Original Article

Comparison the Outcomes between Conventional Procedure for Prolapse and Hemorrhoids and Hybrid Procedure for Prolapse and Hemorrhoids for the Treatment of Mixed Hemorrhoids

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Key Words
Hemorrhoids;
Procedure for prolapse and hemorrhoids;
Hybrid procedure for prolapse and hemorrhoids;
Modified Ferguson procedures

Purpose. Conventional procedure for prolapse and hemorrhoids (conventional PPH) is a common surgical method used worldwide to treat internal hemorrhoids. We attempted to modify the procedure for prolapse and hemorrhoids (PPH) procedure, hoping to provide an alternative treatment option for patients by performing PPH with modified Ferguson procedures and electric skin tag excision (hybrid PPH) as a treatment for internal hemorrhoids with limited prolapsed anal lumps or skin tags. We compared the outcomes between conventional PPH (cPPH) and hybrid PPH (hPPH).
Methods. We retrospectively reviewed data from 100 patients with mixed hemorrhoids who underwent PPH between January 2021 and December 2022. Fifty patients underwent cPPH, and the other fifty underwent hybrid PPH. Post-operative anal wound pain, urinary difficulty, bleeding rate, wound infection rate, and wound healing times were used to assess the short-term outcomes, and recurrence and stricture rates were assessed as long-term outcomes.
Results. The hPPH group experienced significantly greater post-operative anal wound pain and longer wound healing time than the cPPH group. The hPPH group also had a significantly longer operation time; however, there was no statistically significant difference in long-term outcomes with regard to recurrence and post-operative anal strictures between the two groups.
Conclusions. In our cohort, we tried to provide an alternative treatment option for patients with mixed hemorrhoids who received cPPH and had limited residual prolapsed anal lumps or skin tags. The results showed comparable short- and long-term outcomes between the groups. Although patients in the hPPH group experienced more post-operative pain, which requires appropriate care, they may experience cosmetic benefit and is an alternative treatment option.

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Hemorrhoid disease is one of the most common adult diseases worldwide.[1] Although hemorrhoids are rarely life-threatening, the symptoms, such as itching, anal lump, pain, bleeding, and protrusion, are sometimes unbearable. It has been reported that 50% of patients over 50 years old have symptoms related to hemorrhoids.[2] Procedure for prolapse and hemorrhoids (PPH) is a procedure for the treatment of internal hemorrhoids that is widely performed worldwide and is known to cause less pain than conventional hemorrhoidectomy.[3,4] However, in our experience, many patients complain of remaining prolapsed anal lumps or skin tags after conventional PPH (cPPH). Therefore, we attempted to provide an alternative treatment option for patients with internal hemorrhoids and limited prolapsed lumps (one-quadrant) or skin tags after cPPH. We performed PPH with a modified Ferguson procedure or electric skin tag excision (hybrid PPH) to treat internal hemorrhoids with limited prolapsed anal lumps or skin tags. The results of the modified Ferguson procedures in our hospital have been well-published previously.[5] We conducted a retrospective study to compare the outcomes between conventional PPH (cPPH) and hybrid PPH (hPPH).

Methods

Patient population and data collection

This retrospective study enrolled 127 patients (Fig. 1) with hemorrhoids treated between January 2021 and December 2022 at our institution. 27 patients were excluded based on the following criteria: 1. Grades I hemorrhoids; 2. Loss of tracking or incomplete medication; and 3. Patients aged < 18 years, 4. Patients

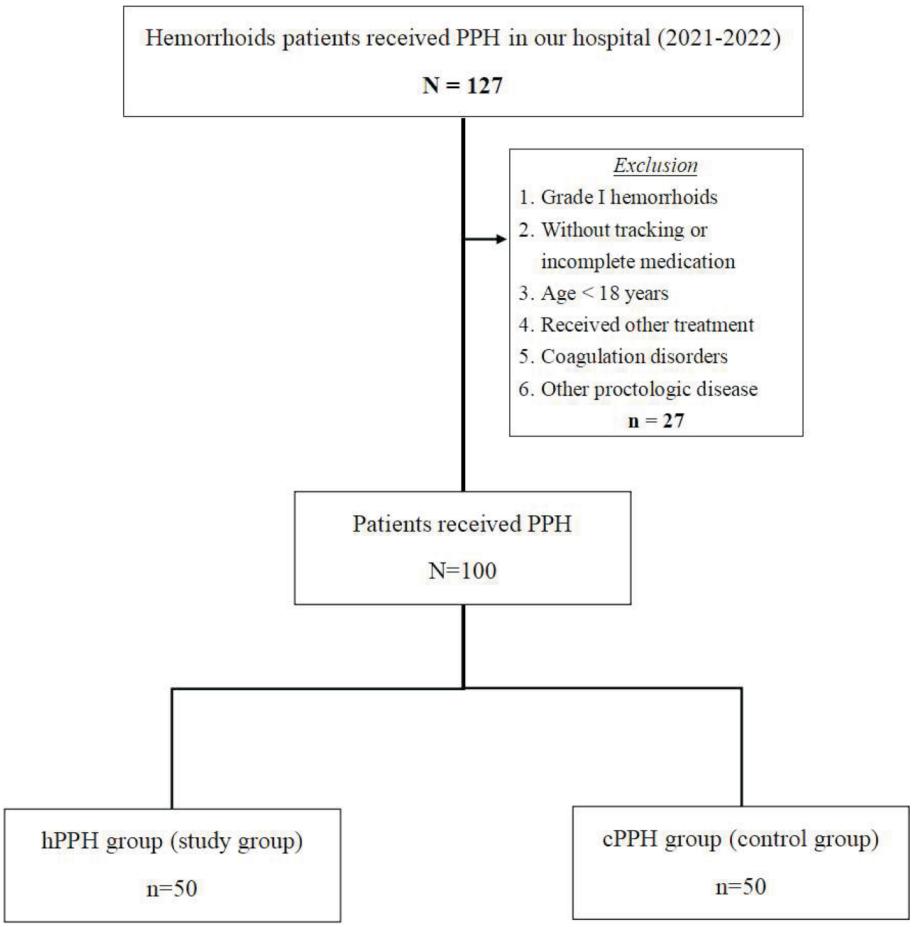

Fig. 1. Flowchart of the patient selection in this cohort.

who received other treatments (include rubber band ligation or hemorrhoids medication); 5. Coagulation disorders; and 6. Other psychological diseases such as anal abscess and anal fistula, etc. The remaining 100 patients were enrolled in this study. Fifty patients who underwent PPH with limited Ferguson procedures and electric skin tag excision (hPPH) were defined as the study group, and the other 50 patients who underwent cPPH were defined as the control group. Table 1 shows the characteristics of the two groups, including age, sex, hemorrhoid symptoms (pain, bleeding, swelling, prolapse and itching) and symptom duration. Both groups were treated with PPH performed according to the corresponding operating guidelines for routine hospital surgery. Our study include prolapsing grades II and III hemorrhoids and grade IV hemorrhoids irreducible by the patient but reducible at surgery or hemorrhoids with skin tags.

Surgical methods of cPPH and hPPH

Fifty patients in the control group underwent cPPH, and all patients were operated on in the prone jackknife position with their buttocks tractioned laterally using two adhesive straps. The operative site was infiltrated with local anesthesia, a mixture of 15 ml of distilled water, 15 ml of 2 percent lidocaine, 30 ml of 0.5 percent bupivacaine, and 1:200,000 epinephrine. We used HEM (Hemorrhoid and Prolapse Stapler Set) (Covidien 33 mm/3.5 mm) as the operating devices. First, we fixed the circular anal dilator with 2-O nylon sutures and placed a purse string 2-3 centimeters above the dentate line or a protruding hemorrhoid lump using 2-O Prolene sutures. After the purse string was completed, a hemorrhoid circular stapler was inserted after being carefully opened. Thereafter, we drove a knot to secure the purse string and inserted and closed the instrument concurrently. Then we fired the instrument and slowly pulled out and opened the instrument at the same time. After the procedure, we used a large-sized anorectal retractor (Ferguson-Moon Retractor® Schreiber Instrumente, Inc., Fridingen/Tuttlingen, Germany) with a stapled line completely exposed to check bleeding, and we routinely sutured the stapler line interruptly by 2-O vicryl sutures for bleeding. The surgery was completed after checking for bleeding using a small-size anal retractor without anal packing.

Fifty patients in the study group received hPPH, and the previous operative step was the same as that for cPPH. After cPPH, some patients had one-quadrant prolapsed lumps or skin tags, on which we performed one-quadrant modified Ferguson procedures. We excised the prolapsed lump and sutured the ligated pedicle using 2-O chromic catgut. We performed one-stitched running sutures and completed the one-sided plication of the redundant anoderm and hemorrhoids,

Table 1. Characteristics of the enrolled patients

	Pre-operation demographics		*p* value
	cPPH group (n = 50) Mean ± SD or number (%)	hPPH group (n = 50) Mean ± SD or number (%)	
Age (years)	55.5 ± 15.6	53.5 ± 14.9	0.513
Female	18 (36)	16 (32)	0.677
Symptoms (n)			
Pain	11 (22)	18 (36)	0.125
Bleeding	39 (78)	36 (72)	0.493
Prolapse	16 (32)	25 (50)	0.068
Swelling	24 (48)	27 (54)	0.553
Itching	5 (10)	7 (14)	0.543
Symptom duration			
< 1 month	12 (24)	16 (32)	
1-3 months	18 (36)	16 (32)	
3-12 months	16 (32)	12 (24)	
> 12 months	4 (8)	6 (12)	

cPPH, conventional procedure for prolapse hemorrhoids; hPPH, hybrid procedure for prolapse hemorrhoids.

followed by another suture to the pedicle from the other side of the anoderm. Furthermore, we performed electric skin tags excision in selected patients and allowed the excision wound lay open after hemostasis. We named this procedure hPPH.

Patient management protocol and post-operation follow-up and outcomes

All patients underwent the same routine systematic examination and were checked for biochemistry and coagulation laboratory data before surgical treatment. Adequate preoperative preparations were done, such as rest, diet, and post-operation education. The patient's vital signs were recorded, and intestinal preparation was completed (most patients received an enema and underwent surgery the next day). All patients received the same analgesic medication after operation (TRAMADOL HCL; ACETAMINOPHEN TAB 75 MG/650 MG q12H, and FLURBIPROFEN 100 MG BID) and we prescribed the same medication during discharge and outpatient department (OPD) follow-up. Post-operative follow-up was performed at least twice on post-operative days (POD) 7 and 14. We recorded the pain grade using the visual analog scale (VAS) score on POD 1 before discharge and on POD 7 and 14 at the OPD. The wound healing condition was also recorded on OPD follow-up. When acute urine retention occurred, even with adequate pain control, we inserted a Foley catheter, allowed the patient to bring it home, and removed it at the OPD. Post-operative bleeding occurred only after patient discharge and was recorded in the emergency department or OPD follow-up within one month. Once poor wound healing develops, we will extend the post-operation follow-up times. Short-term follow-up outcomes within one month and short-term complications, including bleeding and post-operative wound infection, were recorded during the OPD follow-up or when the patient visited the emergency department. Long-term follow-up outcomes within 12-month including anal stricture and hemorrhoid recurrence, were recorded at the OPD. We defined recurrence as the protruding lumps with symptoms or skin tags occurring within one year of operation. Furthermore, we recorded cases with anal stricture and moderate to severe anal stenosis within one year of operation according to Mehdi et al.'s classification.[6] None of the enrolled patients had fecal incontinence or chronic pain.

Statistical methods

Statistical software (SPSS 25.0; SPSS Inc., Chicago, IL, USA) was used for all analyses. Categorical variables were analyzed using Fisher's exact test. Among continuous variables, data were presented as means ± standard deviation and compared using Student's *t*-test. Statistical significance was defined as $p < 0.05$.

Results

Short-term outcomes

Fig. 2A shows that the hPPH group had a significantly greater painful sensation on PODs 1, 7, and 14 than the cPPH group. However, Fig. 2B reveals that the hPPH group had a statistically higher requirement for analgesic medications on POD 7 and no difference on POD 14. Figs. 2C and 2D demonstrate that the hPPH group had a significantly longer operation and wound healing times. Table 2 shows the short-term outcomes of the two groups. Four patients (8%) in the control group and six (12%) in the study group experienced post-operative bleeding without a statistical difference. There were no statistically significant differences in urinary difficulties or post-operative wound infections between the two groups.

Long-term outcomes

Regarding long-term follow-up, four (8%) control group patients and three (6%) study group patients developed anal strictures without a statistical difference. Recurrence occurred in seven (14%) patients in the control group and five (10%) patients in the study group within 12-month. In these patients with recurrence, six patients of control group complained of recurrent skin tags and two patients of study group complained of recurrent skin tags.

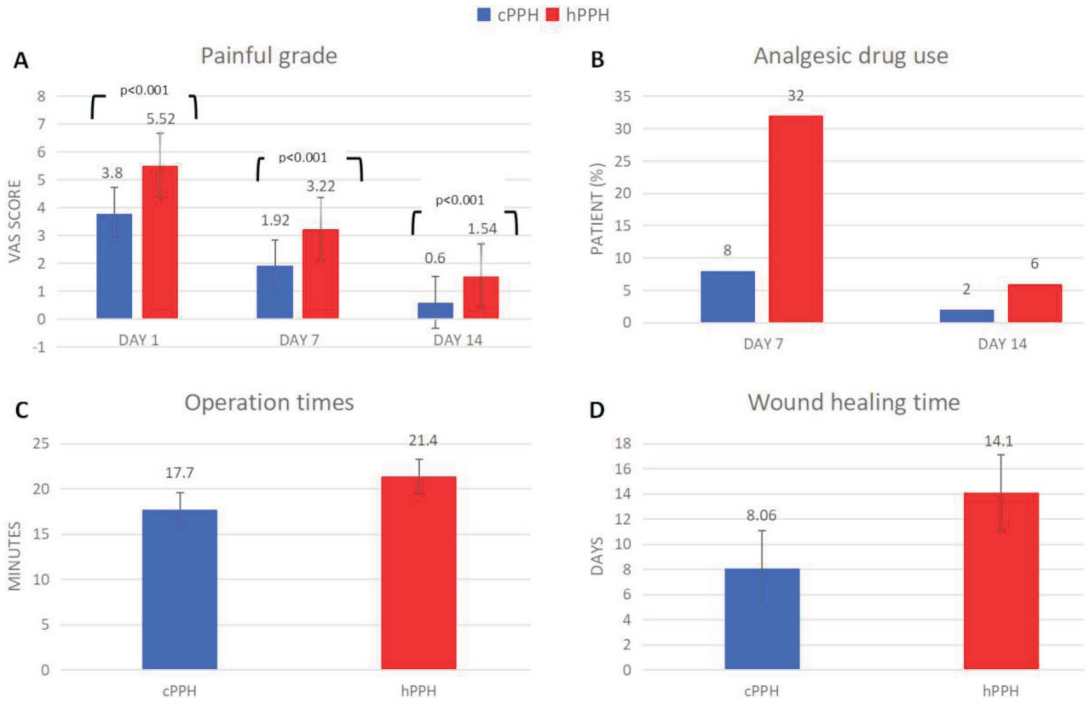

Fig. 2. Comparison of A: painful grade; B: analgesic medication use; C: operation times; D: wound healing time between 2 groups.

Table 2. Short- and long-term outcomes

	cPPH group (n = 50)	hPPH group (n = 50)	*p*-value
Operation time (minutes)	17.7 ± 3.26	21.4 ± 3.61	< 0.001
Painful grade (VAS score)			
POD 1	3.80 ± 0.93	5.52 ± 1.30	< 0.001
POD 7	1.92 ± 0.70	3.22 ± 0.95	< 0.001
POD 14	0.60 ± 0.61	1.54 ± 0.61	< 0.001
Analgesic drug use			
POD 7	4 (8)	16 (32)	0.003
POD 14	1 (2)	3 (6)	0.313
Short-term outcomes			
Wound healing time (days)	8.06 ± 1.42	14.1 ± 2.06	< 0.001
Urinary difficulties	4 (8)	7 (14)	0.730
Bleeding	4 (8)	6 (12)	0.510
Wound infection	2 (4)	2 (4)	
Long-term outcomes			
Recurrence	7 (14)	5 (10)	0.543
Recurrent skin tags	6 (12)	2 (4)	0.144
Stricture	4 (8)	3 (6)	0.699

cPPH, conventional procedure for prolapse hemorrhoids; hPPH, hybrid procedure for prolapse hemorrhoids.

Photographs of operation

Fig. 3A shows the patient's status post-cPPH with the remaining prolapsed lump, and Fig. 3B shows a photo of the same patient who underwent the following modified Ferguson procedures (hPPH).

Fig. 3C shows the electric skin excision with the wound left open.

Discussion

Hemorrhoids are rarely life-threatening but are accompanied by bothering symptoms, including itching,

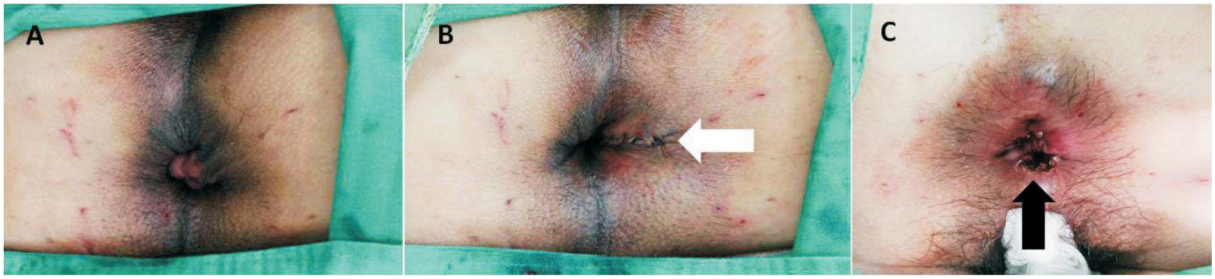

Fig. 3. A: patient status post cPPH with remaining limited prolapsed lump; B: the same patient status post hPPH, solid white arrow showed the procedure of modified Ferguson procedures; C: solid black arrow showed the electric skin tag excision with wound let it open.

lump pain, bleeding, protrusion, and swelling.[2] The anal cushions and lower portion of the anal canal receive blood supply from the branches of the superior and middle hemorrhoidal arteries, which communicate with each other and the inferior hemorrhoidal artery. Meanwhile, the superior, middle, and inferior hemorrhoidal veins drain blood from the anal canal and hemorrhoidal arteries.[7] Haas et al. found that these connective tissues support the vessels in the hemorrhoid pad and anchor them to the internal sphincter and longitudinal muscles. Furthermore, these anchored tissues deteriorate with age, occurring mostly in the third decade of life.[8] Hemorrhoids contribute to abnormal dilation of the internal hemorrhoidal plexus, abnormal distention of arteriovenous anastomosis, prolapse of anal cushions, or anchoring connective tissue destruction.[9] However, the pathogenesis and function of these tissues remains controversial. Hemorrhoids were classified as internal and external hemorrhoids (below the pactinate line) by location and degree (Grades I-IV), only applied to internal hemorrhoids. The treatment of hemorrhoids depends on their symptoms. Symptomatic medications and topical creams are widely used for nonoperative management. Surgical intervention was considered when the anorectal structure was severely compromised, such as ulceration, gangrene, extensive thrombosis, associated fissures, or persistent symptoms, even with nonoperative treatments.[10]

PPH is a widely used procedure to treat internal hemorrhoids and is widely performed.[3,4] Compared with conventional hemorrhoidectomy, this procedure restores symptomatic vascular cushions to their anatomic position, decreases arterial inflow, and increases venous drainage. Hence, this procedure eliminates the cause of symptoms without necessarily excising the redundant tissue and enables spare patient incisions in the highly sensitive anoderm.[11] It was reported that PPH provided short operation times and a shorter hospitalization course, and some patients underwent this procedure at the OPD.[12] PPH was primarily performed in Grade III or Grade II hemorrhoids that failed to ligate the rubber band.[13,14] Most importantly, cPPH is well known for less painful or painless operation of hemorrhoids because the circumferential purse string is sutured above the dentate line.[15] Once the procedure crosses the dentate line, a painful sensation occurs. However, in our experience, many patients complain of remaining prolapsed anal lumps or skin tabs after conventional PPH. Skin tags are skin deformities at the external anal margin, and many patients complain of redundant folds. Therefore, we attempted to extend the surgical indication for conventional PPH (cPPH) to patients with internal hemorrhoids with limited prolapsed anal lumps or skin tags. Our hospital has demonstrated a modified Ferguson procedure that enables the resection of circumferential prolapsed hemorrhoids, redundant anoderm, and skin tags.[5] We combined cPPH with the modified Ferguson procedures in these patients and named this procedure hybrid PPH (hPPH). In our study, post-operative pain was the most significant difference between the two groups.

Delayed bleeding after hemorrhoidectomy was reported from POD7 to POD14.[16] The reason for using chromic catgut for suturing was that its resorption time was approximately 14-21 days. A suitable resorption time can provide security against delayed bleed-

ing and reduce the irritation caused by prolonged sutures. The modified Ferguson procedure has a shorter period of post-operative pain than other types of hemorrhoidectomies,[5] and this is the reason why we chose the modified Ferguson procedure to manage the prolapsed lump. In our study, statistically significant painful sensations occurred on POD1, POD7, and POD14, and analgesic agent used also showed significant difference on POD7. Post-conventional hemorrhoidectomy (Ferguson or Milligan Morgan procedure) pain was reported with a VAS score of 4-8 on POD1.[17] In our study, although hPPH had a greater painful sensation than cPPH, hPPH still had a lower painful sensation than conventional hemorrhoidectomy, which can manage patients with mixed hemorrhoids and prolapsed anal lumps. On POD7, the study group showed alleviated painful sensations; the POD14 pain score decreased significantly, and most patients refused analgesic medications. Regarding short-term outcomes, the hPPH group had a statistically longer wound healing time than the control group; however, no statistically significant differences in other short-term outcomes were noted. There were no significant differences in long-term outcomes between the two groups. Our study aimed to extend the criteria for cPPH to achieve good outcomes. In our experience, most patients were satisfied with hPPH without remaining limited prolapsed anal lumps or skin tags after surgery. However, post-operative pain should be managed appropriately.

Limitations

First, this is a retrospective analysis that utilized a chart review. There must have been some selection bias during the data collection. Further randomized controlled trials should be designed to provide stronger evidence. Second, we could not precisely investigate patient compliance with analgesics or other medications. Third, longer follow-up data were not available and should be performed in the future, especially for the assessment of anal strictures or disease recurrence. Fourth, the sample size was small, with only fifty patients in the study group, which could have caused statistic bias. Finally, all study patients' operations were conducted by the same doctor, whereas randomized trials, multicenter studies, or more operator experience studies can be conducted in the future.

Conclusion

We attempted to provide an alternative treatment option for our patient cohort, which consisted of patients with mixed hemorrhoids who received cPPH and had limited residul prolapsed anal lumps or skin tags. The results showed comparable short- and long-term outcomes between the groups. Although post-operative pain needed to be managed appropriately in the hPPH group, they may experience cosmetic benefit and is an alternative treatment option.

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Conflicts of Interest Statement

The authors have no conflicts of interest to declare.

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原　著

比較傳統痔瘡環切術及混合式痔瘡環切術於混合痔治療的預後分析

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目的　傳統痔瘡環切術 (cPPH) 是一種在全世界廣泛用於治療內痔的常用手術。我們試著在 cPPH 加上 Modified Ferguson 痔瘡切除術或是贅皮切除 (hPPH)，來提供病人多一個術式選擇，用於治療內痔伴隨贅皮或有限度脫垂的病患。我們比較了 cPPH 和 hPPH 的預後。

方法　我們回溯性分析了 2021 年 1 月至 2022 年 12 月間接受 PPH 的一百名病患。五十名病患接受了 cPPH，另外五十名患者接受了 hPPH。我們用術後肛門疼痛程度、排尿困難、術後出血情形、傷口感染率和傷口癒合時間用於評估短期預後，痔瘡復發和肛門狹窄與否用於評估長期預後。

結果　hPPH 組有顯著較高的術後疼痛及較長的傷口癒合時間跟手術時間。在長期的預後上，兩組的術後肛門狹窄及痔瘡復發情形並沒有顯著差異。

結論　在我們的研究中，我們在內痔伴有限度 (一個象限) 脫垂或贅皮的病患中進行了 hPPH，提供這類病人多一個術式的選擇。我們的研究結果顯示 hPPH 或許能得到與傳統環切術組相當的短期和長期預後，並且在外觀上有不錯的效果，但術後疼痛需要得到妥善處理。

關鍵詞　傳統痔瘡環切術、贅皮痔瘡切除術、微創痔瘡切除術。