



POSTOPERATIVE RECOVERY AND RECURRENCE PATTERNS AFTER MILLIGAN–MORGAN HEMORRHOIDECTOMY AND HAL-RAR: A COMPARATIVE CLINICAL STUDY IN GRADE III AND IV HEMORRHOIDS

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ABSTRACT

Background: Grade III and IV internal hemorrhoids frequently require surgical management. Milligan–Morgan hemorrhoidectomy (MMH) is the conventional gold-standard procedure, whereas Doppler-guided hemorrhoidal artery ligation with recto-anal repair (HAL-RAR) is a minimally invasive, artery-sparing alternative. This study compared postoperative recovery, complications and recurrence between the two techniques.

Methods: In a prospective comparative study conducted over 18 months in the Department of General Surgery, 120 patients with grade III or IV internal hemorrhoids were allocated to Group A, MMH (n = 60), or Group B, HAL-RAR (n = 60). Outcomes assessed included operative time, blood loss, Visual Analog Scale (VAS) pain scores at 6 hours and postoperative days 1, 3, 7, 15 and 30, analgesic requirement, hospital stay, return to normal activity, wound healing, complications, six-month recurrence and patient satisfaction. Continuous variables were compared using the independent-samples t-test and categorical variables using Fisher's exact test; p < 0.05 was considered significant.

Results: Baseline demographic and clinical characteristics were comparable between groups (all p > 0.05). Intraoperative blood loss was lower with HAL-RAR (35.8 ± 9.5 ml versus 42.5 ± 9.6 ml, p < 0.001), while operative time did not differ significantly (39.1 ± 8.3 versus 36.8 ± 7.4 minutes, p = 0.112). VAS pain scores were significantly lower in the HAL-RAR group at every postoperative interval (p < 0.001), and analgesic requirement in the first 24 hours was reduced (1.8 ± 0.6 versus 3.1 ± 0.8 doses, p < 0.001). HAL-RAR was associated with shorter hospital stay (1.6 ± 0.4 versus 2.4 ± 0.5 days, p < 0.001) and earlier return to normal activity (7.2 ± 2.1 versus 13.4 ± 3.2 days, p < 0.001). Complication rates and six-month recurrence were low and statistically similar between groups. Patient satisfaction was significantly higher after HAL-RAR (8.7 ± 0.9 versus 7.9 ± 1.1, p < 0.001).

Conclusion: HAL-RAR provides significantly less postoperative pain, faster recovery, shorter hospitalisation and higher patient satisfaction than MMH, with a comparable safety and recurrence profile, and may be considered a preferred option in appropriately selected patients with grade III or IV hemorrhoids.

Keywords: Hemorrhoidectomy, Milligan–Morgan, Hemorrhoidal Artery Ligation, Recto-Anal Repair, Postoperative Pain, Recurrence.

INTRODUCTION

Hemorrhoidal disease is one of the most common anorectal conditions, affecting an estimated 39% of adults worldwide, with peak incidence between 45 and 65 years of age. Grade III and IV hemorrhoids, characterised by irreducible or permanent prolapse, generally require surgical intervention once conservative and office-based measures have failed. Milligan–Morgan hemorrhoidectomy has remained the conventional surgical gold standard since 1937.

It provides excellent long-term symptom control but carries substantial postoperative morbidity, including significant pain, delayed wound healing and urinary retention, largely attributable to the open excisional wound and disruption of the anoderm.

Doppler-guided hemorrhoidal artery ligation with recto-anal repair (HAL-RAR) has emerged as a minimally invasive, artery-sparing alternative. By selectively ligating the terminal branches of the superior rectal artery and performing mucopexy of the prolapsing tissue, HAL-RAR aims to reduce hemorrhoidal inflow and reposition prolapsed mucosa without an open perianal wound, potentially reducing postoperative pain while preserving efficacy.

This study was designed to prospectively compare postoperative recovery, complication rates and recurrence patterns between MMH and HAL-RAR



www.ajmrhs.com
eISSN: 2583-7761

Date of Received: 21-06-2026
Date Acceptance: 28-06-2026
Date of Publication: 27-07-2026

in a cohort of patients with grade III and IV hemorrhoids, in order to inform technique selection in routine surgical practice.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective, comparative clinical study conducted in the Department of General Surgery, Venkateshwara Medical College and Hospital, over a period of 18 months. One hundred and twenty patients with grade III or IV internal hemorrhoids were enrolled and allocated to two groups of 60 patients each: Group A underwent Milligan–Morgan hemorrhoidectomy (MMH) and Group B underwent Doppler-guided hemorrhoidal artery ligation with recto-anal repair (HAL-RAR).

Patient Selection

Inclusion criteria: patients aged 18–70 years with grade III or IV internal hemorrhoids, fit for spinal or general anesthesia, who provided written informed consent.

Exclusion criteria: grade I or II hemorrhoids managed conservatively; recurrent or previously operated hemorrhoidal disease; associated anal fissure, fistula or malignancy; bleeding disorders or anticoagulant therapy; and severe systemic illness (ASA grade III or IV).

Surgical Techniques

MMH group: open excisional hemorrhoidectomy with preservation of mucocutaneous bridges; wounds were left open for secondary healing.

HAL-RAR group: Doppler-guided identification and ligation of superior rectal artery branches 2–3 cm above the dentate line, followed by mucopexy of the prolapsing hemorrhoidal cushions.

Outcome Measures

Intraoperative parameters recorded were operative time and blood loss. Postoperative pain was assessed using the Visual Analog Scale (VAS, 0–10) at 6 hours and on postoperative days 1, 3, 7, 15 and 30, together with the number of analgesic doses required in the first 24 hours, day of first defecation and pain on defecation. Recovery outcomes included hospital stay, time to return to normal activity and wound healing status at 1 month. Safety outcomes comprised postoperative bleeding, urinary retention, wound infection, perianal edema, fever, anal stenosis and incontinence. Symptom resolution was recorded at day 15, day 30 and 6 months, together with recurrence at 6 months and patient satisfaction score (0–10).

Statistical Analysis

Continuous variables are expressed as mean $\pm$ standard deviation and were compared between groups using the independent-samples t-test. Categorical variables are expressed as counts and percentages and were compared using Fisher's exact test. A two-sided p-value < 0.05 was considered statistically significant. Analysis was performed on the complete patient-level dataset for both groups (n = 60 per group).

RESULTS

A total of 120 patients were included, 60 in each group, and all patients completed follow-up.

Baseline Demographic and Clinical Characteristics

Both groups were well matched for age, sex, body mass index, ASA grade, hemorrhoid grade, constipation history and type of anesthesia, with no statistically significant differences (Table 1), confirming comparability of the two cohorts and validity of subsequent comparisons.

Table 1. Baseline demographic and clinical characteristics

Variable	MMH (n = 60)	HAL-RAR (n = 60)	p-value
Age, years (mean $\pm$ SD)	44.6 $\pm$ 9.5	43.9 $\pm$ 9.2	0.682
Male sex, n (%)	31 (51.7)	30 (50.0)	1.000
BMI, kg/m ² (mean $\pm$ SD)	25.2 $\pm$ 3.1	24.9 $\pm$ 2.7	0.572
ASA grade I, n (%)	34 (56.7)	36 (60.0)	0.853
ASA grade II, n (%)	26 (43.3)	24 (40.0)	0.853
Grade III hemorrhoids, n (%)	42 (70.0)	39 (65.0)	0.697
Grade IV hemorrhoids, n (%)	18 (30.0)	21 (35.0)	0.697
Constipation history, n (%)	25 (41.7)	23 (38.3)	0.852
Spinal anesthesia, n (%)	55 (91.7)	54 (90.0)	1.000

Values are mean $\pm$ SD or n (%). p-values from independent-samples t-test (continuous variables) or Fisher's exact test (categorical variables).

Intraoperative Parameters

Operative time was similar between groups. Intraoperative blood loss was significantly lower in

the HAL-RAR group, consistent with the artery-sparing, closed nature of the technique (Table 2). No intraoperative complications occurred in either group.

Table 2. Intraoperative parameters

Parameter	MMH (n = 60)	HAL-RAR (n = 60)	p-value
Operative time, min (mean ± SD)	36.8 ± 7.4	39.1 ± 8.3	0.112
Blood loss, ml (mean ± SD)	42.5 ± 9.6	35.8 ± 9.5	<0.001
Intraoperative complications, n	0	0	—

Postoperative Pain and Analgesic Requirement

VAS pain scores were significantly lower in the HAL-RAR group at every assessed time point, from 6 hours through postoperative day 30 (Table 3,

Figure 1). This was accompanied by a markedly reduced analgesic requirement in the first 24 hours, earlier first defecation and less pain on defecation in the HAL-RAR group.

Table 3. Postoperative pain (VAS) and analgesic requirement

Parameter	MMH (n = 60)	HAL-RAR (n = 60)	p-value
VAS at 6 h	5.84 ± 0.84	3.55 ± 0.91	<0.001
VAS at POD 1	5.29 ± 0.89	3.01 ± 0.99	<0.001
VAS at POD 3	4.14 ± 0.91	1.91 ± 0.92	<0.001
VAS at POD 7	2.75 ± 0.93	1.01 ± 0.78	<0.001
VAS at POD 15	1.81 ± 0.97	0.36 ± 0.51	<0.001
VAS at POD 30	1.31 ± 0.96	0.17 ± 0.36	<0.001
Analgesic doses, first 24 h	3.1 ± 0.8	1.8 ± 0.6	<0.001
First defecation, day	2.08 ± 0.49	1.67 ± 0.36	<0.001
Pain on defecation (VAS)	6.41 ± 0.96	3.64 ± 1.06	<0.001

Figure 1. Postoperative pain scores (VAS) over time

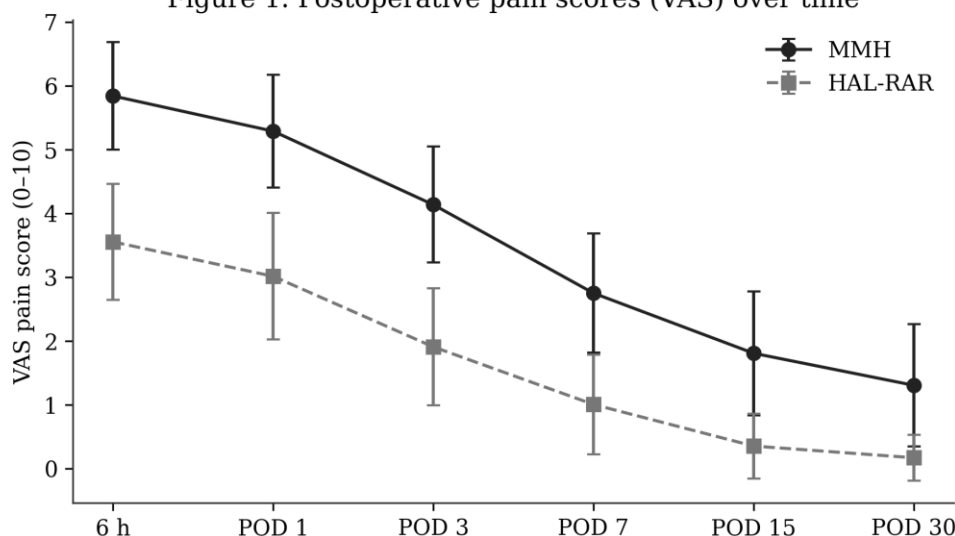


Figure 1. Mean postoperative VAS pain scores (± SD) over time in the MMH and HAL-RAR groups.

3.4 Recovery Outcomes

Patients undergoing HAL-RAR had a significantly shorter hospital stay and returned to normal activity considerably earlier than those undergoing MMH (Table 4, Figure 2). Complete wound healing at 1

month was numerically higher after HAL-RAR, although this difference did not reach statistical significance.

Table 4. Recovery outcomes

Parameter	MMH (n = 60)	HAL-RAR (n = 60)	p-value
Hospital stay, days	2.4 ± 0.5	1.6 ± 0.4	<0.001
Return to normal activity, days	13.4 ± 3.2	7.2 ± 2.1	<0.001
Complete wound healing at 1 month, n (%)	49 (81.7)	55 (91.7)	0.178

Figure 2. Recovery outcomes

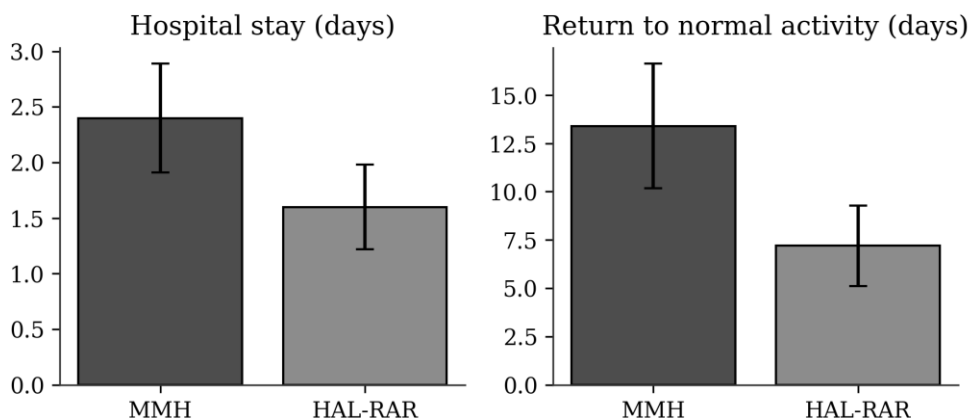


Figure 2. Hospital stay and return to normal activity (mean ± SD) by group.

Figure 4. Wound healing status at 1 month

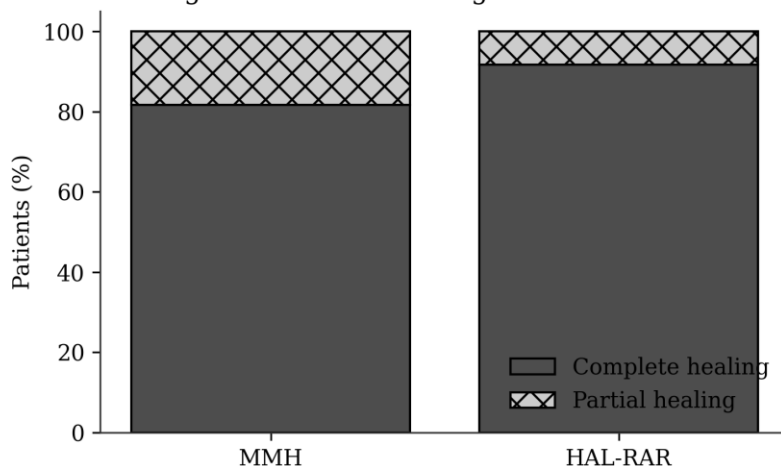


Figure 3. Wound healing status at 1 month by group.

Postoperative Complications

Rates of postoperative bleeding, urinary retention, wound infection, perianal edema and fever were low in both groups, with no statistically significant

differences (Table 5, Figure 4). No cases of anal stenosis or incontinence were recorded in either group.

Table 5. Postoperative complications

Complication	MMH (n = 60)	HAL-RAR (n = 60)	p-value
Postoperative bleeding, n (%)	3 (5.0)	2 (3.3)	1.000
Urinary retention, n (%)	4 (6.7)	1 (1.7)	0.364
Wound infection, n (%)	1 (1.7)	0 (0.0)	1.000
Perianal edema, n (%)	7 (11.7)	3 (5.0)	0.322
Postoperative fever, n (%)	2 (3.3)	1 (1.7)	1.000
Anal stenosis, n (%)	0 (0.0)	0 (0.0)	—
Incontinence, n (%)	0 (0.0)	0 (0.0)	—

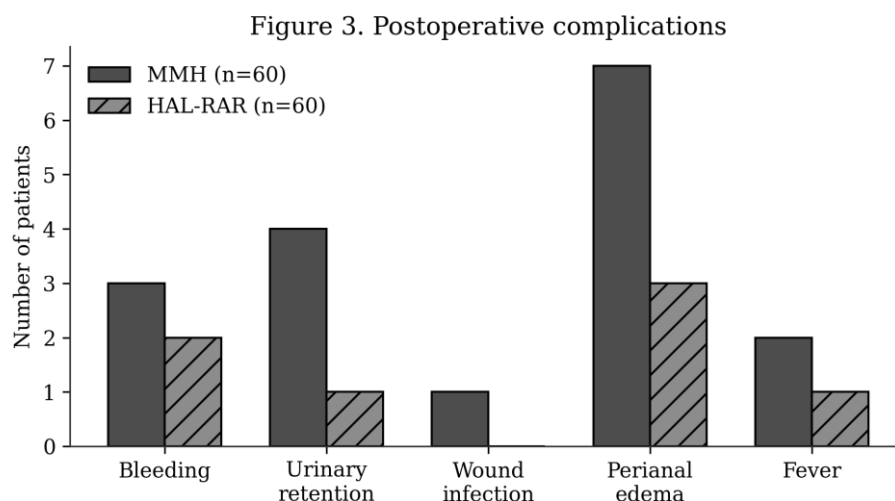


Figure 4. Postoperative complications by group.

Symptom Resolution, Recurrence and Patient Satisfaction

Symptom resolution at day 15 was significantly more frequent after HAL-RAR, and remained numerically higher, though not statistically significant, at day 30. By 6 months, symptom

resolution was similarly high in both groups. Recurrence at 6 months was infrequent and did not differ significantly between groups. Patient satisfaction was significantly higher in the HAL-RAR group (Table 6, Figure 5).

Table 6. Symptom resolution, recurrence and patient satisfaction

Parameter	MMH (n = 60)	HAL-RAR (n = 60)	p-value
Symptom resolution at day 15, n (%)	38 (63.3)	51 (85.0)	0.012
Symptom resolution at day 30, n (%)	51 (85.0)	55 (91.7)	0.394
Symptom resolution at 6 months, n (%)	59 (98.3)	58 (96.7)	1.000
Recurrence at 6 months, n (%)	1 (1.7)	2 (3.3)	1.000
Patient satisfaction score (0–10)	7.9 ± 1.1	8.7 ± 0.9	<0.001

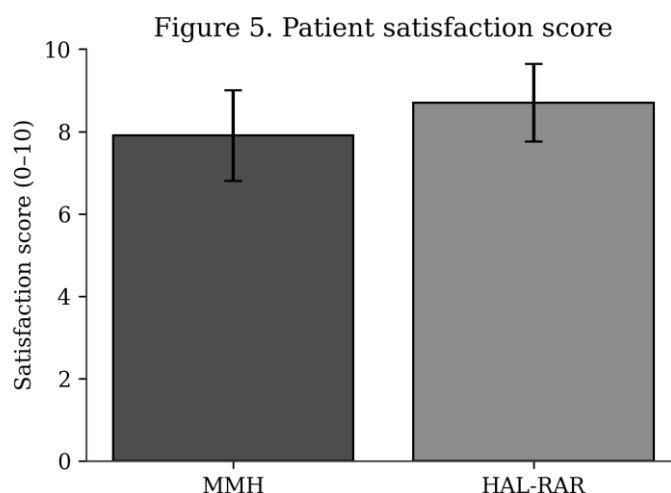


Figure 5. Mean patient satisfaction score ($\pm$ SD) by group.

DISCUSSION

This prospective comparative study of 120 patients with grade III or IV hemorrhoids demonstrates that

HAL-RAR is associated with significantly less postoperative pain, reduced analgesic requirement, shorter hospital stay, earlier return to normal activity

and higher patient satisfaction compared with conventional Milligan–Morgan hemorrhoidectomy, while maintaining a comparable safety and recurrence profile.

The markedly lower VAS pain scores observed with HAL-RAR at every postoperative interval are consistent with the closed, artery-sparing nature of the procedure, which avoids the open perianal wound created during MMH and preserves sensate anoderm. This finding parallels previous randomized and comparative literature reporting reduced postoperative pain with HAL-RAR relative to excisional hemorrhoidectomy.

The shorter hospital stay and faster return to normal activity observed in the HAL-RAR group are clinically meaningful, as they translate directly into reduced convalescence and earlier resumption of occupational and social activities, an important consideration for patient-centred surgical decision-making.

Complication rates, including postoperative bleeding, urinary retention and wound infection, were low in both groups and did not differ significantly, indicating that the safety profile of HAL-RAR is at least comparable to that of MMH. Similarly, six-month recurrence rates were low and statistically similar between groups, suggesting that the efficacy of HAL-RAR in preventing early symptomatic recurrence is not inferior to that of excisional hemorrhoidectomy over this follow-up interval, in keeping with prior comparative series.

Patient satisfaction, an increasingly recognised patient-reported outcome, was significantly higher after HAL-RAR, most plausibly reflecting the cumulative benefit of reduced pain, shorter recovery and preserved anorectal anatomy.

Limitations

This study has several limitations. Follow-up was limited to 6 months, and longer-term recurrence and functional outcomes, including continence, were not assessed beyond this period. The study was conducted at a single centre, which may limit generalisability. Randomization methodology and blinding of outcome assessors were not detailed in the primary data source, which may introduce ascertainment bias in pain and satisfaction scoring. Larger multicentre studies with extended follow-up are required to confirm these findings.

CONCLUSION

HAL-RAR is a safe and effective alternative to conventional Milligan–Morgan hemorrhoidectomy for grade III and IV hemorrhoids, offering significantly reduced postoperative pain and analgesic requirement, shorter hospital stay, faster return to normal activity and greater patient satisfaction, without increasing complications or six-month recurrence. HAL-RAR may be

considered a preferred surgical option in appropriately selected patients, although larger multicentre studies with longer follow-up are recommended to validate long-term recurrence and functional outcomes.

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How to cite this article: Krishnakumar R, Rajkumar K.K, Lochan T, POSTOPERATIVE RECOVERY AND RECURRENCE PATTERNS AFTER MILLIGAN–MORGAN HEMORRHOIDECTOMY AND HAL-RAR: A COMPARATIVE CLINICAL STUDY IN GRADE III AND IV HEMORRHOIDS, *Asian J. Med. Res. Health Sci.*, 2026; 4 (2):2505-2511.
Source of Support: Nil, Conflicts of Interest: None declared.