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Comparison of "Mucopexy with Haemorrhoidal Artery Ligation with Open Hemorrhoidectomy in Terms of Effectiveness and Outcome

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ABSTRACT

Traditional haemorrhoidectomy techniques are effective in the treatment of haemorrhoids but are associated with an increased risk of postoperative bleeding, pain, and longer recovery time. Our study on Mucopexy with haemorrhoidal artery ligation compares the outcomes in both procedures. **Objective:** To compare operating time, postoperative pain and bleeding, and postoperative urinary retention with both methods. **Methods:** This randomized control trial was conducted at the Department of General Surgery at the Pakistan Railway Hospital from January 2023 to December 2023. **Results:** In the hemorrhoidectomy group, the median age was 44.6 ± 14.54 years and the mean age of 50.91 ± 17.23 years for the other group. The mean operating time for the Hemorrhoidectomy group was 56.04 ± 7.52 minutes, while for the Mucopexy group, it was 40.36 ± 6.85 minutes. The difference was significant (p=0.0000000000000000078). On the 1st day, the mean pain score (numerical rating scale for pain) for the Hemorrhoidectomy group was 7.00 ± 1.17, whereas for the Mucopexy group, it was 3.59 ± 1.15 with a significant difference (p=0.000000000000000578). On the 7th postoperative day, the mean score on the numerical rating scale for pain for the Hemorrhoidectomy group was 2.37 ± 1.10, as compared to the mucopexy group, which was 1.07 ± 0.25, (p=0.0000000000258). No statistically significant difference was found for Postoperative bleeding and urinary retention between the two groups. **Conclusions:** It was concluded that HAL with Mucopexy has shown significant improvement in postoperative pain and operating time as compared to the open haemorrhoidectomy.

INTRODUCTION

Conventional hemorrhoidectomy has been the standard option for the management of haemorrhoidal disease and it is effective against 3rd-degree hemorrhoids. However significant postoperative pain, prolonged recovery periods, and other complications like postoperative bleeding can result in notable morbidity [1, 2]. Reported literature has shown that newer dearterialization procedures are the least painful as compared to the traditional open haemorrhoidectomy [3, 4], but the research is still ongoing and more data is required to formulate guidelines with consensus, especially in our procedure where we are doing haemorrhoidal artery ligation (HAL) without the use of Doppler ultrasound. Similarly, post post-operative bleeding has been a major concern after haemorrhoidectomy especially delayed bleeding after discharge, highlighting the need for safer alternatives. New minimally invasive procedures, such as stapled haemorrhoidopexy, laser therapy, and hemorrhoidal artery ligation [5]. offer promising alternatives that minimize these risks while effectively addressing the condition. These more recent procedures aim at dearterialization of hemorrhoids rather than extensive dissection [6]. Keeping in mind the limited resources of under-developed countries it is essential to

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focus on newer and minimally invasive methods that are least dependent on technology and can be implemented with existing equipment, while at the same time, these methods are equally or more effective in the treatment of 3rd-degree hemorrhoids with improves rates of post-operative complications like pain and bleeding. Hemorrhoid artery ligation with Mucopexy has emerged as a promising technique, offering effective relief with reduced recovery times and minimal discomfort [5, 7]. However, this method requires specifically designed ultrasound equipment to accurately locate the hemorrhoidal artery for ligation, which may be replaced with the surgeon's ability to locate the position using the palpatory method and surface anatomy. Our study questions the necessity of using specifically designed equipment for the localization of the haemorrhoidal artery. We aim to establish the fact that our technique could potentially be more effective than open haemorrhoidectomy and it can also demonstrate better results in terms of outcomes and post-operative complications. Furthermore, this method could reduce costs significantly, allowing more patients to benefit from effective treatment while minimizing the reliance on expensive technology.

This study aims to assess whether we can offer our technique as a viable option for patients seeking effective relief with an improved rate of complications like pain, postoperative bleeding, and urinary retention.

METHODS

The randomized controlled trial (RCT) was started at the Pakistan Railway Hospital Rawalpindi, from January 2023 to December 2023 after approval of the hospital's ethical committee (reference no: Riphah/IIMC/IRC/22/2086). Informed consent was obtained from all participants. The trial was registered with the Iranian Registry for Clinical Trials (IRCT) ID: IRCT20241220064108N. G*Power software version 3.1.9.7 was used to detect significant differences in postoperative pain, operating time, and length of hospital stay between the two groups, with an alpha error of 0.05, a power of 0.8, and assuming a medium effect size (Cohen's d=0.5); for sample size calculation.. The formula used was $n=2.(Za/2+Z\beta)2.\sigma2/\Delta2$, where Za/2 corresponds to the alpha level (0.05), Zβ corresponds to the power (0.8), σ represents the standard deviation, and Δ represents the minimum detectable difference, resulting in a required total of 90 participants (45 in each group). A total of 90 patients diagnosed with 3rd-degree hemorrhoids were enrolled. Patients were divided between the two groups randomly: The Mucopexy group and the conventional hemorrhoidectomy group. Patients who were unfit for surgery, those with previous anorectal surgeries, those with 1st or 2nd-degree hemorrhoids, and those below 16 years and above 65 years of age were excluded from the study. Randomization was conducted using a computer-generated sequence. Concealment was ensured using sealed envelopes. Assessors were blinded to the treatment allocation. An objective assessment of outcomes was done throughout the study to ensure blinding. Both groups underwent spinal anesthesia. Both groups received preoperative antibiotic prophylaxis with IV ceftriaxone Ig and IV metronidazole 500mg. All patients were in the lithotomy position. The diagnosis was confirmed and other pathologies were ruled out on initial examination and proctoscopy. The haemorrhoidal artery was ligated with figure-of-8 vicryl 1 suture was performed after finger-guided palpation of the artery without Doppler. After Figure eight suture ligation of the artery, a continuous suture is placed up to and just superior to the dentate line for mucopexy. The consultant surgeons performed all cases. Patients were kept in the hospital for one day and were discharged on 1st postoperative day. All patients were given routine analgesia with IV Panadol and non-steroidal anti-inflammatory drugs (NSAIDs) during their hospital stay. No postoperative antibiotics were prescribed. The conventional hemorrhoidectomy group underwent traditional open hemorrhoidectomy, involving clamping of hemorrhoidal tissue at the base. An inverted V-shaped incision is made and haemorrhoidal tissue is dissected from surrounding tissue and sphincter using scissors or electrocautery. Ligating the vascular pedicle and excision of hemorrhoids. Hemostasis was secured using cautery. Data were collected using pre-designed proformas, recording patient demographics, clinical presentation, and outcome variables, including operating time, length of hospital stay, and postoperative pain on days 1 and 7 measured using the Numerical rating scale, which is a rating scale for pain from 0 to 10, while 0 is no pain and 10 is worse pain. Statistical analysis was performed using SPSS version 26.0, with descriptive statistics calculated for all variables. Mean ± standard deviation (SD) was calculated for continuous variables and analyzed using the independent t-test. In contrast, frequencies and percentages were calculated for categorical variables. The chi-square test or Fisher's exact test was used to analyze categorical variables. With a confidence interval of 95%, a p-value of less than 0.05 was taken as significant.

RESULTS

Data of patients who underwent either Hemorrhoidectomy or Mucopexy was analyzed. The primary variables considered were age, gender, operating, length of hospital stay, postoperative pain on days 1 and 7, postoperative bleeding, and postoperative urinary retention. The data were segregated into two groups based on the type of procedure performed. In the Haemorrhoidectomy Group,

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45 patients were included, with a mean age of 48.4 ±13.9 years for female patients and 43.8 ± 14.7 for male patients as shown in Table 1.

Table 1: Age and Gender Distribution Hemorrhoidectomy Group

Gender	Mean ± SD
Female	48.4 ± 13.9
Male	43.8 ± 14.7

45 patients were included in the mucopexy group with a mean age of 47.8 ± 16.1 years for female patients and 51.8 ± 17.7 years for male patients. This group also had a higher number of male, with 35 male and 10 female, as shown in Table 2.

Table 2: Age and Gender Distribution Mucopexy Group

Gender	Mean ± SD
Female	47.8 ± 16.1
Male	51.8 ± 17.7

These results have shown that the average age of patients undergoing Mucopexy was higher as compared to those undergoing Hemorrhoidectomy. Both groups have a higher proportion of male patients. The mean operating time for the Hemorrhoidectomy group was (56.04 ± 7.52) minutes, while for the Mucopexy group, it was (40.36 ± 6.85) minutes. It was statistically significant (p=0.00000000000000078). The mean length of stay for the Hemorrhoidectomy group was (1.11 ± 0.31) days, compared to (1.02 ± 0.15) days for the Mucopexy group. This difference was not statistically significant (p=0.104). On the first postoperative day, the mean pain score for the Hemorrhoidectomy group was (7.00 ± 1.17), whereas for the Mucopexy group, it was (3.59 ± 1.15). This difference was statistically significant (p=0.000000000000000578). On the 7th postoperative day, the mean pain score for the Hemorrhoidectomy group was (2.37 ± 1.10), compared to (1.07 ± 0.25) for the Mucopexy group. This difference was also statistically significant p=0.0000000000258, as shown in Table 3.

Table 3: Summary of Continuous Variables in Both Groups

Variables	Hemorrhoidectomy (Mean ± SD)	Mucopexy (Mean ± SD)	p-value
Operating Time (min)	56.04 ± 7.52	40.36 ± 6.85	0.000000000000000078
Length of Stay (Days)	1.11 ± 0.31	1.02 ± 0.15	0.104
Postoperative Pain Day 1	7.00 ± 1.17	3.59 ± 1.15	0.000000000000000578
Postoperative Pain Day 7	2.37 ± 1.10	1.07 ± 0.25	0.0000000000258

Hemorrhoidectomy group, post-operative bleeding was observed in 6.6% of cases and 0.0% of patients in the Mucopexy group. It was not statistically significant with a p-value of less than 0.05 (p=0.256). 15.2% of patients in the Hemorrhoidectomy group had urinary retention after surgery and 2.2% of patients in the Mucopexy group. It was not statistically significant p=0.074, as shown in Table 4.

Table 4: Summary Categorical Variables Both Groups

Variable	Hemorrhoidectomy	Mucopexy	p-value
Postoperative Bleeding	3/45 (6.5%)	0/45 (0.00%)	0.256
Postoperative Urinary Retention	7/45 (15.2%)	1/45 (2.22%)	0.074

DISCUSSION

This study provides a comparative analysis of hemorrhoidectomy and Mucopexy with hemorrhoidal artery ligation (HAL) in terms of perioperative and postoperative outcomes. The findings highlight significant differences between the two procedures, with Mucopexy with HAL demonstrating advantages in key clinical parameters, particularly in reducing postoperative pain and operating time. The literature on minimally invasive treatment of haemorrhoidal diseases is growing and these results will add further to it [8, 9]. In our study, both groups consisted of 45 patients each. The mean age in the Hemorrhoidectomy group was 48.4 ± 13.9 years for female and 43.8 ± 14.7 years for male. The mean age was 47.8 ± 16.1 years for female and 51.8 ± 17.7 years for male, with a higher proportion of male (35 male, 10 female) in mucopexy with the HAL group. Alemrajabi *et al.*, reported a mean patient age of 40.9 ± 8.3 years, nearly similar to our study and almost equal male-to-female ratio [10]. Median age for HAL-RAR in another study was 47 years, while 52 years for the Milligan-Morgan hemorrhoidectomy group [11]. The demographic trends in our study align with previous studies, showing a slightly higher representation of male patients in surgical hemorrhoidal treatments [12]. Current study showed a significantly lower mean operating time for the Mucopexy with HAL group (40.36 ± 6.85 minutes) compared to the Hemorrhoidectomy group (56.04 ± 7.52 minutes) (p<0.000000000000000078). This was consistent with Sobrado *et al.*, who reported a mean operating time of 22 minutes for mucopexy procedures [12]. The faster surgical time associated with mucopexy and HAL may contribute to reduced perioperative morbidity and faster recovery. Patients in the Mucopexy with HAL group experienced significantly lower postoperative pain. The mean pain score was 7.00 ± 1.17 in the Hemorrhoidectomy group and 3.59 ± 1.15 in the Mucopexy group (p<0.000000000000000578) on the first postoperative day. By the 7th postoperative day, the pain scores had decreased to 2.37 ± 1.10 and 1.07 ± 0.25, respectively (p=0.0000000000258). These findings align

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with previous studies reporting reduced pain with Mucopexy and artery ligation techniques, likely due to the minimally invasive nature of the procedure, which involves less tissue dissection and trauma [13-15]. Alemrajabi *et al.*, reported an initial postoperative pain score of 7.06 ± 1.58 at 48 hours, consistent with our findings for the Hemorrhoidectomy group [10]. Symeonidis *et al.*, observed adequate pain control with oral analgesics but reported two cases requiring readmission for severe pain in each group [11]. Chivate *et al.*, noted that most patients undergoing mucopexy had minimal pain (VAS 1-2) [16]. Significantly lower pain scores in our study highlight the advantage of Mucopexy with HAL in reducing postoperative discomfort. Current study showed the mean length of stay for the Hemorrhoidectomy group as 1.11 ± 0.31 days, compared to 1.02 ± 0.15 days for the Mucopexy group. This difference was not statistically significant (p=0.104). Chivate *et al.*, and some other literature reported that patients undergoing transanal suture mucopexy could return to normal activities within 48-72 hours [16], whereas Milligan-Morgan hemorrhoidectomy patients required 1-6 weeks [17]. Similar trends were observed in Hemorrhoidal artery ligation has shown a lower postoperative complication rate and faster recovery than conventional hemorrhoidectomy in previously reported literature [18]. The postoperative urinary retention rate of 15.2% and 2.2% was reported in the Haemorrhoidectomy group and mucopexy group respectively with a non-significant p-value of 0.074. Reported literature has also shown non-significant results [19]. Postoperative bleeding was observed in 6.6% of cases in the Hemorrhoidectomy group, while no cases were reported in the Mucopexy group (p=0.256). Symeonidis *et al.*, recorded 2 cases of significant postoperative bleeding in the mucopexy group and 5 cases in the other group, with one case needing surgical intervention [11]. Alemrajabi *et al.*, found a bleeding incidence of 22.2% at one month in patients undergoing HAL with mucopexy, though no cases were reported at three months [10]. Chivate *et al.*, reported no recurrent bleeding with transanal suture mucopexy [16]. Overall, our findings, in conjunction with existing literature, suggest that Mucopexy with HAL offers several advantages over conventional hemorrhoidectomy, particularly in terms of reduced postoperative pain and shorter operative duration [20].

CONCLUSIONS

It was concluded that Mucopexy with HAL WAS associated with significantly reduced operating time, lower postoperative pain scores, and faster recovery compared to conventional hemorrhoidectomy. Although the difference in postoperative complications such as urinary retention and bleeding was not statistically significant, the overall trend suggests a favorable outcome with HAL-Mucopexy. These findings align with previous studies, reinforcing the benefits of less invasive surgical techniques in the management of hemorrhoidal disease. Further studies with larger sample sizes and longer follow-up periods may provide additional insights into the long-term efficacy and recurrence rates of these procedures.

Authors Contribution

Conceptualization: MA
Methodology: KR, MIS, BA, AH, SR
Formal analysis: KR, MI, BA, AH, SR
Writing review and editing: MA, KR, MIS, MI

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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