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ORIGINAL ARTICLE

# Clinical complications of hemorapy device versus Milligan-Morgan hemorrhoidectomy in patients with hemorrhoids in 2017-2018

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## Abstract

**Introduction:** Hemorrhoids can be managed by means of several therapeutic options. Regarding this, it is of fundamental importance to identify the hemorrhoidectomy method with fewer complications (e.g., bleeding, pain, and postoperative infections) or beneficial outcomes (e.g., accelerated speed of wound healing and resumption of normal life activities). Such knowledge can play a significant role in the advancement of medical and educational goals. Therefore, the present study was conducted to compare the clinical results of Milligan-Morgan surgery and hemorapy device in the treatment of patients with hemorrhoids.

**Methods:** This prospective study was conducted on 60 patients aged over 20 years with hemorrhoids referring to Bahonar and Afzalipour hospitals of Kerman, Iran, and diagnosed to need surgery by a surgical specialist. The study population was selected using a simple randomization method and then allocated into two groups of A and B, regardless of gender. Group A was operated by open or Milligan-Morgan technique, while group B was subjected to hemorapy method. After the surgery, the patients' data were recorded in specific forms and analyzed by SPSS software (version 21).

**Results:** Out of 60 patients with hemorrhoids, 37 (64%) cases were male. Regarding the severity of hemorrhoids, 19 (32%) and 41 (68%) patients had fourth-degree and third-degree hemorrhoids, respectively. The mean age of the patients was 35.86±12.84 years. Four weeks after the surgery, the mean pain scores of the patients in the Milligan-Morgan and hemorapy groups were 3.67±1.84 and 1.67±1.35, respectively, showing a statistically significant difference (P=0.001). However, 8 weeks post-surgery, no pain, bleeding events, urinary retention, or incontinence were observed in the patients, except for anal stenosis in two patients treated with Milligan-Morgan method.

**Conclusions:** According to the results, hemorapy method resulted in lower postoperative pain than Milligan-Morgan method. In addition, the hemorapy technique was accompanied by considerably fewer complications, such as bleeding, urinary retention, gas incontinence, and stenosis, compared to the Milligan-Morgan method. Consequently, hemorapy method can be recommended for hemorrhoidectomy.

**Key words:** Hemorapy, Hemorrhoids, Milligan-Morgan, Postoperative complications

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## Introduction

Hemorrhoids have been known as a human disease for centuries. Studies show that currently, 50% of people aged 50 years or older have hemorrhoids. However, many patients, especially in communities such as Iran, do not readily refer to a physician due to social and religious circumstances (1). Located in the anal canal, hemorrhoids are cushions of soft subepithelial tissue that include venules, arterioles, and smooth muscle fibers. Three hemorrhoidal cushions are on the left, right anterior, and posterolateral positions (2).

Because hemorrhoids are part of the natural anorectal anatomy, treatment is indicated only for symptomatic patients. High strain, high abdominal pressure, and stiff excretion cause congestion and dilation of the hemorrhoidal network whereby the hemorrhoidal tissue would bulge (3). Although hemorrhoid treatment requires medical and non-surgical procedures in most of the cases, surgical procedures are inevitable to treat 1 out of every 10 cases of hemorrhoids. Surgery is especially useful in cases that are developed below the pectinate line (4) because unlike non-surgical procedures, surgical treatment involves anesthesia to prevent pain. Surgical approaches for the removal of hemorrhoids consist of many types and methods. However, all of them usually involve hemorrhoid removal or blood supply restriction to shrink and eventually eliminate the hemorrhoid (5).

Hemorrhoidectomy is a large-scale operation that is used to remove internal and external third- and fourth-degree hemorrhoids, extensive external hemorrhoids, or combined types. The most effective treatment for hemorrhoids is hemorrhoidectomy if one accepts the potential adverse effects (6). This surgery is performed in two different ways, namely open and closed (7). It should be noted that both closed hemorrhoidectomy (Ferguson) and open hemorrhoidectomy (Milligan-Morgan) can be equally effective and safe (8). However, the closed procedure will be more satisfactory to the patients in the long run, compared with the open procedure. Nonetheless, both procedures may lead to severe postoperative pain (9).

In open hemorrhoidectomy, the affected area is incised and removed in a similar manner to the closed procedure (10), except that the site is not fully sutured, allowing it to remain open until it heals and closes by itself (11). Sometimes, however, the physician may find that an incised site left open may increase the chance of infection and that the site is less likely to close spontaneously. Therefore, s/he may prefer to suture the site and complete the surgery with an open and closed combination procedure (12).

To minimize or prevent post-hemorrhoidectomy pain, scientists have developed other methods that reduce the severity of pain associated with vascular closure and require less postoperative care (13). Because of its side effects, hemorrhoidectomy is recommended more frequently in emergencies and when the treatment has failed in medical and less invasive procedures (14). In open hemorrhoidectomy (Milligan-Morgan), due to amputation or damage to the anal canal sphincters, the pressure in the duct is likely to decrease and cause some degrees of gas and stool incontinence in the patient (15). In hemorrhoid electrotherapy (hemorapy), no tissue is removed, rather a needle is inserted into the hemorrhoid button, and the hemorrhoid is treated with a mild flow of electricity. Therefore, no apparent damage to the anal canal sphincters should occur whereby the sphincter pressures should remain constant, and the anal canal physiology is preserved (16).

To the best of our knowledge, no studies have yet addressed the comparison of Milligan-Morgan and hemorapy procedures. Accordingly, no information is available on the superiority of these two methods over each other. There are a number of studies comparing hemorrhoid surgical procedure and hemorapy. In the surgery, similar to other branches of medical science, there are different surgical treatments for most of the diseases. However, what makes a surgical procedure more widely employed by physicians is the patient's satisfaction with the surgical procedure, which is itself a function of fewer postoperative complications and improved speed of returning to normal life (17).

As mentioned, there are several surgical procedures for the treatment of hemorrhoids. Therefore, it will be highly relevant to determine the hemorrhoidectomy procedure that has a better and faster trend in terms of complications (e.g., less bleeding, postoperative pain, and infection), speed of wound healing, and resumption of normal life activities. In line with this objective, the present study was conducted to compare the clinical outcomes of Milligan-Morgan and hemorapy in patients with hemorrhoids, hoping to provide valuable and practical results in this field.

## Methods

The project is a prospective study with the ethics code of IR.KMU.AH.REC.1397.108. Our study population consisted of 60 patients with hemorrhoids referring to the Bahonar and Afzalipur hospitals of Kerman, Iran, and diagnosed



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to need surgery by a surgical specialist. The study population was selected via simple randomization method. The patients, who were all above 20 years of age, were allocated into two groups of A and B, regardless of their gender. Group A was operated by open or Milligan-Morgan procedure, while group B was subjected to hemorapy.

A series of information forms (collecting information on age, gender, degree of hemorrhoid, pain, bleeding, urinary retention, gas incontinence, anal stenosis, personal information, patient address, and telephone number) were prepared for each group before and after the procedure. For each patient, two duplicates of the forms were completed, one recorded in the patient's medical record for further studies and one being provided by the main author of the project and colleagues. The surgery in both groups was performed by a surgeon who was the attending surgeon of the project and did the surgery completely from the incision to the last suture.

In the Milligan-Morgan surgical procedure, the hemorrhoid cushions and associated extra mucosa were identified and excised through a circular incision. Then, the tip of the hemorrhoid network was ligated, and the hemorrhoid was excised. It was left open and allowed to recover in the secondary stage. In the hemorapy procedure, however, after the implementation of anorectal examination by an anoscope and determination of hemorrhoid type and degree, the surgeon inserted the hemorapy device electrode through the anoscope with its tip entering into the hemorrhoid root. The current severity was intensified using the buttons on the control panel until the hemorrhoid tissue began to discolor or gas out. After the treatment, the flow was reduced to zero mA once again, and the device was shut down. After 10-14 days, the hemorrhoid tissue would disappear without leaving any scars or traces.

The preoperative and intraoperative data for each patient were recorded in a specific form, and the postoperative information was recorded within the first 24 h post-surgery, as well as in the first visit performed a week after patient discharge. Sufficient explanations were given to the patients about all possible complications. Using the phone number or address recorded in the patients' files, the researchers inquired about the complications occurring 24 h post-surgery, as well as 1, 4, and 8 weeks after the surgery.

The first visit was conducted 24 h after the surgery in the surgical ward and before discharge. The second visit was made a week later in the surgical clinic or the researcher's office or by telephone. Furthermore, the third and fourth visits were performed 4 and 8 weeks later in the surgical clinic or office or by telephone for patients who did not refer. The patients were also advised to refer to the emergency department of the respective hospital or call the research colleague if any of the complications noted would present after discharge.

***Statistical analysis***

The data were analyzed in SPSS software (version 21) using descriptive and analytical statistical tests. Descriptive statistical tests included mean, standard deviation, and frequency, while the analytical statistical tests comprised Mann-Whitney U and Friedman tests. A p-value less than 0.05 was considered statistically significant.

## Results

Out of 60 patients with hemorrhoids, 37 (64%) cases were male. With regard to the severity of the hemorrhoids, 19 (32%) and 41 (68%) patients had fourth-degree and third-degree hemorrhoids, respectively. The mean age of the patients was 35.86±12.84 years. As Table 1 indicates, the two groups are homogeneous in terms of gender (P=0.012), degree of hemorrhoid (P=0.224), and age (P=0.023).

The results showed no significant difference between the two groups immediately after the surgery in terms of the mean pain (P=0.74; Table 2). However, from 24 h to 8 weeks postoperatively, the patients who underwent surgery through the Milligan-Morgan method were more likely to experience pain than those treated by the hemorapy procedure (P=0.001 and P=0.045). The results of the Friedman test also showed a significantly decreasing trend of pain in both groups (P=0.001).

As Table 3 indicates, 9 (36%) patients in the Milligan-Morgan group and only one patient in the hemorapy group had bleeding immediately after the surgery, showing a significant difference in this regard (P=0.023). Although the postoperative

**Table 1: Homogeneity of study groups**

| Variable | Surgical procedure | | P-value |
|---|---|---|---|
| | Milligan-Morgan | Hemorapy | |
| | Gender | | |
| Male | 21 (56.75%) | 16 (43.25%) | 0.012 |
| Female | 9 (39.13%) | 14 (60.87%) | |
| | Hemorrhoid degree | | |
| 4 | 10 (52.63%) | 9 (47.37%) | 0.224 |
| 3 | 26 (63.59) | 15 (36.59%) | |
| Age | 34.67±11.65 | 35.94±12.84 | 0.023 |



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**Table 2: Comparison of postoperative pain 24 hours and one, four, and eight weeks after surgery in Milligan-Morgan and hemorapy methods and its trend in each group**

| Timepoint | Group | | Mann-Whitney U statistic (p-value) |
|---|---|---|---|
| | Milligan-Morgan | Hemorapy | |
| Immediately after surgery | 84.68±7.2 | 67.84±7.3 | 0.74 |
| 24 h after surgery | 74.94±6.2 | 88.57±5.3 | 0.045 |
| One week after surgery | 42.78±5.1 | 67.95±3.2 | 0.001 |
| Four weeks after surgery | 67.84±3.1 | 67.35±1.1 | 0.001 |
| Eight weeks after surgery | 12.57±1.0 | 55.74±0.0 | 0.001 |
| Freidman statistic (p-value) | 0.001 | 0.001 | |

The digits in bold indicate a p-value that is significant at the 0.05 level.

**Table 3: Comparison of bleeding, urinary retention, gas incontinence, and anal stenosis 24 hours, and one, four, and eight weeks after surgery between Milligan-Morgan and hemorapy groups**

| Timepoint | Bleeding | | | Urinary retention | | | Gas incontinence | | | Anal stenosis | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| After surgery | Milligan-Morgan | Hemorapy | P-value | Milligan-Morgan | Hemorapy | P-value | Milligan-Morgan | Hemorapy | P-value | Milligan-Morgan | Hemorapy | P-value |
| Immediately | 9 (36%) | 1 (4%) | 0.023 | 13 (52%) | 5 (20%) | 0.039 | 6 (24%) | 2 (8%) | 0.051 | 0 (0) | 0 (0) | 1 |
| 24 h | 8 (32%) | 0 (0) | 0.001 | 15 (60%) | 4 (16%) | 0.012 | 6 (24%) | 1 (4%) | 0.001 | 0 (0) | 0 (0) | 1 |
| One week | 4 (16%) | 0 (0) | 0.001 | 0 (0) | 0 (0) | 1 | 1 (4%) | 0 (0) | 0.524 | 0 (0) | 0 (0) | 1 |
| Four weeks | 3 (12%) | 0 (0) | 0.001 | 0 (0) | 0 (0) | 1 | 1 (4%) | 0 (0) | 0.524 | 2 (12%) | 0 (0) | 0.049 |
| Eight weeks | 0 (0) | 0 (0) | 1 | 0 (0) | 0 (0) | 1 | 0 (0) | 0 (0) | 1 | 2 (8%) | 0 (0) | 0.049 |

The digits in bold indicate a p-value that is significant at the 0.05 level.

bleeding frequency in both groups showed a decreasing trend, the number of cases was always significantly higher in the Milligan-Morgan group until 8 weeks post-surgery when there was no bleeding in the two groups. Postoperative urinary retention occurred in 13 (52%) patients in the direct surgery group, whereas in the hemorapy group, 5 (20%) patients presented this complication. Nonetheless, the difference between the groups was not statistically significant (P=0.039). Urinary retention occurred for 13 (52%) patients in the Milligan-Morgan group immediately after the surgery, whereas in the hemorapy group, only 5 (20%) patients experienced the complication. The difference between the groups was statistically significant in this regard (P=0.039).

Twenty-four hours after the surgery, the incidence of urinary retention was observed in 15 patients in the Milligan-Morgan group, which was significantly higher than the four cases in the hemorapy group (P=0.012). However, the complication stopped in both groups after a week. Gas incontinence was also significantly higher in the Milligan-Morgan group than in the hemorapy group 24 h after the surgery (P=0.001). Concerning other parameters, the two groups had no significant difference. Anal stenosis was one of the complications that mostly confirmed the inefficacy of the Milligan-Morgan surgical procedure, compared to hemorapy. This complication occurs basically after several weeks of hemorrhoid surgery in some patients. In our study, anal stenosis occurred only in two patients operated by means of the Milligan-Morgan's method after 4 weeks (P=0.049).

## Discussion

The results showed that the mean postoperative pain was not significantly different between the two groups. However, bleeding and urinary retention rates were significantly higher in the patients who underwent Milligan-Morgan procedure. On the other hand, gas incontinence showed no significant difference although the rate was higher in the patients undergoing the Milligan-Morgan procedure. The results of a study performed by Greenberg et al. (18) demonstrated that post-hemorrhoidectomy pain was significantly higher in the patients undergoing Milligan-Morgan than in those subjected to hemorapy and Ferguson methods. Moreover, bleeding, urinary retention, and gas incontinence occurred more frequently in these patients. Scheyer et al. found similar results to those of our study, showing that the rates of postoperative pain, bleeding, urinary retention, and voluntary gastric emptying were significantly higher in patients undergoing the Milligan-Morgan procedure (19).

The mean pain scores 24 h after the surgery were 6.74±2.94 and 5.88±3.57 in the Milligan-Morgan and hemorapy groups, respectively, where the score was significantly higher in the patients undergoing the Milligan-Morgan surgery. The

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incidence rates of postoperative complications, bleeding, urinary retention, gas incontinence, and anal stenosis were also significantly higher in patients who underwent the Milligan-Morgan procedure. In the same vein, the results obtained by Ramirez et al. (20) and Charua et al. (21) are in line with our findings.

Mean pain scores after one week of surgery were respectively 5.42±1.78 and 3.67±2.95 in the Milligan-Morgan and hemorapy groups, showing a significantly higher rate in the Milligan-Morgan group. Furthermore, after one week of the surgery, bleeding was significantly higher in the Milligan-Morgan patients, although urinary retention and gas incontinence rates were not significantly different between the two groups.

No complaint of pain was recorded in the groups after 8 weeks; therefore, there was no difference between them in this regard. Moreover, anal stenosis was observed in two patients who underwent the Milligan-Morgan procedure. The results obtained by Gallese et al. showed that after 2 months, patients had a partial recovery from pain, compared to that of the preoperation phase. However, in the mentioned study, the pain was relieved at a significantly slower rate in patients undergoing Milligan-Morgan procedure. In addition, Bursics et al. showed that patients who underwent hemorrhoidectomy via the Milligan-Morgan method had significantly greater anal stenosis.

## Conclusions

The results showed that the rate of postoperative pain in the hemorapy procedure was considerably lower than in the conventional Milligan-Morgan method. Furthermore, such complications as bleeding, urinary retention, gas incontinence, and anal stenosis were significantly lower in the hemorapy procedure, as compared to those in the Milligan-Morgan method. Therefore, given the few side-effects and significant benefits of hemorapy and consequently the patient satisfaction with this procedure, this technique can be used along with or in place of other conventional methods. In addition, by incorporating this method into the educational curriculum of general surgery specialty, the ground can be provided for training and promoting this treatment procedure in all academic training centers.

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## Conflict of Interest

There is no conflict of interest to be declared.

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