Surg. Gastroenterol. Oncol. 2025;30(3):159-166 DOI: 10.21614/sgo-782

TND's Vertical Ligation-Mucopexy: A Minimally Invasive Approach for Circumerential Hemorrhoids

Dung Ngoc Tran[1,2,3], Anh Tu Nguyen[2]*, Phan Duc Nguyen[2], Dung Quang Luu[2], Quan Anh Nguyen[3], Linh Van Nguyen[2], Cuong Van Truong[2], Anh Ngoc Nguyen[2,4], Vinh Thu Thi Nguyen[2], Tung Thien Pham[3], Ha Ngoc Hoang[2], Van Quoc Nguyen[2]

[1]Department of Experimental Surgery, Hanoi Medical University, Hanoi, Vietnam
[2]Department of Coloproctology and Pelvic Floor Surgery, Hanoi Medical University Hospital, Hanoi, Vietnam.
[3]Department of Special Under Request, Hanoi Medical University Hospital, Hanoi, Vietnam
[4]Department of Anatomy, Hanoi Medical University, Hanoi, Vietnam

***Corresponding author:**
Anh Tu Nguyen, MD
Department of Coloproctology and Pelvic Floor Surgery, Hanoi Medical University Hospital, Vietnam
No. 1 Ton That Tung Street, Trung Tu Ward, Dong Da District, Hanoi City
Vietnam
Phone: +84 0334996563
E-mail: nguyentuanh2597@gmail.com
ORCID: 0009-0005-5601-6233

ABSTRACT

Introduction: Hemorrhoids are the most common benign anorectal condition, significantly impairing patients' quality of life. When medical treatment fails, surgery becomes necessary. In recent years, minimally invasive techniques have gained attention and been increasingly applied in clinical practice. *Objective:* This study aimed to evaluate the outcomes of TND's Vertical Ligation-Mucopexy (TVLM) in the treatment of circumferential hemorrhoids at Hanoi Medical University Hospital.
Methods: A retrospective study was conducted on 308 patients undergoing TVLM from April 2022 to March 2025.
Results: The mean age was 45.28 ± 14.05 years, with a male-to-female ratio of 0.9:1. According to the BPRST classification, the distribution was B1 (6.8%), P2 (100%), R1 (89.3%), S1 (32.8%), and T1 (14.9%). Rectal mucosal prolapse coexisted in 45.1% of cases. The average operative time was 32.69 ± 8.99 minutes; for TVLM alone, it was 15.2 ± 3.6 minutes. Additional procedures included skin tag excision (22.37%), hemorrhoidectomy (23.70%), thrombectomy (8.77%), and papilloma removal (13.31%). The mean VAS pain score was 3.23 ± 1.03 on postoperative day one and decreased to 1.96 ± 1.18 at discharge. The average hospital stay was 1.48 ± 0.74 days, and the mean duration of postoperative pain was 15.04 ± 6.56 days. Postoperative complications included urinary retention (11.4%) and bleeding (5.2%), with no cases of anal stricture. Only one patient (0.3%) required reoperation. Recurrence after a 14.41-month follow-up was 3.6%.
Conclusion: TVLM is a simple, low-cost, minimally invasive technique with low complication and recurrence rates, suitable for widespread adoption, especially in resource-limited settings.
Keywords: mucopexy, ligation, vertical, circumferential hemorrhoids

Abbreviations:
TVLM: TND's Vertical Ligation - Mucopexy;
CAD: Circular Anal Dilator;
VAS: Visual Analog Scale;
PPH: Procedure for Prolapse and Hemorrhoids;
FH: Ferguson Hemorrhoidectomy;
LH: Ligasure Hemorrhoidectomy;
MMH: Milligan–Morgan Hemorrhoidectomy;
DG-HAL: Doppler-Guided Hemorrhoidal Artery Ligation;
HAL-RAR: Hemorrhoidal Artery Ligation and Rectoanal Repair.

Received: 27.04.2025
Accepted: 09.07.2025

INTRODUCTION

Hemorrhoids are among the most common anorectal conditions worldwide. A 2022 study in South Korea involving 194,620 patients reported a prevalence of

16.6%, with a higher rate in females than males (1). In Vietnam, according to Nguyen Xuan Hung, the prevalence is 34.7%, particularly among individuals with sedentary lifestyles and low-fiber diets (2). Although benign, hemorrhoids can cause persistent symptoms such as bleeding, prolapse, and anal itching or burning, significantly impairing patients' quality of life (3). In recent years, minimally invasive techniques such as ligation-mucopexy have gained attention for reducing postoperative pain, shortening hospital stay, and preserving anal anatomy. In cases of circumferential hemorrhoids with rectal mucosal prolapse, this approach helps correct the prolapse while avoiding extensive tissue excision and related complications like anal stricture, incontinence, or sphincter damage (4). Building on the ligation-anopexy technique proposed by Hussein in 2001, we have developed and successfully implemented the TND's Vertical Ligation-Mucopexy (TVLM) method for treating circumferential hemorrhoids at Hanoi Medical University Hospital (5). Developed in the post-COVID-19 context of limited resources, the TVLM technique was designed to be effective, minimally invasive, and easy to perform. Using vertical sutures along the anal canal, it combines vascular ligation and mucosal suspension while avoiding the anal narrowing often seen with circular suturing methods. Clinical experience has shown promising outcomes with low postoperative pain, minimal complications, and rapid recovery. This study aims to systematically evaluate the efficacy and safety of TVLM in treating circumferential hemorrhoids.

METHOD

Subjects

Patients with circumferential hemorrhoids, with or without rectal mucosal prolapse, who underwent TVLM at Hanoi Medical University Hospital between April 2022 and March 2025.

Inclusion criteria

Patients diagnosed with circumferential hemorrhoids. Patients indicated for surgical intervention due to failure of medical treatment or due to symptoms/complications affecting quality of life. Medical records containing complete research data.

Exclusion criteria

Medical records lacking essential research information.

Study Design

Retrospective Descriptive Study.

Data Collection and Analysis

Data were collected from the electronic medical records of Hanoi Medical University Hospital and analyzed using SPSS version 20.0. Quantitative variables were presented as mean ± standard deviation (SD), and qualitative variables as frequency and percentage (%).

Scientific Basis and Surgical Procedure of the TND's Vertical Ligation-Mucopexy (TVLM) Technique

Scientific Basis of the Vertical Ligation-Mucopexy Technique

Based on the concept of the ligation-anopexy technique proposed by Hussein in 2001 and developed in the post-COVID-19 context of limited surgical equipment, the TVLM method incorporates key technical modifications to minimize the risk of postoperative anal stricture. TVLM is a minimally invasive procedure designed to effectively treat circumferential hemorrhoids, particularly in advanced cases (grade III-IV) with associated rectal mucosal prolapse. It employs X-shaped sutures placed vertically along the anal canal to both ligate hemorrhoidal vessels and support the prolapsed tissue. In contrast, Hussein's technique uses spiral sutures to target individual hemorrhoidal bundles (5). The theoretical basis of this technique is grounded in the mechanical theory of hemorrhoid pathogenesis, which attributes prolapse to weakening of the supporting structures (Treitz muscle and Park's ligament) anchoring anal cushions to the internal sphincter. Therefore, the technique aims to restore this fixation and reduce blood flow to the hemorrhoidal plexus.

TND's Vertical Ligation - Mucopexy technique

The TVLM technique consists of four basic steps (*fig. 1*).

Step 1: Patient Preparation

- Position: Lithotomy position.
- Anesthesia: Spinal anesthesia or general anesthesia, depending on clinical indication.

Step 2: Assessment of Hemorrhoidal Lesions

- Identify the location of hemorrhoidal bundles and classify them using the BPRST system.
- Assess associated lesions such as anal papillae, polyps, or rectal mucosal prolapse.

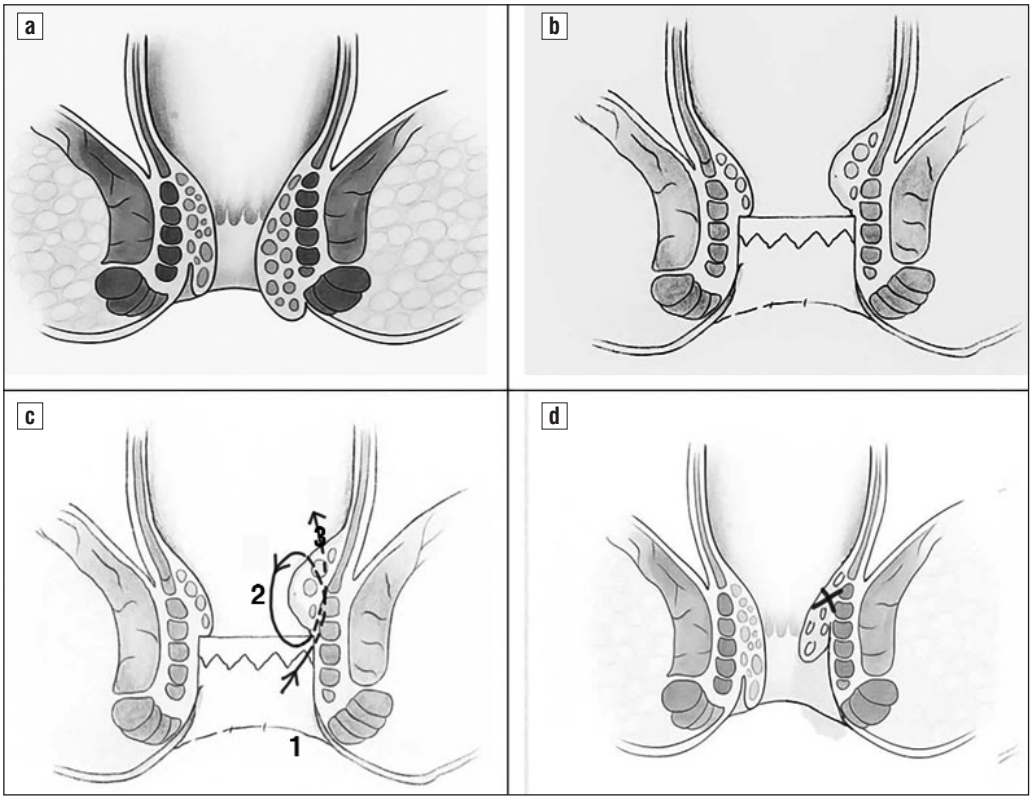

Figure 1 - TVLM Technique: (a) Hemorrhoidal bundle before surgery; (b) Placement of CAD to protect the dentate line; (c) Vertical ligation-mucopexy of the hemorrhoidal bundle; (d) Postoperative appearance of the hemorrhoidal bundle.

- Insert a specialized transparent anal retractor (CAD) to expose hemorrhoidal tissue and anal canal mucosa while protecting the dentate line.

Step 3: Vertical Ligation - Mucopexy

- Suture material: Absorbable sutures (Vicryl 2-0 or equivalent).
- Suturing technique:

Perform interrupted X-shaped stitches just above the dentate line at hemorrhoidal sites.

The sutures are placed from distal to proximal, plicating the mucosa vertically along the anal canal. Each stitch penetrates the mucosa, submucosa, and part of the internal sphincter.

Begin at the primary hemorrhoidal sites (5, 7, and 11 o'clock positions), followed by secondary bundles between them.

The number of sutures depends on the degree of prolapse and circumferential involvement, typically ranging from 6 to 8.

Step 4: Management of Associated Lesions (if present)

- Address accompanying conditions such as skin tags, anal canal polyps, hypertrophic papillae, or external hemorrhoids.

RESULTS

Characteristics of the Study Population (table 1)

Summary: The mean age in the study was 45.28 years, with a male-to-female ratio of 0.9:1. Anal prolapse mass was the most common symptom, present in 100% of cases. The incidence of associated rectal mucosal prolapse was 45.13%. The majority of patients had P2 prolapse (100%) and R1 reducibility (89.3%), while only 6.8% showed active bleeding (B1).

Intraoperative and Postoperative Outcomes of the Study Population (table 2)

Summary: The mean operative time was 32.69 minutes. The VAS score on the first postoperative day was 3.23, decreasing to 1.96 at discharge. The average hospital stay was 1.48 days, and the mean duration of postoperative pain was 15.04 days. Urinary retention was the most common complication, occurring in 11.4% of cases. The postoperative

Table 1 - Characteristics of the Study Population

Characteristics		Results
Mean age		45.28 ± 14.05
Male-to-female ratio		0.9 / 1
Symptoms		
Anal prolapse mass		308 (100%)
Rectal bleeding		201 (65.26%)
Anal itching/burning		93 (30.19%)
Thrombosis		46 (14.94%)
Rectal mucosal prolapse		139 (45.13%)
Hemorrhoid Grading		
B	0	287 (93.2%)
	1	21 (6.8%)
P	1	0 (0%)
	2	308 (100%)
R	1	275 (89.3%)
	2	33 (10.7%)
S	0	207 (67.2%)
	1	101 (32.8%)
T	0	262 (85.1%)
	1	46 (14.9%)

Table 2 - Intraoperative and Postoperative Outcomes of the Study Population

Characteristics	Results
Emergency surgery	60 (19.5%)
Mean operative time (minutes)	32.69 ± 8.99
Associated procedures	
Excision of skin tags	72 (23.37%)
Hemorrhoidectomy	73 (23.70%)
Thrombectomy of hemorrhoidal bundle	27 (8.77%)
Excision of anal papillae	41 13.31%)
Two or more associated procedures	11 (3.57%)
VAS on the first postoperative day	3.23 ± 1.03
VAS at discharge	1.96 ± 1.18
Mean hospital stay (days)	1.48 ± 0.74
Duration of postoperative pain (days)	15.04 ± 6.56
Postoperative complications	
Urinary retention	35 (11.4%)
Bleeding	16 (5.2%)
Fecal incontinence	0
Anal stricture	0
Difficulty defecating after surgery	0
Reoperation	1 (0.3%)
Mean follow-up period (months)	14.41 ± 8.15
Recurrence rate after surgery	11 (3.6%)
Surgical cost (USD)	200-240

recurrence rate was 3.6% after a mean follow-up of 14.41 months.

DISCUSSION

This study has some limitations. Its retrospective design may introduce bias, and the lack of a control group limits comparisons with other techniques. Additionally, variability in surgical experience among operators could have affected outcomes.

General Characteristics of the Study Population

The mean age of patients in our study was 45.28 ± 14.05 years (range: 18–79), consistent with previous studies showing that hemorrhoids predominantly affect middle-aged adults. This is the period when factors such as connective tissue weakening, prolonged increased intra-abdominal pressure (due to physical labor, chronic constipation, or sedentary lifestyle) contribute to a higher risk of disease onset (1). The male-to-female ratio was 0.9:1 (47.4% male, 52.6% female), consistent with findings by Hong et al. (2022) in South Korea, which also reported a higher prevalence of hemorrhoids in females (1). This suggests that, beyond mechanical factors and lifestyle, female-specific physiological and hormonal factors - such as pregnancy and childbirth - may also contribute to hemorrhoid pathogenesis.

Regarding clinical symptoms, all patients presented with anal prolapse (100%), a hallmark of circumferential hemorrhoids. Rectal bleeding was observed in 65.26% of cases. One advantage of the TVLM technique is its ability to reduce blood flow to hemorrhoidal tissue, thereby effectively improving bleeding symptoms. Thrombosed hemorrhoids, an acute condition requiring urgent care, were found in 14.94% of patients; nonetheless, TVLM was successfully performed in these cases, demonstrating its versatility and efficacy. Notably, 45.13% of patients had coexisting rectal mucosal prolapse, which exacerbates prolapse severity and affects anorectal function. In this context, TVLM offers a clear advantage by addressing both hemorrhoidal and mucosal prolapse, helping to relieve symptoms and improve postoperative quality of life. To assess disease severity and guide treatment planning, this study used the BPRST classification system. Unlike the traditional Goligher system, BPRST provides a more detailed description of hemorrhoidal features-Bleeding, Prolapse, Reducibility, Skin tags, and Thrombosis. According to Sobrado et al. (2021), BPRST offers a more comprehensive stratification, supporting individualized treatment decisions

(6). Analysis of BPRST classification revealed that 6.8% of patients had active bleeding (B1); 100% had prolapse involving two or more hemorrhoidal bundles (P2); 89.3% required manual reduction (R1); 32.8% had perianal skin tags (S1); and 14.9% presented with thrombosed hemorrhoids (T1). These detailed assessments enabled appropriate surgical planning and effective management of associated lesions.

Intraoperative and Postoperative Outcomes of the Study Population

Emergency surgeries accounted for 19.5% of cases, mainly due to complications such as thrombosis or bleeding, requiring urgent intervention to control hemorrhage and prevent tissue necrosis. The mean operative time was 32.69 ± 8.99 minutes (range: 15-60). TVLM alone had the shortest average duration (15.2 ± 3.6 minutes), while TVLM with hemorrhoidectomy took the longest (38.5 ± 4.2 minutes), with a statistically significant difference (p = 0.025, One-way ANOVA). This highlights the impact of concomitant procedures on operative time. Compared to Khanna et al. (2021), standalone TVLM was faster than Ferguson hemorrhoidectomy (32.22 ± 9.72 minutes) and Ligasure hemorrhoidectomy (23.15 ± 3.36 minutes). (7) Another study by Sobrado et al. (2006) reported that the mean operative time for the Longo procedure (PPH) was 23 minutes (range: 16-48 minutes) (8). Thus, the TVLM technique has a comparable, or even shorter, operative time than PPH when performed alone. Additionally, Gupta's study showed that mucopexy is relatively quick, with standalone mucopexy taking 9 minutes and Doppler-guided mucopexy combined with artery ligation taking 31 minutes (9).

Regarding postoperative pain, the mean VAS score on the first day after surgery was 3.23 ± 1.03, decreasing to 1.96 ± 1.18 at discharge. In the TVLM-only group, the VAS score on day one was 2.53 ± 0.80 and dropped to 1.52 ± 0.76, significantly lower than in patients undergoing additional procedures (p = 0.003 < 0.05, One-way ANOVA). These values were also markedly lower than those reported for Ferguson hemorrhoidectomy (VAS 6.8 ± 1.8) and Ligasure hemorrhoidectomy (VAS 4.1 ± 0.8) in the study by Khanna (2021) (7) his can be attributed to the TVLM technique, which operates above the dentate line—a less pain-sensitive area—and avoids tissue excision. The absence of open wounds at the anal verge also reduces the risk of edema, ulceration, and postoperative pain. Compared to PPH, as reported by Schmidt et al. (2002), the mean postoperative pain score was 1.83 (10). In our study, the TVLM-only group had a higher VAS score on the first postoperative day but a lower score at discharge compared to PPH. This early postoperative pain may be explained by the TVLM intervention being closer to the dentate line than PPH. Notably, recovery with the TVLM technique was rapid and effective. The mean hospital stay was 1.48 ± 0.74 days, shorter than that reported for FH (4.3 days), LH (2.7 days), and PPH (3 days) (7,10). Thus, the TVLM technique not only maintains effective pain control in the early postoperative period but also shortens hospital stay. In addition, the duration of postoperative pain is an important indicator of surgical invasiveness and recovery. In our study, the mean duration of postoperative pain was 15.04 ± 6.56 days, which is notably shorter than the 19.65 days reported for MMH and 16.36 days for PPH in the study by Fang (2018) (11).

Postoperative complications are key indicators for evaluating the safety of a surgical technique. In this study, the rate of urinary retention was 11.4%, comparable to the 12.6% reported by Qing Long (2025) in a study of 127 patients undergoing MMH. In contrast, Sammarco (2013) reported a significantly lower rate of urinary retention in the PPH group (6.25%) compared to the MMH group (16.25%) (12). The primary cause of postoperative urinary retention is spinal anesthesia, which temporarily inhibits the sacral nerve roots (S2–S4) responsible for bladder control, leading to impaired sensation and reduced detrusor muscle contraction. Other contributing factors include dissection near the pelvic splanchnic and pudendal nerves, excessive intraoperative fluid administration, and patient-related risk factors such as advanced age or prostate enlargement in males. Notably, in our study, no cases of urinary retention required prolonged catheterization or surgical intervention, indicating that this complication was transient and resolved spontaneously within a short period.

Another important complication is postoperative bleeding, which occurred in 5.2% of cases in our study. Among these, only one patient (0.3%) required reoperation due to uncontrolled bleeding, while the remaining 15 cases were managed conservatively with medical treatment and observation. This bleeding rate is significantly lower than that reported for conventional hemorrhoidectomy techniques; Chishti et al. (2024) documented bleeding rates of 22.6% for MMH and 29.5% for FH (13). Similarly, the study by Rahman (2021) reported a postoperative bleeding rate of 25.56% following PPH (14). Postoperative bleeding typically occurs within the first 24–72 hours and may be related to surgical technique, early bowel movements,

or increased intra-abdominal pressure. In our study, no cases of anal stricture or fecal incontinence were observed. These outcomes are favorable compared to Santos et al. (2012), who reported stricture rates of 1.7% with FH and 1.9% with MMH, with higher incidence in females (2%) than males (1.1%) (15). A study by Dan Wei et al. (2023) reported anal stricture rates of 13.68% following PPH and 5.79% with Doppler-guided hemorrhoidal artery ligation. These differences highlight the importance of surgical technique in preventing strictures. In PPH, the 360-degree circular stapling can cause fibrosis and narrowing, especially if placed too close to the dentate line or asymmetrically. Traditional excisional methods like Milligan-Morgan or Ferguson have lower stricture rates, though risks remain if excision is too deep, too close, or lacks skin bridge preservation. In contrast, the TVLM technique employs vertical sutures with precise control of depth and position, preserving the horizontal elasticity of the anal canal and minimizing the risk of mechanical stricture and sphincter injury—key contributors to postoperative incontinence (*fig. 2*).

In this study, the assessment of postoperative recurrence was conducted during follow-up visits (ranging from 3 to 37 months), based on both clinical and paraclinical evaluations. Specifically, recurrence was defined by the following criteria: (a) Recurrence of hemorrhoidal symptoms as before surgery or worse: prolapse, thrombosis, bleeding, etc, (b) Rectoscopy to confirm that the symptoms are due to recurrent hemorrhoids rather than other causes, (c) Recurrent symptoms requiring reintervention with surgery.

Therefore, with a mean followup of 14.41 ± 8.15 months, we observed a 3.6% rate of prolapse recurrence after TVLM - a relatively low figure compared to other techniques. In a study by Zhang (2022) involving 1,003 patients with grade III–IV hemorrhoids over 12 months, the recurrence rates were 8.4% for the PPH group and 7.7% for conventional hemorrhoidectomy, with no significant difference between the two (16). The study by Lauricella (2024) reported a 12-month recurrence rate of 10.5% in the hemorrhoidal artery ligation and rectoanal repair (HAL-RAR) group and 9.2% in the PPH group. After 24 months, these rates increased to 15.7% and 19.7%, respectively (17). Notably, a systematic review by Jin et al. (2021), which included 79 randomized studies with 9,232 patients comparing 14 different interventions, found the highest

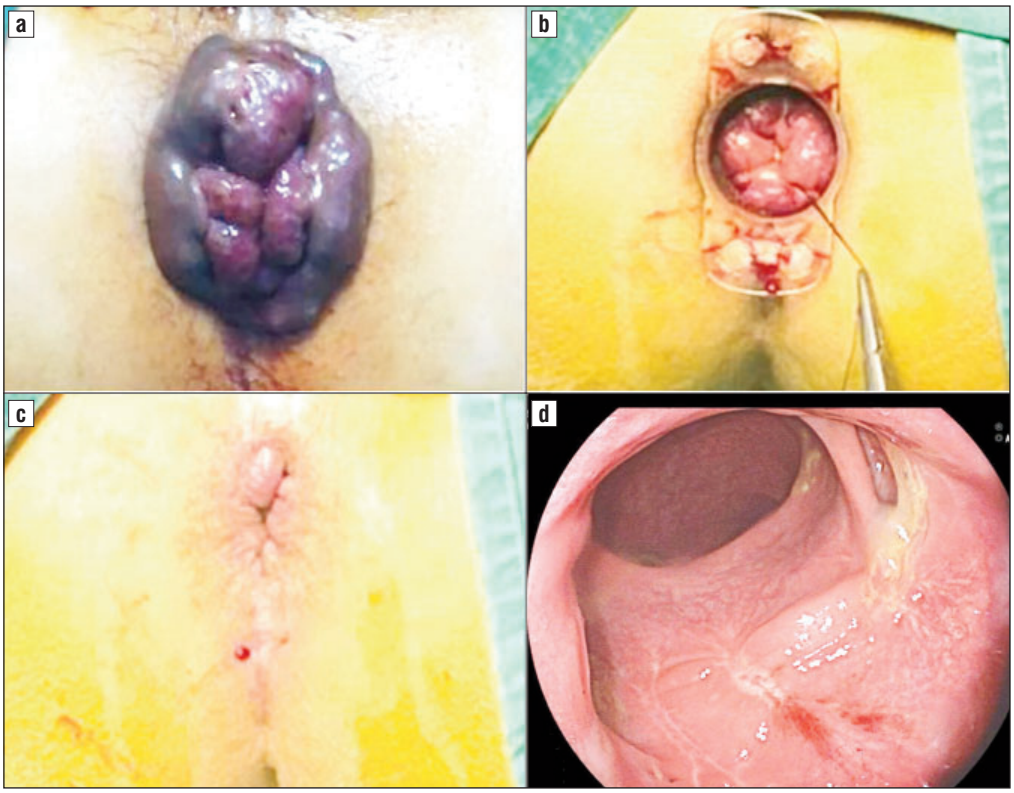

Figure 2 - Intraoperative and Postoperative Images of TVLM: (a) Preoperative image; (b) Intraoperative image; (c) Postoperative image; (d) Rectoscopy result at 6-month follow-up.

recurrence rates in the PPH and DG-HAL with mucopexy groups. In contrast, lower recurrence rates were observed with Ferguson hemorrhoidectomy (FH), Milligan-Morgan hemorrhoidectomy (MMH), and ligation mucopexy techniques (18).

The cost of a ligation-mucopexy procedure for hemorrhoid treatment in Vietnam ranges from 200 to 240 USD, which is significantly lower than Longo surgery (approximately 560-600 USD). Due to its affordability, minimal invasiveness, rapid recovery, and preservation of anal anatomy, the technique has been increasingly adopted. TVLM is currently being successfully implemented and transferred to various primary healthcare facilities (19).

Based on our findings, the complication and recurrence rates following TVLM were relatively low. We believe that TVLM represents an effective and sustainable intervention option for the treatment of circumferential hemorrhoidal prolapse.

CONCLUSION

TVLM is a safe, minimally invasive technique for treating circumferential hemorrhoids. Its low cost and simple execution make it suitable for implementation in healthcare facilities. The study demonstrated that TVLM offers favorable outcomes, including short operative time, low postoperative pain, and low complication and recurrence rates. It presents a promising intervention option, particularly in resource-limited settings.

Authorship

All persons listed as authors have actively contributed to one or more key aspects of the study. All authors confirm that they meet the authorship criteria as defined by the International Committee of Medical Journal Editors (ICMJE). The authors take full responsibility for the content of this article.

Acknowledgements

The authors would like to thank all colleagues and staff at the Department of Coloproctology and Pelvic Floor Surgery, Hanoi Medical University Hospital, for their support during the implementation of this study. We also acknowledge the contributions of those who assisted in data collection and technical support, who are not listed as co-authors, with their consent.

Competing Interests

The authors declare no competing interests.

Funding

This research received no external funding.

Ethical Approval

This study involved the retrospective analysis of anonymized data. According to the regulations of Hanoi Medical University, ethical approval was not required for this type of study. All procedures were conducted in accordance with the ethical principles of the 1964 Helsinki Declaration and its later amendments or comparable ethical standard

Consent to Participate

Not applicable due to retrospective nature.

Data Availability

The datasets used and/or analyzed are available from the corresponding author on reasonable request.

REFERENCES

1. Hong YS, Jung KU, Rampal S, Zhao D, Guallar E, Ryu S, et al. Risk factors for hemorrhoidal disease among healthy young and middle-aged Korean adults. Sci Rep. 2022;12(1):129.
2. Nguyễn XH, Nguyễn NÁ. Epidemiological characteristics of hemorroidal disease and some related factors. Vietnam Medical Journal. 2023;529(1B).
3. Alonso-Coello P, Guyatt G, Heels-Ansdell D, Johanson JF, Lopez-Yarto M, Mills E, et al. Laxatives for the treatment of hemorrhoids. Cochrane Database Syst Rev. 2005;2005(4):CD004649.
4. Chivate SD, Killedar MM, Ladukar LD, Vardhani GS, Kavathe SK, Kanekar SR. Transanal Suture Mucopexy for Hemorrhoids. Dis Colon Rectum. 2022;65(5):742–9.
5. Hussein AM. Ligation-anopexy for treatment of advanced hemorrhoidal disease. Dis Colon Rectum. 2001;44(12):1887–90.
6. Sobrado CW, de Almeida Obregon C, Sobrado LF, Bassi LM, Bacchi Hora JA, Silva E Sousa Júnior AH, et al. The novel BPRST classification for hemorrhoidal disease: A cohort study and an algorithm for treatment. Ann Med Surg (Lond). 2021;61:97–100.
7. Khanna R, Khanna S, Bhadani S, Singh S, Khanna AK. Comparison of Ligasure Hemorrhoidectomy with Conventional Ferguson's Hemorrhoidectomy. Indian J Surg. 2010;72(4):294–7.
8. Sobrado CW, Cotti GC de C, Coelho FF, Rocha JRM da. Initial experience with stapled hemorrhoidopexy for treatment of hemorrhoids. Arq Gastroenterol. 2006;43(3):238–42.
9. Gupta PJ, Kalaskar S, Taori S, Heda PS. Doppler-guided hemorrhoidal artery ligation does not offer any advantage over suture ligation of grade 3 symptomatic hemorrhoids. Tech Coloproctol. 2011;15(4):439–44.
10. Schmidt MP, Fischbein J, Shatavi H. Stapler hemorrhoidectomy versus conventional procedures - a clinical study. Zentralbl Chir. 2002;127(1):15-8. German
11. Fang Y, Zhang Y, Zhang D, Zhao Q, Li L. Clinical observation on treatment of mixed hemorrhoids with milligan morgan hemorrhoidectomy combined with purse-string suture. Int J Clin Exp Med 2018;11(11):12555-12562
12. Sammarco G, Ferrari F, Carpino A, Russo E, Vescio G, Ammendola M, et al. PPH vs Milligan-Morgan: early and late complications in the treatment of haemorrhoidal disease with circumferential prolapse. Ann Ital Chir. 2013;84(ePub):S2239253X13021300.
13. Chishti SSA, Niaz A, Kashif M, Ali W. Comparative Outcomes of

Milligan-Morgan (Open) Versus Ferguson (Closed) Hemorrhoidectomy: A Retrospective Study. Cureus. 2024;16(12):e75012.
14. Rahman MM, Jahan N, Rahman MM, Reza SM, Islam MS, Alam MS, et al. Outcome of Stapled Hemorrhoidopexy: Experience of 90 Cases. Mymensingh Med J. 2021;30(1):159–63.
15. Santos G de A, Coutinho CP, Meyer MMMMDE, Sampaio DV, Cruz GMG da. Surgical complications in 2,840 cases of hemorrhoidectomy by Milligan-Morgan, Ferguson and combined techniques. J Coloproctol (Rio J). 2012;32:271–90.
16. Zhang C, Zhang W, Xu J. Comparison of the outcomes of hemorrhoidectomy and PPH in the treatment of grades III and IV hemorrhoids. Medicine (Baltimore). 2022;101(11):e29100.
17. Lauricella S, Palmisano D, Brucchi F, Agoglitta D, Fiume M, Bottero L, et al. Long-term results and quality of life after stapled hemorrhoidopexy vs Doppler-guided HAL-RAR: a propensity score matching analysis. Int J Colorectal Dis. 2024;39(1):30.
18. Jin JZ, Bhat S, Lee KT, Xia W, Hill AG. Interventional treatments for prolapsing haemorrhoids: network meta-analysis. BJS Open. 2021;5(5):zrab091.
19. Nguyen AT, Tran DN, Nguyen AN, Nguyen DM, Nguyen TH, Trinh CV, et al. Evaluation of the current status and proposals for measures to improve the quality of diagnosis and treatment of anorectal and pelvic floor conditions at bat Xat district general hospital. GSC Advanced Research and Reviews. 2025;23(3):012–9.