

การฉีดยาชา bupivacaine ขนาดต่ำเข้าช่องน้ำไขสันหลังลดภาวะปัสสาวะคั่งหลังการผ่าตัดบริเวณทวารหนัก

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Low-dose Spinal Bupivacaine decreases the Incidence of Postoperative Urinary Retention after Anorectal Surgery

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บทนำ: ภาวะปัสสาวะคั่งเป็นภาวะแทรกซ้อนที่พบมากที่สุดหลังการผ่าตัดบริเวณทวารหนัก การฉีดยาชาเข้าช่องน้ำไขสันหลังเป็นปัจจัยเสี่ยงที่ทำให้เกิดภาวะปัสสาวะคั่งหลังการผ่าตัด

วัตถุประสงค์: เพื่อเปรียบเทียบอัตราการเกิดภาวะปัสสาวะคั่งหลังการผ่าตัดบริเวณทวารหนัก ภายใต้การใช้ยาชา 0.5 % heavy bupivacaine ขนาด 3 มิลลิกรัม กับ 6 มิลลิกรัม ทางช่องน้ำไขสันหลัง

วิธีการศึกษา: การวิจัยนี้ผ่านการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยคณะแพทยศาสตร์โรงพยาบาลรามาธิบดี ผู้ป่วย 80 รายซึ่งได้รับการผ่าตัดริดสีดวง แผลที่ขอบทวารหนัก ฝีคัณฑสูตร และฝีรอบทวารหนักจะถูกนำเข้าสู่การศึกษาแบบไปข้างหน้า และสุ่มแบ่งออกเป็น 2 กลุ่มคือ กลุ่มยาขนาดต่ำ และกลุ่มยาขนาดมาตรฐาน โดยผู้ป่วยจะได้รับยา 0.5% heavy bupivacaine ขนาด 3 มิลลิกรัมและ 6 มิลลิกรัมตามลำดับ และนั่งอย่างน้อย 5 นาทีก่อนจัดทำสำหรับการผ่าตัด ระหว่างการผ่าตัดผู้ป่วยอาจได้รับยา midazolam และ/หรือ fentanyl ตามความจำเป็น ผลการศึกษาหลักคือ อัตราการเกิดภาวะปัสสาวะคั่ง

ผลการศึกษา: วิเคราะห์ข้อมูลจากผู้ป่วย 80 ราย พบว่า การใช้ bupivacaine ขนาดต่ำทางช่องน้ำไขสันหลังลดความเสี่ยงต่อภาวะปัสสาวะคั่ง จากร้อยละ 32.5 เหลือร้อยละ 7.5 ($p=0.005$) (relative risk = 0.231, 95% confidence interval = 0.071-0.748) การใช้ morphine ใน 24 ชั่วโมงแรก

Background: Postoperative urinary retention is the most common complication after anorectal surgery. A significant risk factor for this complication is spinal anesthesia.

Objective: To compare postoperative urinary retention after anorectal surgery under spinal anesthesia between 3 mg and 6 mg of 0.5% hyperbaric bupivacaine.

Methods: This study was approved by the Ramathibodi Ethics Committee. Eighty patients undergoing surgical treatment for hemorrhoids, anal fissures, anal fistulas, or perianal abscesses were enrolled in this prospective controlled trial and randomized into two groups: the low-dose and conventional-dose groups. The patients in the low-dose and conventional-dose groups received spinal anesthesia with 3 mg and 6 mg of 0.5% hyperbaric bupivacaine, respectively, and then sat for at least 5 minutes before positioning for the operation. During the operation, patients were sedated with midazolam and/or fentanyl if necessary. The primary outcome was incidence of postoperative urinary retention.

Results: Data of all 80 patients were analyzed. Low-dose spinal bupivacaine lowered the risk of urinary retention from 32.5% to 7.5% ($P = 0.005$) (relative risk = 0.231, 95% confidence interval = 0.071-0.748). The postoperative morphine consumption during the first 24 hours postoperatively were not significantly different between the groups.

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หลังผ่าตัดไม่แตกต่างกันระหว่าง 2 กลุ่ม

สรุป: การฉีดยาชา 0.5% heavy bupivacaine ขนาด 3 มิลลิกรัมเข้าช่องน้ำไขสันหลังสามารถระงับความรู้สึกในการผ่าตัดบริเวณทวารหนักได้ โดยเกิดภาวะปัสสาวะคั่งลดลง

คำสำคัญ: การผ่าตัดบริเวณทวารหนัก การฉีดยาชาเข้าช่องน้ำไขสันหลัง ภาวะปัสสาวะคั่ง

Conclusions: Spinal anesthesia with 3 mg of 0.5% hyperbaric bupivacaine provides adequate anesthesia for surgery with a lower incidence of postoperative urinary retention.

Keywords: Anorectal surgery, spinal anesthesia, urinary retention

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Introduction

Anorectal diseases are common conditions with a 5% incidence of the general population, and approximately 10% of affected patients require surgery.¹ The most common postoperative complication in patients with anorectal diseases is urinary retention² (incidence of about 16.7%³), which is defined as the inability to urinate within 8 hours after surgery, bladder volume >500 mL from ultrasound assessment or the need for catheterization.⁴ This complication can result in patient dissatisfaction and may prolong the hospital stay⁵ because of the inability to spontaneously void and the development of nausea, arrhythmia, hypertension, and urinary tract infection.

A higher incidence of urinary retention is seen in association with female sex, an age of >50 years, diabetes mellitus, predisposing urinary symptoms, an operation time of >12 minutes, the use of anal canal packing, and inadequate postoperative pain control.³ Furthermore, spinal anesthesia, the use of which is widespread in anorectal surgery, inhibits neuronal signaling between the spine and bladder, affecting the control of voiding.⁶ The use of long-acting local anesthetic drugs is associated with a higher incidence of urinary retention than the use of short-acting anesthetic drugs.⁷ Gudaityte et al. conducted a double-blind randomized controlled trial showing that 4 mg of 0.5% spinal hyperbaric bupivacaine produces a similar level of sensory and motor blockade as a 5-mg dose but with a shorter duration and faster recovery.⁸ However, the urinary retention rates in their study were not different between the groups. Wassef et al. used 1.5 mg of 0.75% hyperbaric bupivacaine for a saddle block in perianal procedures and observed faster

spontaneous voiding than in the 6-mg group.⁹

We retrospectively reviewed 40 cases of anorectal surgery under spinal anesthesia in our institute, Ramathibodi Hospital, from July 2014 to September 2014 and found that the lowest dose of 0.5% bupivacaine used was 3 mg and that the average dose was 6 mg. Patients who received a lower dose of spinal anesthesia tended to have less urinary retention. Therefore, the present study was performed to compare postoperative urinary retention after anorectal surgery under spinal anesthesia between 3 mg and 6 mg of 0.5% hyperbaric bupivacaine and determine whether a lower dose is associated with fewer complications.

Methods

This study was approved by the Ramathibodi Ethics Committee (IRB number: 03-58-38), and conducted from July 2015 to December 2016. All patients provided written informed consent. In total, 80 adults aged >18 years with an American Society of Anesthesiologists physical status of I, II, or III who were admitted for elective minor anorectal surgery under spinal anesthesia for conditions such as hemorrhoids, anal fissures, anal fistulas, or perianal abscesses were enrolled in this prospective randomized controlled trial. Patients with predisposing urinary symptoms, benign prostatic hypertrophy, diabetes mellitus, or contraindications to parecoxib and etoricoxib use and patients who refused to participate were excluded.

The patients were randomized into two groups: the low-dose group, in which 3 mg (0.6 ml) of 0.5% hyperbaric bupivacaine was used, and the conventional-dose group, in which 6 mg (1.2 ml) of 0.5% hyperbaric bupivacaine was used.

The sample size was calculated using a two independent proportions formula with a type I error of 0.05 and type II error of 0.2. Based on the incidence of urinary retention in our previous retrospective review, the urinary retention rate was 10% in low-dose group and 40% in conventional-dose group. The sample size plus a 20% dropout rate was therefore 40 patients per group.

Each patient voided before entering the operation room, and intravenous fluid was then administered at an initial rate of 80 mL/hour and continue throughout the operation without pre-loading or co-loading. After arrival in the operating room, standard monitoring of the electrocardiogram, heart rate, oxygen saturation, and noninvasive blood pressure were started. The concealed envelop with computer generated randomization was opened after enrolled the patient into the study right before positioning the patient for the spinal block. Dural puncture was performed with a 27G Spinocan spinal needle (B. Braun Medical Inc., Bethlehem, PA, USA) at level L3-4 or L4-5. After confirming the needle tip position, the dose of anesthetic indicated by the concealed envelop was injected. The patients sat for at least 5 minutes after the spinal block, and the level of anesthesia was then tested. If the level of anesthesia was above the S2 dermatome, the patient was placed in jackknife position for surgery. Fentanyl 0.5 to 1.0 mcg/kg and/or midazolam 0.02 to 0.04 mg/kg was administered as appropriate according to the anesthesiologist in charge.

At the end of the operation before moving to the recovery room, the patients received intravenous administration of 40 mg of parecoxib. In the ward, the pain control regimen was oral acetaminophen at 500 mg every 6 hours, oral etoricoxib at 90 mg once daily, and intravenous morphine 2 mg for rescue analgesia. Intravenous fluid was removed as soon as the patient was able to drink. Postoperative oral liquid ingestion during the first 6 hours was restricted to ≤ 500 mL because perioperative fluid restriction was associated the lower incidence of postoperative urinary retention.³ If the patient desired to void but failed to void or did not void within 8 hours, he or she was intermittently

catheterized as a usual practice at the ward. Nurses who decided to perform catheterization were unaware of the group to which patients were assigned. Time from spinal block to catheterization and to first spontaneous voiding were recorded. Morphine consumption within first 24 hours was also recorded.

SPSS for Windows, version 20.0 (IBM Corp., Armonk, NY, USA) was used to analyze the data. The results were assessed by intention-to-treat analysis. The distribution normality was tested by Kolmogorov-Smirnov test. Differences were compared between the two groups using Student's t-test in normally distributed data and the Mann-Whitney U test in non-normally distributed data. Categorical data were analyzed by the chi-square test or Fisher's exact test. Data were presented as mean $\pm$ standard deviation or number (%). A *p*-value of <0.05 was considered statistically significant.

Results

Eighty patients were enrolled in this study, and none were excluded. Each patient was given a randomized dose of spinal anesthesia. There were no significant differences in patient demographics (Table 1). The perioperative variables were not different between the two groups except the level of sensory blockade (Table 2). As anticipated, the conventional-dose group achieved a higher blockade level. Although not statistically significant, the low-dose group tended to have a higher use of intraoperative midazolam. Two patients in the low-dose group expressed some discomfort during surgery and were categorized as inadequately anesthetized. The symptoms were alleviated by midazolam and fentanyl.

Postoperatively, the low-dose group had a better rate of spontaneous voiding than the conventional-dose group (92.5% vs 67.5%, respectively). The relative risk of catheterization was 0.231 for the low-dose group compared to conventional-dose group (95% confidence interval, 0.071-0.748) (Table 3). However, the time to first spontaneous micturition was not different between the groups. Morphine use was also not different either quantitatively or qualitatively.

Table 1 Demographic characteristics of the patients (n = 80)

Characteristics	Low-dose group (0.6 mL) n=40	Conventional-dose group (1.2 mL) n=40	P-value
Sex			
Male	22 (55.0)	22 (55.0)	1.000
Age (yr)	40.33±12.69	44.43±11.53	0.134
Height (cm.)	164.43±7.68	162.84±8.50	0.384
Weight (kg)	66.53±13.91	65.39±11.87	0.696
Underlying disease(s)			
Hypertension	6 (15.0)	3 (7.5)	0.481
Anemia	4 (10.0)	4 (10.0)	1.000
Dyslipidemia	3 (7.5)	4 (10.0)	1.000

Note: Data was presented in mean±SD or number (%)

Table 2 Intraoperative characteristics

Variables	Low-dose group (0.6 mL) n=40	Conventional-dose group (1.2 mL) n=40	P-value
Operation			0.339
Hemorrhoidectomy	13 (32.5)	20 (50.0)	
fistulectomy& fistulotomy	15 (27.5)	13 (22.5)	
Sphincterotomy	7 (17.5)	3 (7.5)	
I&D abscess	5 (12.5)	4 (10.0)	
Operation time (minutes)	22.25±14.00	23.00±9.12	0.777
Intraoperative fluid (mL)	373.00±176.44	368.75±163.59	0.911
Sensory level			0.001
Thoracic	1 (2.5)	8 (20.0)	
Lumbar	6 (15.0)	14 (35.0)	
Sacrum	33 (82.5)	18 (45.0)	
Spinal anesthesia			
Inadequate	2 (5.0)	0	0.494
Use Fentanyl	3 (7.5)	3 (7.5)	1.000
Use Midazolam	25 (62.5)	17 (42.5)	0.073

Note: Data was presented in mean±SD or number (%). I&D, Incisional and drainage

Table 3 Postoperative variables

Variables	Low-dose group (0.6 mL)	Conventional-dose group (1.2 mL)	P-value	RR (95% CI)
Need catheterization (cases) (Urinary retention)	3 (7.5)	13 (32.5)	-	0.231 (0.071 to 0.748)
Time to catheterization (minutes)	305.0±114.56	361.15±108.32	0.498	
Time to spontaneous voiding (minutes)	317.84±109.68	319.07±86.31	0.960	
24 hr morphine consumption (cases)	11 (27.5)	9 (22.5)	-	1.222 (0.569 to 2.624)
24 hr morphine consumption (mg)	2.82±1.25	4.44±3.75	0.191	

Note: Data was presented in mean±SD or number (%). RR, relative risk; CI, confidence interval

Discussion

The results of this study indicate that low-dose spinal anesthesia is associated with significantly less urinary retention than conventional-dose spinal anesthesia. Wassef et al. used a very low dose of spinal bupivacaine in short perineal surgery (1.5 mg vs. 6 mg) and found that the lower dose was associated with a shorter time to first micturition.⁹ This distinction, however, was not found in the present study, possibly because the two doses studied (3 mg vs. 6 mg) were close to each other.

Two cases were judged to be inadequate anesthesia by the anesthesiologist in the operating room because the patient felt discomfort before the operation was finished. They were rescued by administration of intravenous sedation, and the surgery was then completed. After further investigation, we found that these two patients had internal hemorrhoids. The operation time was 45 and 60 minutes, respectively, which was much longer than the mean operation time.

Although not statistically significant, midazolam was used more frequently in the low-dose group than in the conventional-dose group. This might have occurred because the anesthesiologists performing the spinal anesthesia were not blinded. They might have more readily considered the use of sedative drugs because of concern regarding the lower level of sensory blockade.

In this study, 50% of the patients in conventional-dose group were undergone hemorrhoidectomy whereas only 32.5% in low-dose group were undergone hemorrhoidectomy, even though we used concealed envelop with computer generated randomization. However, the difference was not statistically significant. Data from Toyonaga et al. showed that hemorrhoidectomy was associated with the highest incidence of urinary retention compared to fistulectomy or other anorectal surgery.³ This might cause some degree of interference on the study outcomes.

Currently, there is no clear definition of postoperative urinary retention.^{10,11} Baldini G et al. reviewed studies related to postoperative urinary retention and found that

postoperative urinary retention has been diagnosed by any of the following criteria: clinical criteria such as full bladder or inability to void, need catheterization or ultrasound assessment criteria.⁴ In this study urinary retention was defined as requiring catheterization because it is more practical and identical to our routine practice compared to ultrasound assessment criteria. Clinical criteria such as desired but failed to void or did not void within 8 hours were used as indications for intermittent catheterization. However, nurses who decided to perform catheterization were unaware of the study group assignment. Ultrasound assessment of the bladder either bladder volume or bladder diameter was not used in this study. Therefore, the incidence of postoperative urinary retention in this study which was not including all possibly diagnostic criteria might be a limitation of this study.

Conclusion

The use of low-dose spinal anesthesia in short-duration anorectal operations decreases the incidence of postoperative urinary retention.

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