injection. Atropine was administered in six patients on account of bradycardia. Nevertheless, there were no statistically detectable the differences between the mean values of the heart rate after the block and the control (before the block) (Fig. 2). Other complications included urinary retention, post-spinal headache, post-operative psychosis, shivering and nausea (table 5). Five patients expressed apprehension which was satisfactorily ma-

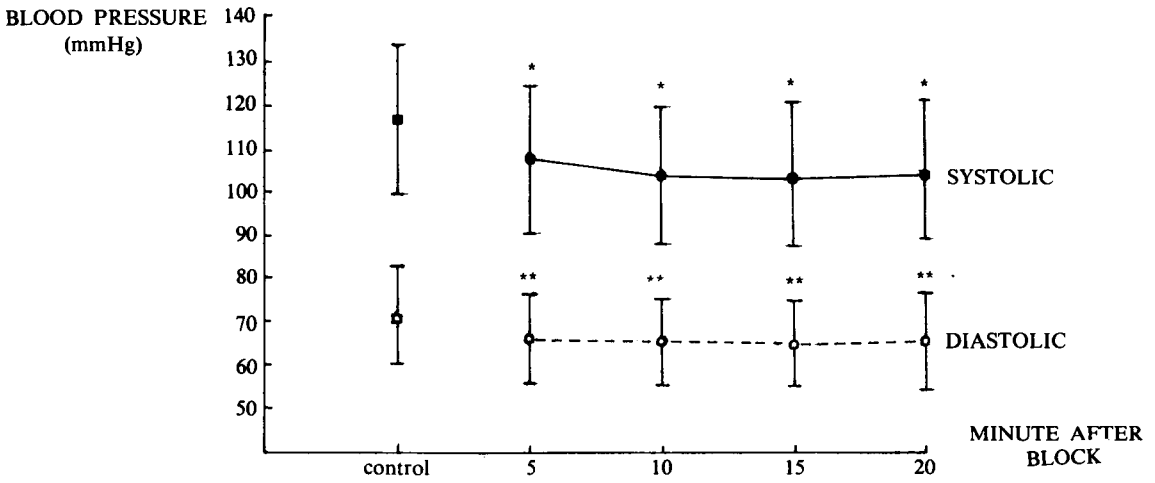

Figure 1 Changes in systolic and diastolic blood pressures. Mean ± SEM for forty-one patients. *Differences from control values statistically significant $P \leqslant 0.0002$, **$P \leqslant 0.005$.

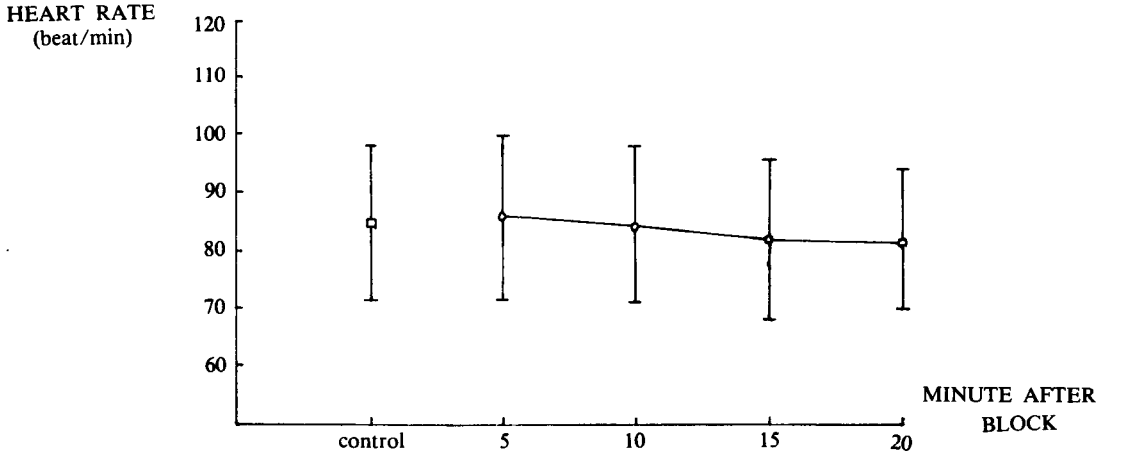

Figure 2 Changes in heart rate. Mean ± SEM for forty-one patients. Differences from control values not significant

Table 5 Complications

Intraoperative		
- nausea	1	case
- shivering	1	case
- inadequate anesthesia	2	cases
Post-operative		
- urinary retention	3	cases
- post-spinal headache	1	case
- post-operative psychosis	1	case

naged with additional sedation. Anesthesia was judged to be inadequate in two cases, and heavy sedation was required in one whereas supplementation with general anesthesia had to be given in the other.

Discussion

Spinal anesthesia with bupivacaine was first reported by Ekblom and Widman in 1966.[13] Several investigations had been extensively carried out ever since.[1-12] In recent studies, 15-20 mg. of 0.5% bupivacaine solution with or without glucose had been found to be satisfactory for spinal anesthesia.[4-10] Our results indicated that 15 mg. of 0.5% bupivacaine hydrochloride with glucose could provide adequate anesthesia for lower abdominal, perineal and lower extremity surgery. Moreover, the onset and duration of sensory and motor blockade observed in this study are in agreement with the results of others.[4,5,6,7,9] The noted transient hypotension and bradycardia were not so severe and could be easily controlled. The minor complications reported above were all correctable.

Conclusion

The findings of this study confirmed that the hyperbaric solution of 0.5% bupivacaine provides a safe and satisfactory spinal anesthesia and appears suitable for moderately long lower abdominal surgery or orthopedic procedures.

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