Outcome of hemorrhoid artery ligation as a novel procedure for hemorrhoidal disease, case series in Shariati hospital of TUMS

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Received: 2025-04-21; Received in revised form: 2025-04-22; Accepted: 2025-04-22

Abstract

Background: Hemorrhoidal Artery Ligation and Recto-Anal Repair (HAL-RAR) is a minimally invasive procedure designed to treat grades III and IV hemorrhoidal disease by addressing both vascular supply and tissue prolapse.

Methods: This study retrospectively evaluated patients undergoing HAL-RAR between January 2024 and January 2025. Data collected included demographics, disease severity, postoperative pain (Days 1 and 3), hospital stay, and time to first non-problematic defecation.

Results: A total of 16 patients were included. Postoperative pain was low, with 62.5% reporting no pain on Day 1 and 88% on Day 3. Median pain scores decreased over time and were not significantly affected by sex. Defecation function recovered rapidly, with 100% achieving non-problematic defecation within two days postoperatively. Age showed a non-significant trend toward delayed recovery and slightly increased pain. No major complications were observed, and all patients were discharged after one night.

Conclusions: HAL-RAR appears to be a safe, well-tolerated, and effective short-term treatment for advanced hemorrhoidal disease, offering minimal pain and rapid functional recovery. However, larger studies with control groups and long-term follow-up are required to confirm these findings and evaluate durability.

Keywords: Hemorrhoidal Artery Ligation; Recto-Anal Repair; HAL-RAR; Hemorrhoidal Disease; Minimally Invasive Surgery; Doppler-Guided Surgery

Citation: Dehghani Firoozabadi M., Yaghoubi Notash A., Dah Mardeh Ei A, Shahsavand A. **Outcome of hemorrhoid artery ligation as a novel procedure for hemorrhoidal disease, case series in Shariati hospital of TUMS.** *Acad J Surg*, 2025; 8(1): 1-5.

Introduction

Hemorrhoidal Artery Ligation and Recto-Anal Repair (HAL-RAR) is a minimally invasive surgical technique designed to treat symptomatic hemorrhoidal disease, particularly grades II-IV. This procedure combines Doppler-guided hemorrhoidal artery ligation (HAL) with recto-anal repair (RAR) to address both the vascular and prolapse components of hemorrhoids. The American Society of Colon and Rectal Surgeons (ASCRS) recommends Doppler-guided HAL for patients with internal hemorrhoids, noting that it may result in decreased pain compared to excisional hemorrhoidectomy, although it may have higher recurrence rates [1]. The procedure involves using a Doppler-equipped anoscope to identify and ligate the arteries supplying the hemorrhoids, followed by a mucopexy to lift and secure the prolapsed tissue. Clinical studies have demonstrated the effectiveness of HAL-RAR in reducing hemorrhoidal symptoms with favorable short-term outcomes. For instance, a prospective study by Hoyuela et al. reported a 93%

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symptom-free rate at 24 months' follow-up [2]. Similarly, Faucheron et al. found that HAL-RAR was effective in treating grade IV hemorrhoids, with a 9% recurrence rate over a mean follow-up of 34 months [3]. The procedure is associated with low complication rates and a relatively quick recovery. Karkalemis et al. reported a median hospital stay of 2 days and a low complication rate of 7.61%, with most patients experiencing complete symptom resolution within 12 months [4]. Additionally, a systematic review by Liew et al. indicated that non-Doppler-guided HAL-RAR is non-inferior to Doppler-guided HAL-RAR, suggesting flexibility in the approach based on available resources [5]. In conclusion, HAL-RAR is a safe and effective option for the treatment of hemorrhoidal disease, offering significant symptom relief and a low risk of complications. However, long-term follow-up studies are needed to further establish the durability of these results.

Methods

This study included patients who underwent HAL-RAR for grades III and IV hemorrhoidal disease from January 2024 to January 2025. Data collected included demographics, degree of disease, hospital stay, postoperative pain on days 1 and 3, and first non-problematic defecation. Initially, all patients underwent a thorough examination and video proctoscopy. Patients with grades I and II were treated medically. Patients with grade III who had indications for surgery, such as uncontrolled bleeding or suspected necrosis of the hemorrhoidal mass, were considered candidates for surgery. Other grade III patients initially received one course of medical treatment (including stool softeners, lidocaine gel, diltiazem gel, and Daflon). Those who did not respond to this treatment, as well as patients with grade IV hemorrhoids, were included in the study. All procedures were performed using a single device. Hemorrhoidal masses were ligated at three points, and, in addition, patients with surgical indications underwent resection of the masses. A limited rectoanal repair was performed for all patients. All patients were hospitalized for one night post-procedure.

Results

The outcomes of the Hemorrhoidal Artery Ligation and Recto-Anal Repair (HAL-RAR) procedure were assessed through postoperative pain and time to first non-problematic defecation, with analyses stratified by time, sex, and age. Pain was measured on a 0–10 numerical rating scale on Day 1 and Day 3 post-procedure. Figure 1 illustrates pain distributions via violin plots, revealing a median score of 0 on Day 1 (interquartile range [IQR], 0 to 1), which decreased to 0 on Day 3 (IQR, 0). This suggests a trend toward reduced pain over time, though not a significant decline in intensity. Recovery of defecation function was rapid, as the proportion of patients achieving their first non-problematic defecation rose steeply, reaching 100% by Day 2 post-procedure, with the majority occurring within the first day (Figure 2). Sex-based comparisons revealed no significant differences in pain outcomes. On Day 1 (Figure 3), females (n = 10) exhibited a median pain score of 1 (IQR, 0 to 1), while males (n = 6) reported 0 (IQR, 0). The difference was not significant ($p > 0.05$). By Day 3 (Figure 4), median scores for both sexes approached 0. Similarly, Figure 5 indicates no significant sex-based difference in time to first non-problematic defecation ($p > 0.05$). Figure 8 demonstrates a positive trend between age and time to non-problematic defecation, suggesting poorer outcomes in older patients, though not significant. Figure 9 examines pain change (Day 1 to Day 3) versus age, yielding a moderate positive correlation ($r = 0.5$, $p = 0.052$), marginally non-significant, indicating older patients are prone to experience

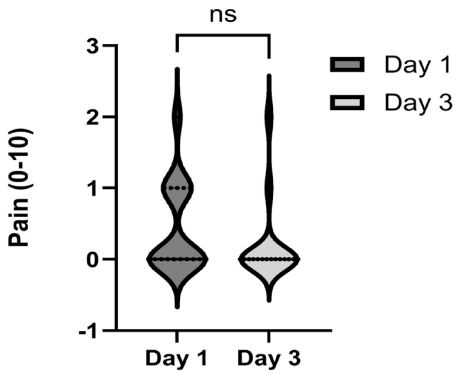

Fig. 1: Post-operative pain (visual analog scale, 0-10) on days 1 and 3 show low levels associated with Hemorrhoidal Artery Ligation and Recto Anal Repair

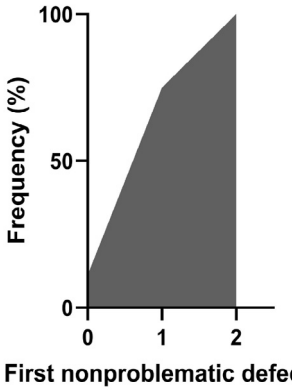

Fig. 2: Post-operative cumulative frequency of nonproblematic defecation shows complete recovery by day 2

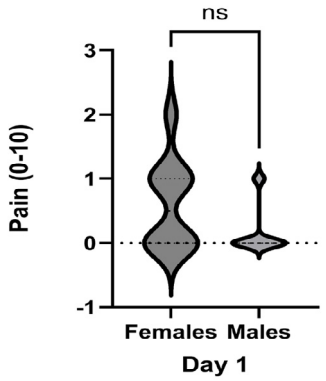

Fig. 3: Post-operative pain (visual analog scale, 0-10) shows low levels for both males and females on day 1

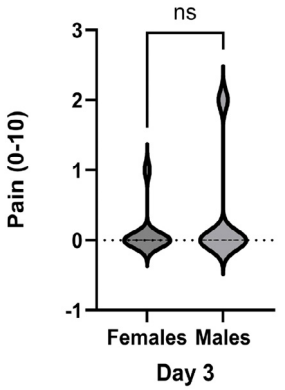

Fig. 4: Post-operative pain (visual analog scale, 0-10) shows low levels for both males and females on day 3

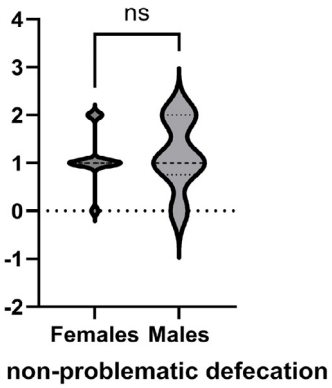

Fig. 5: Defecation recovery happens within two days for males and females

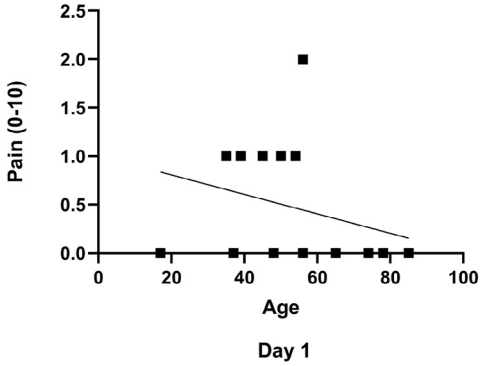

Fig. 6: Association of day 1 post-operative pain (visual analog scale, 0-10) with age

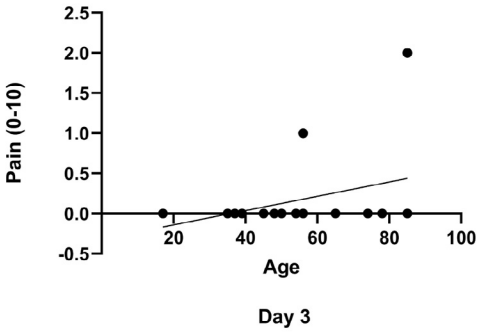

Fig. 7: Association of day 3 post-operative pain (visual analog scale, 0-10) with age

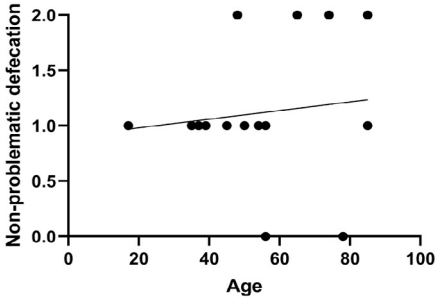

Fig. 8: Association of defecation recovery with age

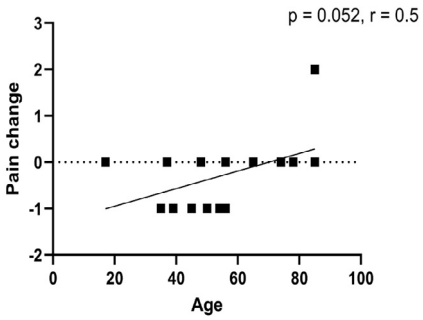

Fig. 8: Association of post-operative pain (visual analog scale, 0-10) recovery with age

a slight pain increase post-operation. In summary, HAL-RAR is associated with low postoperative pain, stable between Day 1 and Day 3, and rapid defecation recovery, with comparable outcomes for both genders. Age-related trends suggest subtle influences—slight increases over time in older patients—yet lack statistical significance.

Discussion

While surgical hemorrhoidectomy is the established treatment for hemorrhoidal disease, it presents a substantial postoperative pain burden and a 15% complication rate [6]. Analysis of our findings reveals that the absence of pain on Day 1 post-operation was reported by 62.5% of patients undergoing HAL-RAR. Although minimal pain (VAS of 1 or 2) is reported by some patients on the first day, this generally resolves by Day 3, at which point 88% report the absence of pain. Moreover, rapid recovery of defecation was observed, with 100% of patients reporting normal defecation after two attempts. While patients in our study demonstrated excellent recovery compared to similar studies [1, 7, 8], we observed a trend for slower recovery in older patients, which might also point to increased complications for these patients in the future. Rigorous monitoring, increased analgesics, and patient-specific care plans for elderly patients may improve their course of recovery and prevent complications [9]. In contrast to the postoperative pain often associated with other hemorrhoid treatments, the minimally invasive HAL-RAR procedure is largely painless, as all manipulations and sutures are confined to the endoanal region above the dentate line [2]. This technique's minimally invasive nature also facilitates ambulatory patient management. Existing literature suggests that HAL-RAR shows promising safety and efficacy in the management of hemorrhoid patients [10, 11]. In addition to low post-operative pain, studies report recurrence rates as low as 3–23% within two years, with high satisfaction rates [2, 12, 13]. While complications are reported for HAL-RAR, especially pain and bleeding, their frequency is relatively low (5–15%) [2]. Also, as Lauricella et al. demonstrated, HAL-RAR results in increased quality of life in comparison to stapled hemorrhoidopexy [12]. Our study has important limitations. First, we report results of HAL-RAR on a limited number of patients, and we did not have a control group. This may lead to overestimation of the efficacy of HAL-RAR. Second, our patients were from a single surgical center, with low sociodemographic variance, and may not represent the general population. Application of our results in other centers must be done with caution. Third, we only assessed immediate outcomes after surgery. Our results are not meant to be interpreted in the context of long-term efficacy and safety of the HAL-RAR technique, as our study lacks follow-up of patients.

Conclusion

HAL-RAR is a safe and effective minimally invasive technique for treating hemorrhoidal disease, offering low rates of short-term problems and low rates of hospitalization. However, this study has limitations, including a small number of cases and the absence of a control group, which will be addressed in future studies. Additionally, long-term follow-up studies are needed to evaluate long-term results and complications.

References

1. Hawkins AT, Davis BR, Bhama AR, Fang SH, Dawes AJ, Feingold DL, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Hemorrhoids. Dis Colon Rectum. 2024 May 1;67(5):614-623. https://doi.org/10.1097/dcr.0000000000003276
2. Hoyuela C, Carvajal F, Juvany M, Troyano D, Trias M, Martrat A, et al. HAL-RAR (Doppler guided haemorrhoid artery ligation with recto-anal repair) is a safe and effective procedure for haemorrhoids. Results of a prospective study after two-years follow-up. Int J Surg. 2016 Apr;28:39-44. https://doi.org/10.1016/j.ijsu.2016.02.030
3. Faucheron JL, Poncet G, Voirin D, Badic B, Gangner Y. Doppler-guided hemorrhoidal artery ligation and rectoanal repair (HAL-RAR) for the treatment of grade IV hemorrhoids: long-term results in 100 consecutive patients. Dis Colon Rectum. 2011 Feb;54(2):226-31. https://doi.org/10.1007/dcr.0b013e318201d31c
4. Karkalemis K, Chalkias PL, Kasouli A, Chatzaki E, Papanikolaou S, Dedemadi G. Safety and effectiveness of hemorrhoidal artery ligation using the HAL-RAR technique for hemorrhoidal disease. Langenbecks Arch Surg. 2021 Nov;406(7):2489-2495. https://doi.org/10.1007/s00423-021-02190-0
5. Liew AN, Wang J, Chen MZ, Tay YK, Kong JCH. Haemorrhoid artery ligation - recto anal repair (HAL-RAR) blind versus Doppler: a systematic review and meta-analysis. ANZ J Surg. 2024 Nov;94(11):2053-2061. https://doi.org/10.1111/ans.19258
6. Hardy A, Chan CL, Cohen CR. The surgical management of haemorrhoids--a review. Dig Surg. 2005;22(1-2):26-33. https://doi.org/10.1159/000085343
7. Giordano P, Tomasi I, Pascariello A, Mills E, Elahi S. Transanal dearterialization with targeted mucopexy is effective for advanced haemorrhoids. Colorectal Dis. 2014 May;16(5):373-6. https://doi.org/10.1111/codi.12574
8. Jeong WJ, Cho SW, Noh KT, Chung SS. One Year Follow-up Result of Doppler-guided Hemorrhoidal

Artery Ligation and Recto-Anal Repair in 97 Consecutive Patients. J Korean Soc Coloproctol. 2011 Dec;27(6):298-302. https://doi.org/10.3393/jksc.2011.27.6.298

9. Yamamoto M, Ikeda M, Matsumoto T, Takemoto M, Sumimoto R, Kobayashi T, et al. Hemorrhoidectomy for elderly patients aged 75 years or more, before and after studies. Ann Med Surg (Lond). 2020 May 16;55:88-92. https://doi.org/10.1016/j.amsu.2020.04.045
10. Al Zagryadskiy E, Gorelov SI. Transanal doppler-guided hemorrhoidal artery ligation and recto anal repair vs closed hemorrhoidectomy for treatment of grade III-IV hemorrhoids. a randomized trial. Pelviperineology. 2011;30(4):107.
11. Elmér SE, Nygren JO, Lenander CE. A randomized trial of transanal hemorrhoidal dearterialization with anopexy compared with open hemorrhoidectomy in the treatment of hemorrhoids. Dis Colon Rectum. 2013 Apr;56(4):484-90. https://doi.org/10.1097/dcr.0b013e31827a8567
12. 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 Feb 22;39(1):30. https://doi.org/10.1007/s00384-024-04603-0
13. Avellaneda N, et al. Tratamiento no resectivo de la enfermedad hemorroidal: HAL RAR ¿Una alternativa? Rev Argent Coloproctol. 2021;32(01). https://doi.org/10.46768/racp.v0i0.42