

Original Article

# Effectiveness of Bilateral Pudendal Nerve Blockade in Managing Postoperative Pain in Overweight Patients Undergoing Ferguson Hemorrhoidectomy

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## Key Words

Ferguson hemorrhoidectomy;  
Bilateral pudendal nerve blockade;  
Overweight

**Background.** Effective post hemorrhoidectomy pain management remains a major concern. Patients with a higher body mass index (BMI) have been reported to experience more postoperative pain. This retrospective study examined the safety and effectiveness of pudendal nerve blocks (PNBs) in managing pain in overweight patients who had undergone Ferguson hemorrhoidectomy.

**Methods.** We included patients who had grade III hemorrhoids and had undergone Ferguson hemorrhoidectomy along with bilateral PNB administration between October 2020 and March 2021 at Taipei Medical University Hospital. We compared short-term postoperative outcomes between overweight (BMI > 24) and nonoverweight (BMI < 24) groups, and the definition of overweight was based on the Asian criteria in Taiwan. Data were extracted retrospectively from the hospital database.

**Results.** The overweight group had a significantly higher male proportion ( $p < 0.01$ ) and more people with higher American Society of Anesthesiologists score ( $p < 0.01$ ) than did the nonoverweight group. However, we observed no significant between-group difference in the incidence of complications, including nausea ( $p = 0.29$ ), vomiting ( $p = 1$ ), fever ( $p = 1$ ), bleeding ( $p = 0.14$ ), perianal swelling ( $p = 1$ ), urinary retention ( $p = 0.53$ ), and urinary incontinence ( $p = 1$ ). We noted no significant between-group differences in visual analogue scale scores at 6 ( $p = 1$ ), 12 ( $p = 0.33$ ), 18 ( $p = 0.85$ ), 24 ( $p = 0.54$ ), and 48 h ( $p = 0.99$ ) postoperatively. Generalized estimating equations revealed no significant between-group difference in pain scores ( $p = 0.43$ ).

**Conclusion.** Our groups had similar postoperative outcomes and low postoperative pain scores. Large-scale studies comparing PNBs with other anesthesia modalities are warranted to validate these findings.

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**H**emorrhoidal disease is among the most common benign anal conditions encountered by physicians and surgeons.<sup>1</sup> The prevalence of hemorrhoidal disease in Asian countries was reported to be 2%-14%,<sup>2</sup> and the lifetime risk of hemorrhoidal disease could reach up to 75% in the general population,<sup>3</sup> therefore, hemorrhoidal disease represent a major medical and socioeconomic problem.

Several risk factors contribute to the development of hemorrhoidal disease, including aging, depressive moods, and pregnancy.<sup>4</sup> Additionally, studies have investigated the association between body mass index (BMI) and hemorrhoidal disease and demonstrated that obesity appeared to be an independent risk factor for hemorrhoidal disease.<sup>2,5</sup> Obesity is a major health concern globally. According to statistics released by Taiwanese health authorities, 47.9% of adults in Taiwan are overweight, reaching a record-high BMI.<sup>24</sup>

Hemorrhoidectomy remains the mainstay of treatment for high-grade hemorrhoids and complicated hemorrhoids. Surgical management techniques for hemorrhoids have advanced considerably from the traditional Milligan-Morgan hemorrhoidectomy to the contemporary Ferguson hemorrhoidectomy; these advancements have expedited patient recovery, enabling quicker returns to normal life.<sup>6</sup> However, Ferguson hemorrhoidectomy often engenders severe postoperative pain, which leads to delayed hospital discharge and unplanned emergency room visits. A study revealed that individuals with morbid obesity were four times more likely to report chronic pain compared with those without obesity.<sup>7</sup> Another study revealed that among patients undergoing the same surgical procedure, those with obesity experienced higher levels of pain during surgery and at discharge than did those without obesity.<sup>8</sup> These findings thus suggest that individuals with a higher BMI exhibit higher pain sensitivity levels.

Considering the preceding observations, optimal pain control is necessary for ensuring a favorable quality of life for patients after surgery. A recent evidence-based review demonstrated that the use of pudendal nerve blocks (PNBs) is effective in reducing postoperative pain in patients undergoing colorectal surgery.<sup>9</sup> Accordingly, we conducted the present single-center

retrospective clinical study to evaluate the safety and effectiveness of PNBs in managing postoperative pain among patients with different BMI values who had undergone Ferguson hemorrhoidectomy.

## Materials and Methods

### Experimental design

This study enrolled 68 patients who were aged between 18 and 60 years and had undergone Ferguson hemorrhoidectomy for grade 3 hemorrhoids at Taipei Medical University Hospital between October 12, 2020, and March 29, 2021. Among these patients, 25 (36.7%) were overweight (overweight group; BMI: 24-27) and 43 (63.3%) were not overweight (nonoverweight group), while the definition of overweight was based on the Department of Health in Taiwan.<sup>24</sup> Of the patients in the nonoverweight group, 40 (58.8%) were of normal weight (BMI: 18.5-24.0) and 3 (4.5%) were underweight (BMI: < 18.5). The study excluded patients with malignant anal conditions. The Taipei Medical University Joint Institutional Review Board approved the study protocol (N202305099).

### Surgical procedures

All procedures were performed under spinal anesthesia. A bilateral PNB was administered postoperatively by an anesthesiologist. Each of the patients was placed in the Jackknife position for the procedure. Subsequently, the anal canal was expanded, and an anoscope was then used to determine the location of the hemorrhoids. To detach the hemorrhoidal mass from the internal sphincter, a skin incision was made at the base of the hemorrhoids, and a submucosal dissection were performed using an energy device. Next, the hemorrhoids pedicle was transfixed, and the mucosal edges of the surgical defect were sutured together using 3/0 Monocryl sutures. Moreover, an anal Spongostan sponge was inserted to control bleeding. All surgical procedures were performed by the same specialized surgeon who has amassed 15 years of sur-

gical experience and is a member of the Taiwan Society of Colon and Rectal Surgeons.

### Postoperative pain management

The routine postoperative pain control after hemorrhoidectomy is detailed below. Bilateral PNB was performed by anesthesiologist at postoperative recovery room, Ketorolac 10 mg (1# qid) was given orally. Parecoxib intramuscular injection every 12 h was put on request individually based on the pain intensity evaluated by the patients using the visual analog scale (VAS). Daflon was used in all cases for anti-inflammation.

### Postoperative parameters

The outcomes of Ferguson hemorrhoidectomy performed along with bilateral PNB administration were evaluated by the surgeon, a care nurse with 10 years of nursing experience, and the patients who underwent surgery. We considered various factors that could contribute to postoperative complications, including nausea, fever, bleeding, perianal swelling, urinary retention, and urinary incontinence. Additionally, we considered the duration of these symptoms. Postoperative pain was evaluated using the VAS, which was scored from 0 (no pain) to 10 (unimaginable pain),<sup>10</sup> and the evaluation was performed at five time points after Ferguson hemorrhoidectomy: 6, 12, 18, 24, and 48 h. To ensure the reliability of the data, the patients were strongly encouraged to provide honest VAS ratings.

### Statistical analysis

Continuous variables are presented as means  $\pm$  standard deviations (under the assumption of a normal distribution), and categorical variables are presented as numbers (percentages). Two-sample t tests were used to analyze normally distributed continuous variables, Fisher's exact test was applied to analyze categorical variables with small sample sizes, and chi-square tests were used to analyze other categorical variables.

Considering the differences in baseline characteristics between the overweight and nonoverweight groups, we used regression and generalized estimating equations (GEE) to identify a cohort of patients with similar baseline characteristics.

## Results

### Baseline patient characteristics without regression

Table 1 presents a comparison of preoperative demographic and patient characteristics between the nonoverweight and overweight groups. The overweight group had a significantly higher proportion of male patients than did the nonoverweight group (80% vs. 55.81%,  $p < 0.01$ ). Both groups exhibited similar ages and heights. However, the two groups exhibited significant differences in weight, as expected.

The nonoverweight and overweight groups did not differ significantly in clinical characteristics and

**Table 1.** Preoperative demographic and patient characteristics

	BMI < 24 ( <i>n</i> = 43)	BMI $\geq$ 24 ( <i>n</i> = 25)	<i>p</i> value
Preoperative patients' characteristics			
Gender: male, <i>n</i> (%)	19 (55.81%)	20 (80.00%)	< 0.01*
Age	36.16 (10.49)	38.20 (9.67)	0.43
Weight	59.94 (10.05)	74.68 (8.35)	< 0.01*
Height	165.4 (9.91)	169.1 (8.82)	0.13
Clinical characteristics-comorbidity			
Cardiovascular disease, <i>n</i> (%)	3 (6.98%)	1 (4.00%)	1
Hypertension, <i>n</i> (%)	2 (4.65%)	4 (16.00%)	0.18
Hemorrhoids			
Grade	3	3	N/A

comorbidities, including cardiovascular disease (6.98% vs. 4%,  $p = 1$ ), hypertension (4.65% vs. 16%,  $p = 0.18$ ), and hemorrhoids grade.

### Comparison of intraoperative parameters between groups

Table 2 presents the intraoperative parameters observed for the two groups. The overweight group had a more people with significantly higher American Society of Anesthesiology (ASA) score than did the nonoverweight group ( $p < .01$ ). However, the two groups did not differ significantly in terms of anesthesia dose of spinal anesthesia (mg).

### Incidence of side effects after PNB administration

Table 3 lists the parameters observed after PNB administration. The nonoverweight and overweight

groups did not differ significantly in terms of the incidence of complications, including nausea (6.98% vs. 0%,  $p = 0.29$ ), vomiting (2.33% vs. 4%,  $p = 1$ ), fever (0% vs. 0%), bleeding (2.33% vs. 12%,  $p = 0.14$ ), perianal swelling (2.33% vs. 4%,  $p = 1$ ), urinary retention (4.65% vs. 0%,  $p = 0.53$ ), and urinary incontinence (0% vs. 0%). Nevertheless, the duration of symptoms and the total number of readmissions were higher in the overweight group, but these differences were nonsignificant.

### Postoperative pain scores for two groups

We also compared postoperative VAS scores between the two groups, and Table 4 lists the results. Compared with the overweight group, the nonoverweight group had higher VAS scores at 6 ( $0.86 \pm 1.12$  vs.  $0.8 \pm 1$ ,  $p = 1$ ), 24 ( $1.72 \pm 1.69$  vs.  $1.48 \pm 1.26$ ,  $p = 0.54$ ), and 48 h ( $1.32 \pm 1.19$  vs.  $1.32 \pm 1.36$ ,  $p = 0.99$ ) but had lower VAS scores at 12 ( $0.98 \pm 2.15$  vs.  $1.52 \pm$

**Table 2.** Intraoperative parameters

	BMI < 24 (n = 43)	BMI ≥ 24 (n = 25)	p value
Anesthesia			
ASA			< 0.01*
I	28	7	
II	15	18	
Spinal anesthesia dosage (mg)	8.58 (1.12)	8.88 (0.97)	0.29
Ferguson hemorrhoidectomy			
OP time (mins)	53.83 (12.66)	59.20 (22.94)	0.29
Recovery room (mins)	92.53 (19.30)	99.419 (20.44)	0.18

**Table 3.** Postoperative parameters

	BMI < 24 (n = 43)	BMI ≥ 24 (n = 25)	p value
Complications			
Nausea, n (%)	3 (6.98%)	0 (0%)	0.29
Vomiting, n (%)	1 (2.33%)	1 (4.00%)	1
Fever, n (%)	0	0	N/A
Bleeding, n (%)	1 (2.33%)	3 (12.00%)	0.14
Perianal swelling, n (%)	1 (2.33%)	1 (4.00%)	1
Urinary retention, n (%)	2 (4.65%)	0 (0%)	0.53
Urinary incontinence, n (%)	0	0	N/A
Duration of complication (days)	0.86 (4.58)	6.45 (24.48)	0.27
Hospital stay (days)	0.86 (1.13)	0.80 (1.00)	0.82
Readmission			
Total (%)	3 (6.98%)	4 (16.00%)	0.41
Duration between admission and readmission (days)	5.58 (28.72)	4.67 (18.44)	0.87

**Table 4.** Postoperative pain score comparison between non-overweight and overweight groups

VAS score	BMI < 24 ( <i>n</i> = 43)				BMI ≥ 24 ( <i>n</i> = 25)				<i>p</i> value
	n	Mean	SD	Missing rate	n	Mean	SD	Missing rate	
6 h	43	0.86	1.12	0	25	0.8	1	0	0.82 (t test)
12 h	43	0.98	2.15	0	25	1.52	2.28	0	0.33 (t test)
18 h	43	0.93	1.33	0	25	1	1.55	0	0.85 (t test)
24 h	43	1.72	1.69	0	25	1.48	1.26	0	0.54 (t test)
48 h	43	1.32	1.19	0	25	1.32	1.36	0	0.99 (t test)

2.28,  $p = 0.33$ ) and 18 h ( $0.93 \pm 1.33$  vs.  $1 \pm 1.55$ ,  $p = 0.85$ ); nevertheless, these differences were nonsignificant.

### Pain scores for female and male patients

Considering the gender difference between the two groups, we examined the relationship between postoperative pain scores and gender at each specified hour after Ferguson hemorrhoidectomy conducted along with bilateral PNB administration, and Table 5 presents the results. The results revealed that pain scores did not differ significantly between female and male patients at 12 and 18 h. However, female patients reported significantly lower pain scores than did male patients at 6, 24, and 48 h. However, our GEE model indicated no significant gender differences in pain scores ( $p = .43$ ).

## Discussion

Patients with a higher BMI were reported to experience greater postoperative pain when compared with those with a lower BMI.<sup>8</sup> However, our findings demonstrate that the overweight and nonoverweight groups experienced similar levels of postoperative pain after Ferguson hemorrhoidectomy conducted along with bilateral PNB administration. Our study is the first to analyze this issue by primarily using retrospective clinical data; therefore, our study can serve as a basis for future clinical trials to explore the use of PNBs for pain management after hemorrhoidectomy.

Studies have reported a relationship between postoperative pain and body weight. Specifically, a study on patients undergoing lung cancer surgery revealed

**Table 5.** Relation between pain score at each hour and gender

Var	Estimate	<i>p</i> value	
6 h			
Female	0.59	0.04*	
Male	ref	ref	
12 h			
Female	0.07	0.91	
Male	ref	ref	
18 h			
Female	0.64	0.11	
Male	ref	ref	
24 h			
Female	1.3	< .001*	
Male	ref	ref	
48 h			
Female	0.83	0.01*	
Male	ref	ref	
Overall			
Var	Estimate	95% CI	<i>p</i> value
Male	-0.21	-0.75 0.32	0.43
Female		ref	

that patients with obesity exhibited a lower pain threshold than did those without obesity;<sup>11</sup> this finding suggests that a higher BMI is associated with higher pain scores.<sup>12,13</sup> A possible explanation for this finding is that increased release of inflammatory mediators due to macrophage accumulation in patients with higher BMI values can lead to systemic inflammation, which in turn contributes to lower pain thresholds.<sup>14</sup> Other studies have also indicated that 65% of patients who did not receive adequate pain management after conventional hemorrhoidectomy had elevated VAS scores;<sup>15,16</sup> this highlights the importance of perioperative anesthesia. Notably, we observed no significant difference in VAS scores between the overweight and nonoverweight groups after Ferguson hemorrhoidect-

omy conducted along with bilateral PNB administration. Anatomically, the pudendal nerve branches into the inferior rectal nerve and perineal nerve in Alcock's canal; it eventually continues as the dorsal nerve, which innervates the penis and clitoris. The external anal sphincter and perianal skin are innervated by the inferior rectal nerve. The perineal nerve innervates the bulbospongiosus, ischiocavernosus, and levator ani muscles and relays sensory information from the skin of the labia majora and scrotum. The dorsal nerve branch transmits sensory information to the skin of the clitoris and penis.<sup>17</sup> Therefore, considering the anatomic structure of the pudendal nerve, the blockade of the pudendal nerve has been considered a more effective analgesic method, when compared with alternatives such as spinal anesthesia, for pain management after hemorrhoidectomy.<sup>18,19</sup> The effectiveness of PNBs in reducing postoperative pain has also been demonstrated in patients who had undergone surgery involving major excisions in the area of the vulva and groin.<sup>20</sup>

Ensuring high-quality and gradual postoperative analgesia is crucial in facilitating early recovery, improving long-term outcomes, and fostering a positive perception of the surgical experience among patients.<sup>21</sup> Our study revealed that PNB administration was associated with a low risk of side effects and minimal contraindications, including known allergic reactions, injection site infections, coagulopathy, and altered local anatomy; we also observed a low incidence of nausea, vomiting, bleeding, perianal swelling, and urinary retention. Severe postoperative complications, including pudendal nerve injury or damage to adjacent organs such as the bladder and rectum, are rare. Notably, neither group in our study exhibited symptoms of fever or urinary incontinence. Compared with general anesthesia or neuraxial anesthesia methods, PNB administration have been shown to minimize the occurrence of painful defecation and urinary retention after surgery, thus allowing a quicker return to normal activities;<sup>22,23</sup> moreover, relative to other local anesthesia techniques, PNB administration has been revealed to engender a decrease in the incidence of perianal swelling and hematoma. Therefore, PNBs could be recommended as an effective option for pain control after

hemorrhoidectomy.

Our study has some limitations. First, our analyses were based on retrospective data and a relatively small sample size. Hence, prospective research should be conducted to confirm our findings. Second, the gender imbalance in our participant pool, which included more male patients than female patients, may influence postoperative pain perceptions. Therefore, future studies should explore the effect of gender on the effectiveness of PNBs in managing pain after hemorrhoidectomy in patients with different BMI values.

## Conclusion

This retrospective study revealed both overweight and nonoverweight patients experienced similar outcomes and pain scores after Ferguson hemorrhoidectomy conducted along with PNB administration. Despite the limitations of the study, PNBs should be considered as a viable option for pain management in patients undergoing hemorrhoidectomy. Large-scale studies comparing the effectiveness of PNBs with that of other anesthetic modalities should be conducted to identify the optimal approach for managing post hemorrhoidectomy pain in patients with different BMI categories.

## Conflicts of Interest

The authors declare no conflicts of interest.

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## 原 著

# Ferguson Hemorrhoidectomy 後使用雙側陰部神經阻滯對超重患者的術後鎮痛效果

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**背景** 痔瘡切除術後的疼痛仍然令人擔憂，隨著病人的體重指數 (BMI) 越高，他們的疼痛感越強。本研究比較了在過重和非過重患者中，Ferguson 痔瘡切除術後使用坐骨神經阻滯治療的術後疼痛、安全性和有效性。

**方法** 在這項回顧性研究中，在 2020 年 10 月至 2021 年 3 月間，所有患者在臺北醫學大學醫院臨床診斷為第三期痔瘡均接受 Ferguson 痔瘡切除術，並隨後以雙側坐骨神經阻滯止痛，比較過重組 (BMI > 24) 和非過重組 (BMI < 24) 的短期術後結果。數據是從臺北醫學大學醫院數據庫中回顧收集的。

**結果** 過重組中男性患者 ( $p < 0.01$ ) 比例較高和 ASA 分數較高的病患明顯較多。然而，兩組之間並沒有觀察到顯著不同的併發症發生率，包括噁心 ( $p = 0.29$ )、嘔吐 ( $p = 1$ )、發燒 ( $p = 1$ )、出血 ( $p = 0.14$ )、肛門周圍腫脹 ( $p = 1$ )、尿滯留 ( $p = 0.53$ ) 和尿失禁 ( $p = 1$ )。兩組在 6 小時 ( $p = 1$ )、12 小時 ( $p = 0.33$ )、18 小時 ( $p = 0.85$ )、24 小時 ( $p = 0.54$ ) 和 48 小時 ( $p = 0.99$ ) 的 VAS 也未顯示顯著差異。在使用 GEE 模型時，我們沒有發現兩個性別之間在疼痛評分 ( $p = 0.43$ ) 上有顯著差異。

**結論** 無論是過重還是非過重患者，在 Ferguson 痔瘡切除術後接受雙側坐骨神經阻滯治療，均獲得相似的術後結果和低疼痛分。然而，仍需大規模研究以驗證這些結果。

**關鍵詞** Ferguson 痔瘡切除術、雙側坐骨神經阻滯治療、過重。