Predicting the Unwelcome Return: Insights From a Cohort of Postoperative Haemorrhoid Patients

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AIM: Recurrence after haemorrhoid surgery is a clinical concern, but the factors associated with recurrence have not yet been fully elucidated. In particular, the effects of external haemorrhoids and postoperative complications on long-term outcomes have not been clearly defined. This study aimed to identify the factors associated with haemorrhoid recurrence and recurrence-free survival following haemorrhoid surgery.

METHODS: This retrospective cohort study included patients who underwent elective haemorrhoid surgery between January 2021 and December 2023 at Dr. Soliman Fakeeh Hospital. We grouped the participants according to their recurrence status. Continuous variables were compared using the Mann–Whitney U test, while categorical variables were analysed using chi-square or Fisher's exact tests, as appropriate. We assessed recurrence-free survival using Kaplan–Meier analysis with log-rank tests. Independent predictors of recurrence were identified using Cox proportional hazards regression analysis.

RESULTS: A total of 529 patients were included, with a cumulative recurrence incidence of 4.3% (n = 23). Patients who developed recurrence were younger than those who did not (median age: 33 vs. 37 years, $p = 0.025$). There were also higher incidences of external haemorrhoids (30.4% vs. 14.0%, $p = 0.030$) and postoperative complications in the recurrence group (43.5% vs. 11.9%, $p < 0.001$). Kaplan–Meier analysis demonstrated significantly lower recurrence-free survival among patients who developed postoperative complications (log-rank $p = 0.005$). Patients with external haemorrhoids showed a trend towards lower recurrence-free survival, but the difference did not reach statistical significance (log-rank $p = 0.151$). In our multivariable Cox regression analysis, postoperative complications remained independently associated with recurrence risk (hazard ratio [HR] 4.63, 95% confidence interval [CI]: 1.68–12.80, $p = 0.003$). The association between external haemorrhoids and recurrence risk demonstrated borderline significance (HR 2.55, 95% CI: 0.99–6.60, $p = 0.053$).

CONCLUSIONS: Postoperative complications were independently associated with earlier recurrence and poorer recurrence-free survival following haemorrhoid surgery. There was a trend towards increased recurrence risk in patients with external haemorrhoids, but the association did not remain statistically significant after adjustment. These findings may help identify patients at higher risk of recurrence and support more individualised postoperative follow-up strategies.

Keywords: cox proportional hazards analysis; external haemorrhoids; haemorrhoidectomy; postoperative complications; recurrence-free survival; risk factors

Introduction

Despite generally favourable outcomes after haemorrhoid surgery, recurrence is a clinical issue in a subset of patients. Symptoms of recurrence, such as prolapse and bleeding, may be a consequence of multiple interacting patient-, disease- and treatment-related factors. While previous studies have found external haemorrhoids, postoperative complications, disease severity and surgical procedure to be associated with an increased risk of recurrence, the available evidence is inconsistent [1,2].

The current recommendations of the American Society of Colon and Rectal Surgeons (ASCRS) and the National Institute for Health and Care Excellence (NICE) emphasise selecting the appropriate surgical approach for haemor-

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rhoids based on disease severity. There has been relatively little research into the factors associated with postoperative recurrence, particularly those affecting recurrence-free survival (RFS) during long-term follow-up. Among the available studies, few have evaluated recurrence patterns using time-to-event analytical approaches [3,4].

Accordingly, the present study aimed to investigate factors associated with recurrence and RFS following haemorrhoid surgery using Kaplan–Meier and Cox proportional hazards analyses. The study also provides local data on outcomes following colorectal surgery in a tertiary care setting.

Methods

Study Design

This retrospective single-center cohort study included patients who underwent elective haemorrhoid surgery at Dr. Soliman Fakeeh Hospital, a tertiary care center in Jeddah, Saudi Arabia, between 1 January 2021 and 30 December 2023.

Inclusion Criteria

Eligible patients aged ≥18 who had had complete medical records, at least 12 months of postoperative follow-up, and procedures performed by surgeons beyond the learning curve.

Exclusion Criteria

Patients were excluded if they were lost to follow-up before recurrence could be adequately assessed, were pregnant, or had concomitant anorectal conditions such as anal fissures or fistulas. Cases performed during the surgeon's learning curve, were also excluded. Learning curve was defined as the period during which surgeons acquire proficiency in a specific operative technique. In our institution, all haemorrhoidal procedures were performed by experienced consultant colorectal surgeons who had already completed their learning curve before the study period.

Data Collection

Data were retrospectively retrieved from our hospital's healthcare information system (YASASII, v. 5.0.0.24, Kameda Infologics Pvt. Ltd., Thiruvananthapuram, India). For each patient, we retrieved information on demographic characteristics, body mass index (BMI), comorbidities, symptom duration, disease characteristics, presenting symptoms, surgical procedure, postoperative complications, follow-up duration, recurrence status and time to recurrence. Patients were categorised into a recurrence (R+) group or a no recurrence (R−) group.

Definitions

Recurrence was defined as the reappearance of symptomatic haemorrhoid disease at least 6 months after surgery. Its reappearance was determined based on both patient-reported complaints and clinical evaluations during follow-up visits. The most commonly reported symptoms suggestive of recurrence were prolapse and persistent bleeding [3,4,5,6]. The 6-month minimum postoperative interval was used to ensure that persistence of the original disease and delayed recovery were distinguished from true recurrence.

Recurrence could develop at the original operative site or a different anatomical location. Clinical assessment results and patient symptoms were documented during routine follow-up visits, which were performed at 2 and 6 weeks, and 3, 6 and 12 months postoperatively. Additional follow-up data beyond 12 months were available through outpatient visits and electronic medical record review, and these data were included in the Kaplan–Meier and Cox regression analyses.

At our facility, standardised patient-reported outcome measures (PROMs), including disease-specific quality-of-life questionnaires, are not routinely incorporated into postoperative assessments, so no such data were available.

Goligher grade I–IV classification was used to evaluate internal haemorrhoid prolapse. This grading was not applied to patients with combined internal–external haemorrhoids and those with isolated external haemorrhoids.

Statistical Analysis

All data were analysed using SPSS for Windows, v. 25.0 (IBM Corp., Armonk, NY, USA). The distribution normality of continuous variables was assessed using the Shapiro–Wilk test. Continuous variables with non-normal distributions were presented as median and interquartile range (IQR). Categorical variables were presented as frequencies and percentages. Group comparisons were performed using the Mann–Whitney U test for continuous variables and the chi-square test for categorical variables. Fisher's exact test was used when the expected cell count was <5.

RFS was evaluated using Kaplan–Meier analysis, with between-group comparisons made using log-rank tests. R− patients were censored at the time of their most recent follow-up visit. We used Cox proportional hazards regression to identify independent predictors of RFS. Given the limited recurrence rate, we selected the variables included in the multivariable model according to clinical relevance and literature review to reduce the risk of overfitting. In addition, variables showing potential association in the univariable analysis were considered. We visually assessed the proportional hazards assumption using log-minus-log survival plots. We presented the results as hazard ratios (HRs) and corresponding 95% confidence intervals (CIs). Two-sided p-values of <0.05 were considered statistically significant.

Results

Baseline Demographic and Disease Characteristics

Among the 529 patients included in this study, the median (IQR) age was 37 (31–46) years. Females accounted for

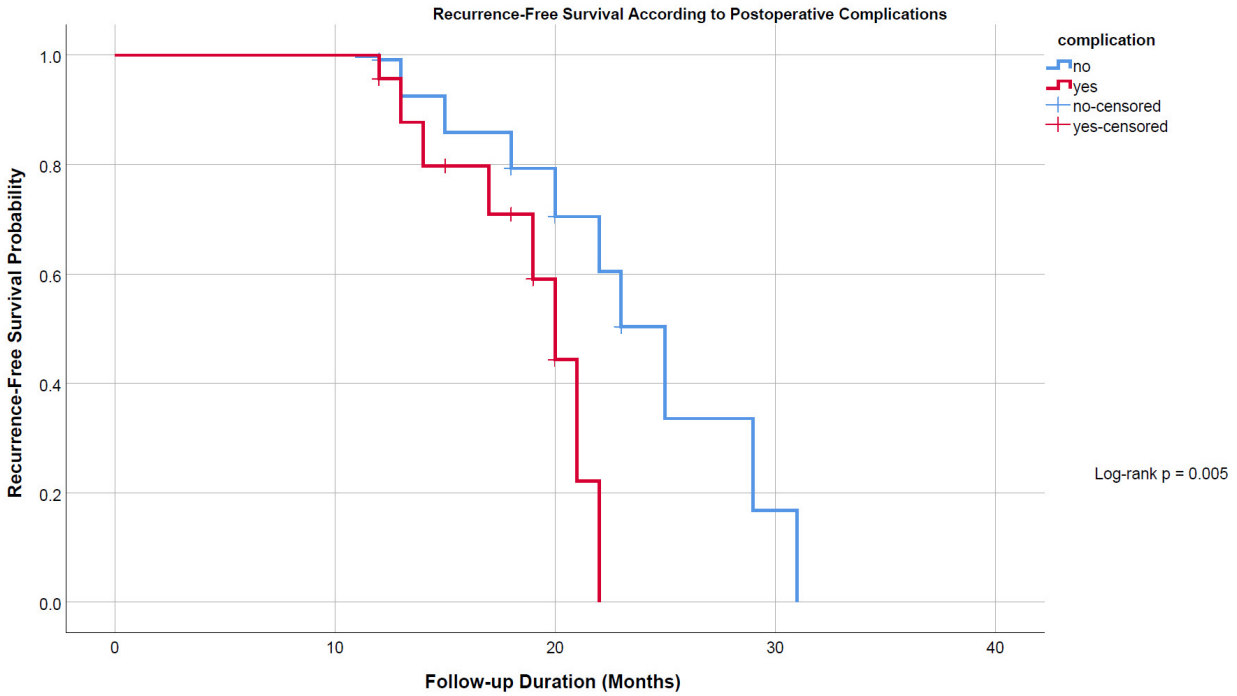

Fig. 1. Kaplan–Meier curves showing recurrence-free survival after haemorrhoidal surgery according to the presence or absence of postoperative complications. Patients who developed postoperative complications experienced earlier recurrence and lower recurrence-free survival during follow-up compared with those without complications (log-rank $p = 0.005$).

slightly more than half of the cohort (n = 295, 55.8%). Obesity, defined as a BMI of ≥30 kg/m^2, was present in 29.1% (n = 154) of patients and comorbidities in 34.6% (n = 183). These were primarily diabetes mellitus and hypertension. Approximately one-third (n = 182, 34.4%) of the cohort reported a preoperative symptom duration of >6 months. Pain was the most common presenting complaint, reported by 82.6% (n = 437). This was followed by bleeding (n = 305, 57.7%), constipation (n = 227, 42.9%) and haemorrhoid prolapse (n = 109, 20.6%). Only a small proportion of patients (n = 85, 16.1%) reported regular dietary fibre intake.

The most common physical examination finding was the involvement of three quadrants, which was observed in 45.0% (n = 238) of the cohort. One- and two-quadrant disease were identified in 39.3% (n = 208) and 15.7% (n = 83) of cases, respectively. Most patients with internal haemorrhoids presented with advanced disease, with 23.8% (n = 126) classified as Goligher grade III and 40.6% (n = 215) as grade IV. Combined internal–external haemorrhoids and isolated external haemorrhoids were not Goligher-graded. We identified external haemorrhoids in 14.7% (n = 78) of the patients (Table 1).

Operative and Postoperative Outcomes

The most frequently performed procedure was conventional excisional haemorrhoidectomy (n = 251, 47.5%), followed by laser haemorrhoidoplasty (LHP) (n = 133, 25.1%), haemorrhoid artery ligation (HAL) (n = 80, 15.1%) and stapled haemorrhoidectomy (n = 65, 12.3%). Mucopexy was used as an adjunctive procedure in 10.6% (n = 56) of patients. Most operations were performed under spinal anaesthesia (n = 352, 66.5%).

The median operative time was 29 (19.5–38) min. Postoperative complications occurred in 13.2% (n = 70) of patients, with bleeding being the most common (n = 33, 6.2%). Other reported complications were fistula formation, constipation, urgency, anal fissures, strictures or stenosis, infection and abscess formation.

Most patients were discharged within 24 hours after surgery (n = 494, 93.4%). A smaller proportion required a hospital stay exceeding 24 hours (n = 35, 6.6%). The 30-day reoperation (n = 7, 1.3%) and readmission (n = 11, 2.0%) rates were low, with postoperative bleeding being the most common reason for both (Table 2).

Recurrence and Associated Factors

The overall cumulative incidence of recurrence in this cohort was 4.3% (n = 23). R+ patients tended to be younger than those without recurrence, the median age was 33 (27–42) years in the R+ group and 37 (31–46) years in the R– group ($p = 0.025$).

There was a significantly higher proportion of males in the R+ group than in the R– group (69.6% vs. 43.1%, $p = 0.012$). External haemorrhoids (30.4% vs. 14.0%, $p = 0.030$) and postoperative complications (43.5% vs. 11.9%, $p < 0.001$) were significantly more common among R+ than R– patients.

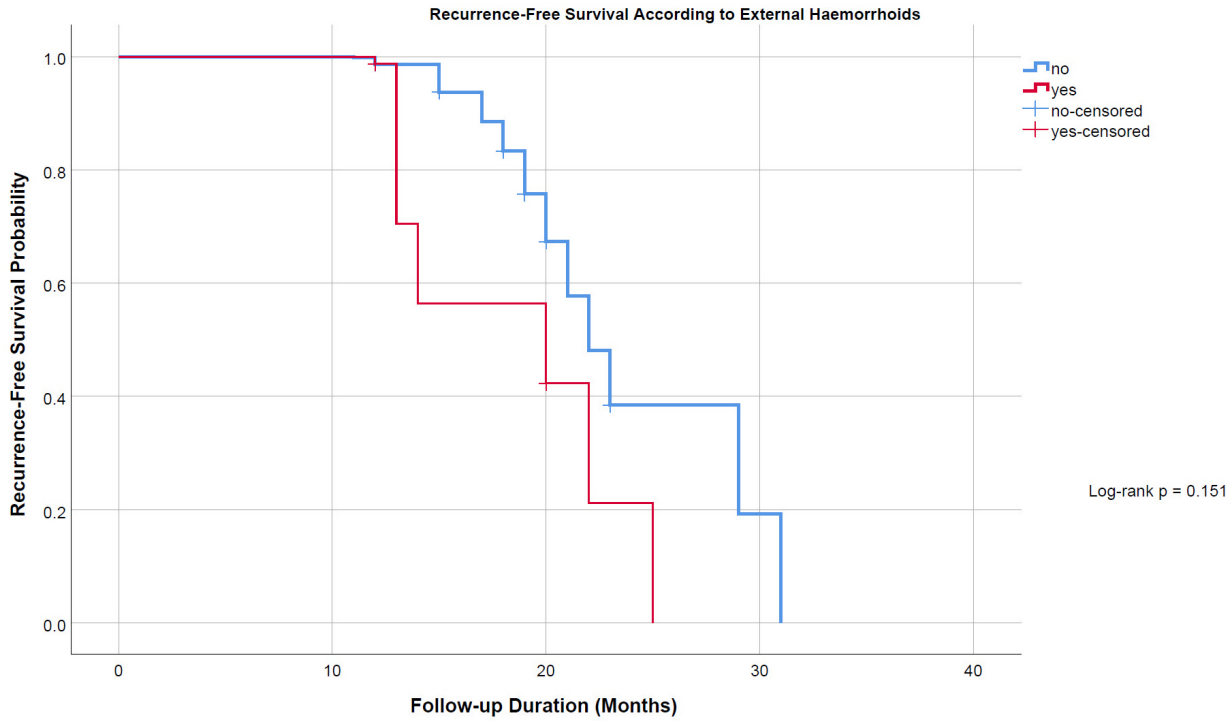

Fig. 2. Kaplan–Meier curves showing recurrence-free survival after haemorrhoidal surgery according to the presence of external haemorrhoids. Patients with external haemorrhoids demonstrated a trend toward lower recurrence-free survival during follow-up; however, the difference did not reach statistical significance (log-rank $p = 0.151$).

R+ patients were more likely to report preoperative symptoms lasting >6 months, but this association did not reach statistical significance (52.2% vs. 33.6%, $p = 0.067$). Operative times tended to be longer in the R+ group, with a median duration of 35 (24–48) min compared with 29 (20–38) min in the R– group. However, this difference was also not statistically significant ($p = 0.121$).

We found no significant between-group differences in the presence of obesity or comorbidities, the presenting symptoms, dietary fibre intake or surgical technique (Table 3).

Predictors and Time-to-Recurrence Analysis

Patients were followed for a minimum of 12 months after surgery. The median follow-up duration was 25 (12–37) months, calculated from the date of surgery to the first documented recurrence or the last recorded clinical follow-up. Patients without recurrence were censored at their last documented follow-up visit. Kaplan–Meier analysis demonstrated significantly lower RFS among patients who developed postoperative complications compared with those who did not (log-rank $p = 0.005$) (Fig. 1). These patients tended to experience earlier recurrence and showed a more rapid decline in RFS over time. In contrast, patients with external haemorrhoids demonstrated a trend towards lower RFS. However, this difference did not reach statistical significance (log-rank $p = 0.151$) (Fig. 2).

Our multivariable Cox proportional hazards regression analysis found postoperative complications to be significantly independently associated with the risk of recurrence (HR 4.63, 95% CI: 1.68–12.80, $p = 0.003$) (Table 4). After adjustment, the trends towards increased recurrence risks with external haemorrhoids (HR 2.55, 95% CI: 0.99–6.60, $p = 0.053$) and younger age (HR 0.96, 95% CI: 0.92–1.01, $p = 0.098$) did not reach statistical significance. Surgical approach (conventional vs. minimally invasive) was not independently associated with RFS ($p = 0.549$) (Table 4).

Discussion

In a cohort of 529 patients who underwent haemorrhoid surgery at a tertiary care center, the cumulative recurrence incidence was 4.3%, while postoperative complications occurred in 13.2% of patients. The most important finding of this study was the strong association between postoperative complications and RFS. We found that patients who developed postoperative complications were significantly more likely to suffer early recurrence and had a significantly higher risk of recurrence over time. External haemorrhoids and younger age showed trends towards increased recurrence risks, but the associations did not remain independently significant after adjustment.

Previous studies have reported variable recurrence rates following haemorrhoid surgery and have found several associated factors. These include disease severity, surgical technique, duration of follow-up and the definition of recurrence. Conventional excisional haemorrhoidectomy is associated with recurrence rates of 1%–5%. While

Table 1. Baseline demographic and disease characteristics.

Feature	Overall cohort (N = 529)
Age, median (IQR)	37 (31–46)
Gender	
Male	234 (44.2%)
Female	295 (55.8%)
BMI ≥30 kg/m^2	154 (29.1%)
Comorbidities	183 (34.6%)
Duration of symptoms	
≥6 months	182 (34.4%)
<6 months	347 (65.6%)
Presenting symptoms	
Bleeding	305 (57.7%)
Pain	437 (82.6%)
Haemorrhoidal prolapse	109 (20.6%)
Constipation	227 (42.9%)
Diarrhea	11 (2.1%)
Regular fiber intake	85 (16.1%)
Physical Examination	
Number of diseased quadrants	
One quadrant	208 (39.3%)
Two quadrants	83 (15.7%)
Three quadrants	238 (45.0%)
Grades of Internal haemorrhoids (Goligh -er classification)	
Grade I	5 (1.0%)
Grade II	105 (19.8%)
Grade III	126 (23.8%)
Grade IV	215 (40.6%)
External haemorrhoid involvement	
Combined internal and external haem -orrhoids	49 (9.3%)
Isolated External haemorrhoids	29 (5.5%)
Any external haemorrhoid component (combined + isolated) *	78 (14.7%)

* Included both isolated external haemorrhoids and external components associated with combined internal–external disease. IQR, interquartile range; BMI, body mass index.

Table 2. Operative and postoperative outcomes.

Feature	Overall cohort (N = 529)
ASA	
I	279 (52.7%)
II	219 (41.4%)
III	31 (5.9%)
Anesthesia Type	
Spinal	352 (66.5%)
General	177 (33.5%)
Surgical procedures	
surgical haemorrhoidectomy	251 (47.5%)
stapled haemorrhoidectomy	65 (12.3%)
HAL	80 (15.1%)
Laser haemorrhoidoplasty	133 (25.1%)
Mucopexy	56 (10.6%)
Operative time, min [median (IQR)]	29 (19.5–38)
Postoperative complications	70 (13.2%)
Bleeding	33 (6.2%)
Fistula	9 (1.7%)
Constipation	8 (1.5%)
Urgency	6 (1.1%)
Fissure	5 (0.9%)
Stricture/stenosis	5 (0.9%)
Infection or abscess formation	4 (0.8%)
Length of hospital stay	
<24 hours	494 (93.4%)
>24 hours	35 (6.6%)
30-day reoperation rate	7 (1.3%)
30-day readmission rate	11 (2.0%)

ASA, American Society of Anesthesiologists; HAL, haemorrhoid artery ligation.

higher rates have been reported following stapled haemorrhoidopexy in certain patient populations [7]. In our cohort, the recurrence rates for the different surgical approaches were at the lower end of the previously reported range, despite the relatively high proportion of advanced haemorrhoid disease. Our Cox regression analysis showed no significant association between the surgical technique and recurrence. The selection of appropriate patients and the experience and skill of the surgeon are critical determinants of surgical outcomes. A recent meta-analysis of 68 randomised trials reported a mean overall recurrence rate of 5.7% [8]. Another meta-analysis has identified increased recurrence rates when LHP is used for advanced haemorrhoids [9]. This demonstrates the need to match the surgical technique to the grade of haemorrhoid disease. Approximately 40.6% of our cohort had grade IV haemorrhoids. Conventional excisional haemorrhoidectomy was performed in 47.5%. This suggests that the surgical strategy was tailored to disease severity, with selection of the most appropriate technique based on clinical grade and presentation.

Our findings suggest that postoperative complications may have a meaningful impact on long-term outcomes beyond the immediate postoperative period. Our Kaplan–Meier analysis demonstrated significantly lower RFS among patients who developed postoperative complications, and the association remained significant in our multivariable Cox regression analysis. Complications such as postoperative bleeding, infection, anal stenosis and impaired wound healing can become persistent or recurrent and delay recovery. Although postoperative morbidity after haemorrhoid surgery has been widely described, relatively few studies have explored its relationship with RFS using time-to-event analysis [2,10,11,12].

External haemorrhoids appeared to be a clinically relevant variable in our cohort. We found that patients with external haemorrhoids tended to experience recurrence earlier and demonstrated lower RFS over time. Although this association did not remain significant after adjustment, the ob-

Table 3. Clinical characteristics according to recurrence status.

Variables	No recurrence (R−) (n = 506)	Recurrence (R+) (n = 23)	*p**
Age, median (IQR)	37 (31–46)	33 (27–42)	0.025
Gender			
Male	218 (43.1%)	16 (69.6%)	0.012
Female	288 (56.9%)	7 (30.4%)	
Obesity (BMI> 30 kg/m^2)	146 (28.9%)	8 (34.8%)	0.540
Comorbidities	178 (35.2%)	5 (21.7%)	0.185
Duration of symptoms (>6 months)	170 (33.6%)	12 (52.2%)	0.067
Bleeding	291 (57.5%)	14 (60.9%)	0.750
Pain	418 (82.6%)	19 (82.6%)	1.000
Haemorrhoidal prolapse	103 (20.4%)	6 (26.1%)	0.506
Constipation	219 (43.3%)	8 (34.8%)	0.421
Diarrhea	10 (2.0%)	1 (4.3%)	0.390
Regular fiber intake	79 (15.6%)	6 (26.1%)	0.181
External haemorrhoids	71 (14.0%)	7 (30.4%)	0.030
Surgery			0.885
surgical haemorrhoidectomy	241 (47.6%)	10 (43.5%)	
stapled haemorrhoidectomy	63 (12.5%)	2 (8.7%)	
HAL	76 (15.0%)	4 (17.4%)	
Laser haemorrhoidoplasty	126 (24.9%)	7 (30.4%)	
Mucopexy	53 (10.5%)	3 (13.0%)	0.725
Operative time, min [median (IQR)]	29 (20–38)	35 (24–48)	0.121
Postoperative complication	60 (11.9%)	10 (43.5%)	<0.001

* Mann–Whitney U test or chi-square test.

Table 4. Cox proportional hazards regression analysis of factors associated with recurrence-free survival following haemorrhoidal surgery.

Covariates	Hazard ratio (HR)	95% confidence interval	*p*-value
Age	0.96	0.92–1.01	0.098
*Surgical approach (conventional vs. minimally invasive)	0.76	0.31–1.87	0.549
External haemorrhoids	2.55	0.99–6.60	0.053
Postoperative complications	4.63	1.68–12.80	0.003

HR, hazard ratio; CI, confidence interval.

*Surgical approach refers to conventional versus minimally invasive surgery.

served trend reflects the technical challenges mixed haemorrhoid disease poses for surgeons, particularly when there is residual untreated external tissue or the haemorrhoids are incompletely excised. This is supported by previous studies, which have similarly suggested that persistent external disease may contribute to the recurrence of symptoms and prolapse [1,2].

Interestingly, younger patients showed a tendency towards higher recurrence risk compared with older patients. However, this association was not significant after adjustment. There may be multiple reasons for this finding, including bowel habits, lifestyle, physical activity, symptom perception and healthcare-seeking behaviour [4]. In contrast, the surgical approach was not independently associated with RFS, suggesting that patient- and disease-related factors may be more influential than procedural variables.

At our institution, surgical strategies are individualised according to disease severity and anatomical characteristics. Minimally invasive procedures, such as LHP and HAL, are reserved for select patients with less advanced disease. Conventional excisional haemorrhoidectomy is more commonly performed in patients with advanced haemorrhoids or cases with a significant external component. This tailored approach may partially explain the relatively low recurrence rate in the present study.

The present study had several limitations. First, retrospective study designs carry inherent risks of selection bias, incomplete documentation and residual confounding despite statistical adjustment. Second, this was a single-center study, which may have reduced the generalisability of our findings to other institutions with different patient characteristics, surgical approaches and follow-up practices.

Third, the relatively low recurrence rate in our cohort may have limited the statistical power of our analyses and increased the chances of model instability. However, considering this, we utilised a parsimonious Cox regression model to reduce the risk of overfitting. Fourth, we assessed patients' recurrence status based on clinical evaluations and patient-reported symptoms during follow-up visits, as our institution does not routinely use validated PROMs or disease-specific quality-of-life questionnaires. Consequently, the possibilities of recall bias and observer bias cannot be completely excluded. The lack of standardised PROMs data also prevented a more comprehensive assessment of postoperative symptom burden, patient satisfaction, functional outcomes and health-related quality of life. Finally, between-patient variations in follow-up duration may have affected our detection of late recurrence, particularly after minimally invasive procedures, in which symptoms of recurrence can develop more gradually over time.

Conclusions

Haemorrhoid surgery is an effective treatment option for most patients with symptomatic disease, and this was reflected in the relatively low recurrence incidence observed in our cohort. We found that postoperative complications were strongly associated with earlier recurrence and significantly lower RFS over time. External haemorrhoids and younger age also showed trends towards increased recurrence risks, although these associations did not remain independently significant after adjustment.

These findings highlight the importance of appropriate surgical technique selection and its meticulous application, careful perioperative management and early recognition of postoperative complications to optimise long-term outcomes. Identifying patients at higher risk of recurrence could support more individualised postoperative surveillance, improve patient counselling and help guide surgical decision-making for patients with complex haemorrhoid disease.

Availability of Data and Materials

The data used and analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

AAlo made substantial contributions to the study conception and design, data acquisition, analysis and interpretation. SNH, MNA, MMR, JHT, NYM, BMBL, AAlm, SF and WT made substantial contributions to the study data analysis and interpretation. AAlo drafted the manuscript. All authors contributed to the critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This retrospective study was approved by the institutional review board of Dr. Soliman Fakeeh Hospital, Fakeeh Institutional Review Board (F-IRB) and received the number: FIRB-24-0021. Patient consent was waived due to the nature of retrospective data analysis. The study conformed to the provisions of the Declaration of Helsinki.

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Conflict of Interest

The authors declare no conflict of interest.

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