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Original Research Article

Comparative Evaluation of Pile Plication and Open Milligan–Morgan Hemorrhoidectomy for Second- and Third-Degree Hemorrhoids: An Observational Study

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Abstract

Background: Open hemorrhoidectomy remains an established surgical treatment for symptomatic hemorrhoids but is commonly associated with postoperative pain, bleeding, urinary retention, and delayed return to routine activities. Pile plication is a tissue-preserving procedure that reduces hemorrhoidal blood flow and corrects prolapse without excising the hemorrhoidal cushions.

Methods: This hospital-based prospective comparative observational study was conducted in the Department of General Surgery, Shri Jagannath Pahadiya Medical College, Bharatpur, Rajasthan, over 15 months. A total of 204 patients with symptomatic second-degree hemorrhoids not responding to conservative treatment or uncomplicated third-degree hemorrhoids were included. Group A underwent open hemorrhoidectomy using the Milligan–Morgan technique, while Group B underwent pile plication. The groups were compared for operative time, estimated blood loss, postoperative pain, hospital stay, and return to routine work, early and late complications, and recurrence.

Results: The mean operative time was significantly shorter with pile plication than with open hemorrhoidectomy (29.8 ± 5.9 vs. 42.1 ± 6.8 minutes; $p<0.001$). Estimated blood loss was also lower in the pile plication group (24.6 ± 6.8 vs. 34.2 ± 9.1 mL; $p<0.001$). Postoperative pain scores were significantly lower after pile plication at Day 1, Week 1, Week 2, and one month ($p<0.001$ at all assessments). Hospital stay was shorter (1.04 ± 0.20 vs. 1.18 ± 0.39 days; $p=0.002$), and return to routine work was earlier (24.6 ± 6.8 vs. 34.2 ± 9.1 days; $p<0.001$) following pile plication. Urinary retention was significantly less frequent after pile plication (5.9% vs. 18.6%; $p=0.009$). Other early and late complications were comparable. Recurrence was higher after pile plication, but the difference was not statistically significant (7.8% vs. 3.9%; $p=0.373$).

Conclusion: Pile plication is a safe and effective alternative to open hemorrhoidectomy for selected patients with second- and third-degree hemorrhoids. It provides shorter operative time, lower blood loss, less postoperative pain, faster recovery, and a lower incidence of urinary retention, with comparable short-term complication and recurrence rates.

Keywords: Hemorrhoids; Milligan–Morgan Hemorrhoidectomy; Pile Plication; Postoperative Pain; Urinary Retention.

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Introduction

Hemorrhoidal disease is a benign anorectal disorder characterized by symptomatic enlargement and distal displacement of the normal anal cushions. [1] Its reported frequency varies considerably because asymptomatic hemorrhoids are common, and many patients do not seek medical care. [1,2] When symptomatic, the disease can affect daily activities and health-related quality of life. [2,3] In India, hemorrhoidal disease is frequently encountered in surgical practice, although reliable population-based prevalence data remain limited. [4] The clinical burden of hemorrhoidal disease is related primarily to its symptoms. Rectal bleeding and prolapse are the predominant manifestations, while pruritus, mucous discharge, soiling and pain may also occur.5 Increasing symptom severity has been associated with deterioration in health-related quality of life.6 Accordingly, assessment of treatment should consider not only correction of prolapse or control of bleeding, but also

postoperative pain, complications, continence, recovery and recurrence. [7] Conservative treatment, including dietary fibre, adequate fluid intake and correction of bowel habits, forms the initial management of hemorrhoidal disease. [4,8] Surgical treatment is considered in patients with persistent symptoms despite conservative or office-based therapy and in those with clinically significant prolapse. Excisional hemorrhoidectomy remains an established surgical treatment and provides durable control of symptomatic hemorrhoidal disease. [9] The Milligan–Morgan technique is a conventional excisional procedure in which the hemorrhoidal tissue is removed and the wounds are left open to heal by secondary intention.

The effectiveness of open hemorrhoidectomy is accompanied by postoperative morbidity related to tissue excision and the presence of an open perianal wound. Postoperative pain, bleeding, urinary retention and delayed recovery are recognized concerns following excisional hemorrhoidectomy. [10] Pain may be pronounced during defecation and can delay mobilization and return to routine activity. Although excisional techniques provide effective and durable treatment, their early postoperative morbidity has led to continued evaluation of procedures that control bleeding and prolapse without excision of the hemorrhoidal cushions [.9,10]

Hemorrhoidal cushions are normal vascular structures that contribute to anal canal closure. Hemorrhoidal disease develops with enlargement and distal displacement of these cushions and deterioration of their supporting tissues. [1,5] This understanding provides a basis for non-excisional treatment directed at reducing vascular engorgement and restoring the prolapsing tissue rather than removing the cushions.

Pile plication applies this non-excisional principle. Pile-suture techniques have been described for the treatment of hemorrhoidal disease, including second- and third-degree hemorrhoids. [11,12] The prolapsing hemorrhoidal cushion is reduced and fixed with sutures, which also compress its vascular component. Unlike open hemorrhoidectomy, the procedure does not require excision of the hemorrhoidal cushion or creation of an open wound.

Preservation of the anoderm and avoidance of excision may therefore influence operative blood loss, postoperative pain and recovery. Any reduction in early postoperative morbidity with a non-excisional procedure must be considered together with control of symptoms and recurrence. Tissue-preserving procedures may offer advantages during early recovery, but persistence or recurrence of bleeding and prolapse remains an important outcome. [13] Thus, evaluation of pile plication requires assessment of both perioperative recovery and subsequent complications and recurrence. Direct comparative evidence between pile plication and conventional open hemorrhoidectomy remains limited, particularly for symptomatic second-degree hemorrhoids unresponsive to conservative treatment and uncomplicated third-degree hemorrhoids.

The present study was undertaken to compare pile plication with open Milligan–Morgan hemorrhoidectomy in patients with symptomatic second-degree hemorrhoids not responding to conservative treatment and uncomplicated third-degree hemorrhoids. The outcomes assessed were operative time, estimated blood loss, postoperative pain, and duration of hospital stay, return to routine work, early and late postoperative complications, and recurrence.

Materials and Methods

This Hospital based Prospective Comparative Observational study was conducted in the Department of General Surgery, Shri Jagannath Pahadiya Medical College, Bharatpur, and Rajasthan over a period of 15 months. Written informed consent was obtained from all participants before enrolment.

Patients presenting to the surgical outpatient department with symptomatic hemorrhoids were screened for eligibility. Patients with symptomatic second-degree hemorrhoids who did not respond to conservative medical treatment and those with uncomplicated third-degree hemorrhoids were included in the study.

Patients who were willing to undergo surgery and provided written informed consent were enrolled. Patients with fourth-degree hemorrhoids, thrombosed or strangulated hemorrhoids, associated anal conditions such as anal fissure, fistula-in-ano, or perianal abscess, portal hypertension, bleeding disorders, ongoing anticoagulant therapy, or active anorectal sepsis were excluded from the study.

Sample Size: The sample size was calculated using the formula for comparison of two independent proportions. The expected incidence of postoperative urinary retention was considered to be 19% after open hemorrhoidectomy and 5.5% after pile plication. [14] With a 95% confidence level, 80% study power, the minimum required sample size was calculated as 92 patients in each group.

After allowing for a possible 10% loss to follow-up, the final sample size was increased to 102 patients per group, resulting in a total sample size of 204 patients; In Group A, patients with Open

hemorrhoidectomy (Milligan-Morgan technique), and in Group B patients with Pile plication.

Preoperative Evaluation: A detailed history was obtained from every patient regarding bleeding per rectum, prolapse, and pain during defecation, mucous discharge, pruritus, constipation, bowel habits, duration of symptoms, and previous medical treatment. Local examination included inspection of the perianal region, digital rectal examination, and proctoscopy to determine the number, position, and grade of hemorrhoidal cushions.

Routine preoperative investigations included complete blood count, blood sugar, renal function tests, liver function tests, coagulation profile, urine examination, electrocardiography, chest radiography (when indicated), and anaesthetic fitness.

All procedures were performed under regional or general anaesthesia according to anaesthetic assessment. Patients were placed in the lithotomy position with approximately 25–30° Trendelenburg tilt. The perianal region was cleaned with antiseptic solution and draped under strict aseptic precautions. After induction of anaesthesia, gentle digital anal dilatation was performed. The anal canal was exposed using an anal speculum, and the principal hemorrhoidal cushions were identified.

Group A: Open Hemorrhoidectomy

Open hemorrhoidectomy was performed using the Milligan-Morgan technique. Each hemorrhoidal cushion was grasped with artery forceps and gently retracted. A V-shaped skin incision was made at the mucocutaneous junction over the hemorrhoidal tissue. Sharp and blunt dissection was continued in the submucosal plane while carefully preserving the underlying internal anal sphincter. The hemorrhoidal pedicle was identified proximal to the dentate line and transfixed using an absorbable polyglactin suture. The hemorrhoidal tissue distal to the ligated pedicle was excised.

The remaining hemorrhoidal cushions were treated in a similar manner. Adequate mucocutaneous bridges were preserved between adjacent excision sites to prevent postoperative anal stenosis. Complete haemostasis was achieved using ligatures or electrocautery whenever required. The wounds were left open to heal by secondary intention. The anal canal was inspected before completion of the procedure to ensure satisfactory haemostasis and preservation of the mucocutaneous bridges.

Group B: Pile Plication

Pile plication was performed without excision of the hemorrhoidal tissue. Following exposure of the anal canal with an anal speculum, the hemorrhoidal cushion was held with tissue forceps. A 2-0 polyglactin 910 absorbable suture mounted on a 26-mm, 5/8-circle round-bodied needle was used for plication. The first stitch was placed immediately below the anorectal junction in a figure-of-eight fashion to anchor the suture securely. Thereafter, continuous sutures were placed distally through the mucosa and submucosal hemorrhoidal tissue while progressing towards the dentate line. The continuous plication compressed the hemorrhoidal vascular plexus and interrupted the arterial inflow from the terminal branches of the superior rectal artery while preserving the hemorrhoidal cushions and anoderm. Once the dentate line was reached, the suture was tied securely, resulting in reduction and fixation of the prolapsing hemorrhoidal tissue. The same technique was repeated for each of the remaining principal hemorrhoidal cushions. The operative field was inspected for bleeding. Minor oozing was controlled by compression with sterile gauze, while persistent bleeding was managed with additional absorbable sutures whenever necessary. No hemorrhoidal tissue was excised, and no open wound was created during the procedure. Routine anal packing was not performed, and a sterile external dressing was applied at the completion of surgery.

Postoperative Management: Patients were observed in the postoperative ward for pain, bleeding, urinary retention, nausea, vomiting, and other immediate complications. All patients received the same postoperative management protocol, including analgesics, stool softeners, dietary advice regarding a high-fibre diet, adequate oral hydration, and warm sitz baths.

Follow-up: Patients were followed up in the outpatient department at the end of the first and second postoperative weeks and subsequently at one, three, and six months after surgery. At each follow-up visit, patients were assessed for postoperative pain, bleeding, wound healing, urinary symptoms, infection, return to routine work, recurrence of prolapse or bleeding, and any late complications including anal stenosis, fissure, fistula, or incontinence.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) version 27.0. Continuous variables were tested for normality using the Shapiro–Wilk test. Normally distributed variables were expressed as mean ± standard deviation (SD), whereas non-normally distributed variables were expressed as median with interquartile range (IQR). Continuous variables were compared between the two groups using the independent Student's t-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data. Categorical variables were presented as frequencies and percentages and compared using the Chi-square test

or Fisher's exact test, as appropriate. Changes in postoperative pain scores measured at different follow-up visits were analysed using repeated-measures analysis. A p value of less than 0.05 was considered statistically significant.

Results

[Table-1] The two groups were comparable in terms of age, sex, grade of hemorrhoids, and duration of symptoms. The mean age was 44.3 ± 7.2 years in the open hemorrhoidectomy group and 43.9 ± 7.0 years in the pile plication group. Most patients were male and had Grade III hemorrhoids.

None of the baseline differences were statistically significant. [Table-2] Bleeding per rectum and prolapse during defecation were the most common presenting features in both groups. Constipation, pain during defecation, pruritus ani, and mucous discharge were less frequent. None of the presenting symptoms differed significantly between the two groups.

Three cushions were observed in 72 patients (70.6%) in the open hemorrhoidectomy group and 69 patients (67.6%) in the pile plication group. Two cushions were present in 30 patients (29.4%) and 33 patients (32.4%), respectively. This distribution was comparable between the two groups (p=0.649). The mean operative time was significantly shorter in the pile plication group than in the open hemorrhoidectomy group (29.8 ± 5.9 versus 42.1 ± 6.8 minutes; p<0.001). Similarly, the mean estimated blood loss was significantly lower with pile plication (24.6 ± 6.8 mL) than with open hemorrhoidectomy (34.2 ± 9.1 mL; p<0.001).

The mean duration of hospital stay was significantly shorter in the pile plication group than in the open hemorrhoidectomy group (1.04 ± 0.20 days versus 1.18 ± 0.39 days; p=0.002). The mean time to return to work was 24.6 ± 6.8 days after pile plication compared with 34.2 ± 9.1 days after open hemorrhoidectomy (p<0.001).

[Table-3] Postoperative pain scores decreased progressively in both groups. However, pain was significantly lower in the pile plication group on postoperative Day 1, at the end of the first and second weeks, and at one month. All comparisons were statistically significant (p<0.001).

[Table-4] Urinary retention was significantly more common in the open hemorrhoidectomy group than in the pile plication group (18.6% vs. 5.9%, p=0.009). Although primary hemorrhage, delayed hemorrhage, wound edema or congestion, and surgical site infection were numerically more frequent in the open hemorrhoidectomy group, these differences were not statistically significant (p>0.05).

[Table-5] Anal stenosis and fecal incontinence occurred only in the open hemorrhoidectomy group, whereas anal fistula was observed only in the pile plication group. Recurrence was numerically higher after pile plication (7.8%) than after open hemorrhoidectomy (3.9%); however, none of the late complications showed a statistically significant difference between the two groups.

Table 1: Baseline demographic and clinical characteristics

Variable	Open hemorrhoidectomy (n=102)	Pile plication (n=102)	p-value
Male	66 (64.7)	64 (62.7)	0.771
Female	36 (35.3)	38 (37.3)	
Grade II hemorrhoids	26 (25.5)	28 (27.5)	0.751
Grade III hemorrhoids	76 (74.5)	74 (72.5)	
Duration of symptoms (months)	13.8 ± 6.4	13.2 ± 6.1	0.494

Table 2: Presenting clinical features

Clinical feature	Open hemorrhoidectomy n (%)	Pile plication n (%)	p-value
Bleeding per rectum	92 (90.2)	90 (88.2)	0.652
Prolapse during defecation	78 (76.5)	76 (74.5)	0.745
Pain during defecation	37 (36.3)	35 (34.3)	0.77
Constipation	58 (56.9)	55 (53.9)	0.673
Pruritus ani	26 (25.5)	24 (23.5)	0.745
Mucous discharge	22 (21.6)	20 (19.6)	0.729

Table 3: Postoperative pain assessed using VAS

Assessment time	Open hemorrhoidectomy, mean ± SD	Pile plication, mean ± SD	p-value
Postoperative Day 1	5.9 ± 1.1	4.8 ± 1.0	<0.001
End of Week 1	4.1 ± 1.0	2.9 ± 0.9	<0.001
End of Week 2	2.9 ± 0.9	1.5 ± 0.7	<0.001
One month	0.8 ± 0.6	0.3 ± 0.4	<0.001

Table 4: Early postoperative complications

Complication	Open hemorrhoidectomy n (%)	Pile plication n (%)	p-value
Primary hemorrhage within 48 hours	4 (3.9)	1 (1.0)	0.369
Delayed hemorrhage after 48 hours	6 (5.9)	2 (2.0)	0.279
Wound edema or congestion	5 (4.9)	9 (8.8)	0.407
Urinary retention	19 (18.6)	6 (5.9)	0.009
Surgical site infection	4 (3.9)	1 (1.0)	0.369

Table 5: Late Postoperative complications

Outcome	Open hemorrhoidectomy, n (%)	Pile plication, n (%)	p-value
Anal fissure	4 (3.9)	5 (4.9)	1.000
Anal stenosis	3 (2.9)	0 (0.0)	0.246
Anal fistula	0 (0.0)	2 (2.0)	0.498
Fecal incontinence	3 (2.9)	0 (0.0)	0.246
Recurrence	4 (3.9)	8 (7.8)	0.373

Discussion

The present study compared pile plication with open Milligan–Morgan hemorrhoidectomy in patients with symptomatic second-degree hemorrhoids not responding to conservative treatment and uncomplicated third-degree hemorrhoids.

The two study groups were comparable with respect to age, sex, grade of hemorrhoids, and duration of symptoms, presenting features, and number of hemorrhoidal cushions. This baseline comparability is important because the severity of prolapse, number of cushions, and duration of disease may influence operative difficulty and postoperative recovery. Most participants were male, and Grade III hemorrhoids were more frequent than Grade II disease. Abd El-Wahab et al [14] similarly found no significant difference in age, sex, or hemorrhoidal grade between their open hemorrhoidectomy and pile plication groups. Their patients were aged 35–54 years, and most had third-degree hemorrhoids. Manoj et al [15] and Gupta et al [16] also reported a predominance of male patients, with bleeding and a prolapsing mass being the common presenting complaints.

Bleeding per rectum and prolapse during defecation were the most frequent symptoms in the present study. Bleeding results from trauma to congested hemorrhoidal mucosa during defecation, whereas prolapse reflects downward displacement of the anal cushions following weakening of their supporting tissue. Constipation was also common and may contribute through repeated straining and increased pressure within the hemorrhoidal plexus. Cabrera Garrido et al [17] similarly described bleeding, prolapse, pain, pruritus, and mucus secretion as common symptoms of hemorrhoidal disease. The absence of significant differences between the two groups indicates that the clinical severity was similar before treatment. The mean operative time was significantly shorter with pile plication than with open hemorrhoidectomy. Abd El-Wahab et al [14] reported mean operative times of 29.40 minutes for pile plication and 41.85 minutes for open hemorrhoidectomy. Open hemorrhoidectomy requires incision at the mucocutaneous junction, dissection of each pile mass, ligation of the vascular pedicle, preservation of adequate mucocutaneous bridges, excision of the tissue, and careful haemostasis. In contrast, pile plication is completed by continuous suturing of the hemorrhoidal cushion from the anorectal junction towards the dentate line.

Gupta et al [16] reported a mean operative time of 25.90 minutes for the minimally invasive procedure for hemorrhoids and 46.73 minutes for open hemorrhoidectomy. Maloku et al [18] also found a shorter operative duration with laser hemorrhoidoplasty than with open surgery. Bagul et al [19] reported a significantly shorter procedure with stapled hemorrhoidopexy. These studies do not directly establish the effectiveness of pile plication, but they support that avoiding excision and open wound formation reduces operative time.

Estimated blood loss was also significantly lower in the pile plication group. In open hemorrhoidectomy, bleeding may arise during dissection or from the vascular pedicle and wound edges. Macwan, while describing a modified bloodless open technique, emphasised the need for meticulous dissection and haemostasis during excisional hemorrhoidectomy. [20] The lower blood loss in the present study therefore appears consistent with the less invasive nature of plication.

Postoperative pain was significantly lower after pile plication at all assessment points. Pain declined progressively in both groups, but the difference remained significant on the first postoperative day, at the end of the first and second weeks, and at one month. Abd El-Wahab et al [14] reported the same pattern, with significantly lower VAS scores after plication on the first day, first week, and second week. Their VAS scores were 6.42, 4.38, and 3.20 after open hemorrhoidectomy, compared with 5.47,

3.07, and 1.45 after pile plication. The lower pain after plication can be explained by preservation of the anoderm and avoidance of an open perianal wound. Pain after Milligan–Morgan hemorrhoidectomy is related to tissue excision in a highly sensitive region, postoperative inflammation, sphincter spasm, wound exposure, and trauma during defecation. Plication avoids dissection of the cushion from the sphincter and does not leave a raw wound to heal by secondary intention. Gupta et al [16], Maloku et al [18], and Bagul et al [19] also reported lower postoperative pain with less invasive procedures than with open hemorrhoidectomy. In contrast, Mohapatra et al [21] found no significant difference in pain between open and closed hemorrhoidectomy.

Hospital stay was significantly shorter after pile plication, patients also returned to routine work approximately ten days earlier. Abd El-Wahab et al [14] reported a shorter hospital stay and earlier return to work after plication, with mean return-to-work times of 3.51 weeks after pile plication and 4.91 weeks after open hemorrhoidectomy. The earlier recovery is probably related to less pain, absence of an open wound, reduced need for wound care, and greater comfort during bowel movements. Gupta et al [16] and Bagul et al [19] also observed shorter hospitalization and earlier resumption of work with less invasive approaches.

Among the early complications, urinary retention was significantly more frequent after open hemorrhoidectomy. This was also the only early complication that differed significantly between the groups in the study by Abd El-Wahab et al [14]. Postoperative urinary retention following anorectal surgery is multifactorial and may be related to pain, reflex sphincter spasm, regional anaesthesia, perioperative fluids, and reluctance to void because of discomfort.

Primary and delayed hemorrhage, wound edema, and surgical site infection did not differ significantly. Although bleeding and infection were numerically more frequent after open hemorrhoidectomy, the low number of events limited the ability to detect a clear difference. Farid et al [22] reported surgical site infection in 10.9% of open hemorrhoidectomy cases compared with 6.7% after closed hemorrhoidectomy, supporting the possibility that an exposed wound may increase susceptibility to contamination.

Late complications were uncommon in both groups. Anal stenosis and fecal incontinence occurred only after open hemorrhoidectomy, whereas anal fistula occurred only after pile plication, but none of these differences were statistically significant. Anal stenosis after open surgery may result from excessive removal of anoderm or circumferential scarring, while incontinence may occur following sphincter injury or unmasking of pre-existing weakness. Pile plication avoids sphincter dissection and preserves the anoderm, which may reduce these risks. Abd El-Wahab et al [14] reported anal stenosis and incontinence only after open hemorrhoidectomy, with one fistula in the plication group. Recurrence was higher after pile plication than after open hemorrhoidectomy, although the difference was not statistically significant. Abd El-Wahab et al [14] reported a comparable pattern, with recurrence rates of 7.2% after plication and 3.6% after open hemorrhoidectomy. Open hemorrhoidectomy removes the affected tissue and may therefore offer more durable anatomical control. Nevertheless, the six-month follow-up in the present study is relatively short for assessing recurrence.

Conclusion

The present study demonstrated that pile plication is a safe and effective alternative to open hemorrhoidectomy for the management of symptomatic second-degree hemorrhoids refractory to conservative treatment and uncomplicated third-degree hemorrhoids. Pile plication was associated with a shorter operative time, lower estimated blood loss, reduced postoperative pain, shorter hospital stay, and earlier return to routine work compared with open hemorrhoidectomy. Postoperative urinary retention was also significantly less frequent after pile plication.

The rates of other early complications, late complications, and recurrence were comparable between the two groups. Although recurrence was numerically higher after pile plication, the difference was not statistically significant.

These findings suggest that pile plication is offers better early postoperative recovery while maintaining acceptable short-term clinical outcomes. Longer follow-up is required to assess the durability of symptom control and the long-term recurrence rate. Further studies with larger sample sizes and longer follow-up are recommended to evaluate long-term recurrence and functional outcomes.

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