Original Article

**Hemorrhoidal Ablation and Fixation: An Alternative Procedure for Prolapsing Hemorrhoids**

**Author**

**Dr Smita Uday Vaidya**
Address: Procto Clinic Sai Suman Hospital, Plot No. 10, Vasant Vihar, Behind Awanti Nagar, Near Old Pune Naka, Solpaur - 413001 Maharashtra

**ABSTRACT**

**Background:** Many new techniques have been evolved to curb the problem of postoperative pain after hemorrhoidectomy. Stapler hemorrhoidopexy and doppler guided hemorrhoidal artery ligation are the two methods gaining popularity amongst proctologists. The author proposes another technique called radiofrequency ablation and fixation of hemorrhoids to add to this list.

**Patients and Methods:** The surgical technique and clinical follow-up of 410 patients operated by this technique are presented. A Ellman radiofrequency generator was used for hemorrhoidal ablation. Post defecation pain and pain at rest were assessed using a visual analogue scale. Patient satisfaction score was calculated at the mean follow up of 60 months (range 48 to 72 months). The results in terms of mean hospital stay, postoperative pain, postoperative complications, period of incapacity for work were compared with the published data of results of stapled hemorrhoidectomy and Doppler guided hemorrhoidal artery ligation.

**Results:** Pain score at first evacuation was 6. The post defecation pain score in the first week was 4 (range 3-6) and it was 3 (range 2-5) in the second week. The mean pain score at rest in the first week was 2 (range 1-4) and 1 (range 0-2) in the second postoperative week. 94.5% patients expressed their satisfaction with the procedure.

**Conclusion:** Early results of this technique of radiofrequency ablation and fixation of hemorrhoids hold positive promises in terms of less postoperative pain, early discharge from the hospital and faster return to work. The results are comparable to stapled hemorrhoidectomy and are better than Doppler guided hemorrhoidal artery ligation in terms of effectiveness and symptomatic relief on long-term basis.

**Keywords:** Stapled hemorrhoidectomy Doppler guided hemorrhoidal artery ligation Radiofrequency Hemorrhoids Pain.

**INTRODUCTION**

The control of post hemorrhoidectomy pain has always been the focal point of concern for the surgeon. Different techniques have been attempted to tackle this problem. This has led to introduction of newer techniques like stapled hemorrhoidectomy (SH) and Doppler guided hemorrhoidal artery ligation (DGHAL), which claim success in minimizing pain, reducing bleeding, and avoiding postoperative complications. However, their effectiveness, safety, and long-term results are still open to debate. Hemorrhoids are regarded as cushions of fibrous and vascular tissue present in the anal canal,
which help in maintaining the anal continence. These cushions produce symptoms when there is a pathological enlargement and fragmentation of the connective tissues within the cushions, leading to their distal displacement causing prolapse and bleeding. A method, which would help the hemorrhoidal cushions to return to their normal size and fixed at their usual positions in the course of obscuring the hemorrhoidal vascular components, should be a logical approach.

Attempting in this direction, a method of fixation of the hemorrhoids to reposition the hemorrhoidal cushions back to their original positions is being practiced since long. A technique of ligation-anopexy [hemorrhoid lift] had been found successful in dealing with the advanced degree of hemorrhoids. Miles used to leave the hemorrhoids distal to the ligature at the pedicle, allowing the hemorrhoids to slough off. Serdev advocated a method of suturing ligation of hemorrhoids without their excision. He used absorbable sutures, placing them above the dentate line to fix the anal cushion back to the internal sphincter. He claimed that the stitch reduces the hemorrhoidal blood supply and obliterates the bulk of the pile mass. Gaj proposed transfixed correction of hemorrhoids. The author has adapted these time-tested methods with a modification, whereby the hemorrhoids are ablated by using radiofrequency waves before carrying out the suture fixation of hemorrhoidal cushions to the underlying structures.

The present study elaborates the operative technique, postoperative events, and early and late complications of this modified procedure. There is also an attempt to compare the outcome of this procedure with published data on the technique namely stapled hemorrhoidectomy, and Doppler guided hemorrhoidal artery ligation.

**MATERIALS AND METHODS**

This study was carried out at Procto Clinic Sai Suman Hospital, Solapur, Maharashtra, India for 410 consecutive patients with advanced hemorrhoids [Grade III and Grade IV] admitted for elective surgery between June 2007 and May 2011 were enrolled for this study. The patient demographics are given in Table 1. Patients operated for hemorrhoids in the past, patients taking anti-platelet medicines or having acute thrombosed hemorrhoids were excluded from the study. Detailed clinical and anoscopic examination was carried out before the procedure. An informed consent was obtained from all the patients after explaining them the details about the procedure. Two tablets of bisacodyl were administered on the night before the procedure. The patients underwent spinal anesthesia.

**The Radio surgical Unit** - A Ellman Dual Frequency 4MHz radiofrequency generator [Ellman International – Oceanside, New York] was used for ablation of hemorrhoids. The unit is provided with a handle to which different electrodes could be attached to meet the requirements of the procedure. A ball electrode meant for coagulation was used in this procedure.

**Operative technique**

The procedure was performed with the patient in a gynecological position. The three skin tags corresponding to three principal sites of hemorrhoidal cushions, namely 3, 7 and 11O clock position were held with artery forceps and retracted out to visualize and deal with the hemorrhoids. Beginning at the pedicle, the complete hemorrhoidal mass was evenly ablated by using radiofrequency waves into heat. This ablation causes abolition of blood flow of the tissue under focus of these waves and final healing is achieved by way of cicatrisation. The radiofrequency generator produces radio wave, which passes down from an uninsulated electrode tip to the targeted tissues and generates changes in the direction of ions within the tissue fluid. This creates ionic agitation and frictional heating. This process drives out the extra and intracellular water from the tissue, and ultimately destroys the tissue by coagulative necrosis. This phenomenon is called as cellular volatilization.
coagulated by gradually rotating the ball electrode. The output power intensity of the radiofrequency generator was so adjusted as to produce shrinkage of the tissues without creating a char. The gradual change of hemorrhoids to dusky white color (blanching) indicated satisfactory coagulation necrosis. Care was taken to avoid charring of rectal mucosa or the anoderm by precisely targeting the hemorrhoidal mass. These precautions helped to avoid undue fibrosis and anal narrowing, a complication, which is often encountered after such procedures.16.

After achieving the desired ablation, the hemorrhoidal mass was under-run with absorbable suture (No. 4246 Ethicon UK). Beginning from the distal end of the hemorrhoid just proximal to the dentate line, the suturing was carried towards the hemorrhoid pedicle in a continuous locking manner. A knot was tied at the hemorrhoidal pedicle to secure this fixation. All the hemorrhoids were dealt with in a similar fashion in a single session. Whenever a secondary hemorrhoid was found associated at any specific position such as at 6'O clock, it was similarly dealt with. The patients were assessed after 6 hours of the procedure and were allowed to go home if they were found to have pain within tolerable limit and had passed urine. It was not considered necessary to wait for the first bowel movement before discharge. In the postoperative course, patients were prescribed a standard regimen of two teaspoonful of Paraffin oil with Milk of Magnesia [Syp Crimaffin] at bedtime for 4 weeks. Pain was controlled with tablets of Tramadol Hydrochloride (Contramal) 50 mg two times a day with an extra dose if required, but never more than three per day.

Postoperative pain was assessed using a visual analogue scale (VAS) from 0 to 10, with zero referring to absence of pain and 10, the maximum pain experienced by the patient anytime in the past. Patients were provided with a diary in which they were asked to enter the pain score immediately after defecation and then again after 6 hrs (pain at rest) every day until 4 weeks after the procedure.

Outpatient follow up was carried out at 1, 2 and 8 weeks after the procedure. Patients were subsequently followed up to 5 years to note late complications like continence disorder, recurrence of hemorrhoids and development of any new symptoms. Patient satisfaction was assessed using a 5-point scale (1=very satisfactory, 5= very unsatisfactory). These data were recorded by an independent observer in person with patients attending the clinic or by postal correspondence with patients unable to report personally.

RESULTS

The mean operative time was 7 minutes, ranging between 5 and 9 minutes. The mean hospital stay was 7 hours. (Range 6-18 hours).

Post operative pain- The mean post defecation pain score was 4 in the first week [range 3 to 6]. In the second week the pain score was 3 [range 2 to 5]. The post defecation pain score was between 0 and 1 in the third week, while less than 1% patients had post defecation discomfort at the end of 4 weeks.[Figure 1]

Pain at rest- The mean pain score in the first week was 2 (range 1 to 4) on the visual analogue scale and 1 (range 0 to 2) in the 2nd week. 80% patients did not require any additional dose of analgesics. In the remaining, one extra dose of Tramadol provided adequate relief. None of the patient had any pain at rest at the end of 3rd week. [Figure 2]

The mean analgesic tablet requirement was 21 tablets (range 14-29)

Bowel movements- 86% patients could pass stool within 24 hours of the procedure.

Duration of incapacity to work- 322 patients [78%] could resume their routine as early as on the 7th postoperative day. The remaining patients required about 2 weeks time to return to work.

Complications-

Retention of urine- 7 male patients [2%] had retention of urine requiring catheterization. No dwelling catheter was needed.
Hemorrhage- One patient returned with spontaneous rectal bleeding on the 6th postoperative day. He was readmitted. He responded well to conservative treatment with local compression and haemostatic medication. He had an uneventful recovery thereafter.

Perianal Thrombosis- 12 patients [3%] developed perianal thrombosis at the sites of hemorrhoidal fixation. Patients were asked to apply cold compresses over the site, which relieved them of the pain and swelling.

Anal Narrowing- Soft stricture was found in 2 patients during digital examination at the 2-week follow-up. Digital dilatation was performed in the office. Such narrowing was not noticed in the subsequent follow-up.

Wound healing- The wounds were found to be healed at the 2-week follow-up in 94% of the patients.

Incontinence – 9 (2%) patients complained of incontinence for flatus in the first two weeks, which was self-limiting. None of the patients complained of fecal incontinence.
None of the patients developed any septic complication like wound infection, abscess, or fistula formation. None of the patient developed anal fissure.

During a mean follow-up of 60 months (range 48-72 months), all patients showed symptomatic improvement. None of the patient had any stricture or continence disorder. 11(2.6%) patients had residual anal skin tags, 5(1%) patients had intermittent bleeding episode and one patient complained of hemorrhoidal prolapse. 94.5% patients expressed their satisfaction with the treatment. {Mean satisfaction score 3.7(SD 0.9)}

Table 1- Patient demographics

|                     | Mean age in years [range] | Mean duration of disease in years [range] | Hemorrhoid degree* 3/4 |
|---------------------|---------------------------|------------------------------------------|------------------------|
|                     | 41[19-84]                 | 3.6 [1.3- 22.6]                          | 327/83                 |

* Parks classification

Figure 1- Post defecation pain score after radiofrequency ablation and fixation of hemorrhoids
Figure 2- Pain score at rest after radiofrequency ablation and fixation of hemorrhoids.

Table 2- Comparative evaluation of peri and postoperative findings in patients with stapled hemorrhoidectomy and radiofrequency ablation and fixation of hemorrhoids.

| Observations                   | Stapled Hemorrhoidectomy | Radiofrequency ablation and fixation |
|-------------------------------|--------------------------|--------------------------------------|
| Operative time                | 15-25 minutes            | 7 minutes                            |
| Hospital stay                 | 1.7-2.7 days             | < 1 day                              |
| Analgesic requirement         | 2.6-9.6 tablets          | 21 tablets                           |
| Pain score                    | 1.8-3²                   | 1 to 6                               |
| Incapacity to work            | 7-21 days², 1-31 days³   | 7-14 days                            |
| Bleeding control              | 78%-8% to 80%³           | 98%                                  |
| Development of new symptoms   | 10%-40%⁴ to 40%⁵         | 2.6%                                 |
| Complication rates            | 6.4%² to 31%¹⁸           | 8%                                   |

Table 3- Comparative evaluation of postoperative complications in patients with stapled hemorrhoidectomy [SH] and radiofrequency ablation and fixation of hemorrhoids.

| Complications                  | SH                        | Radiofrequency ablation and fixation |
|--------------------------------|---------------------------|--------------------------------------|
| Urinary retention              | 12%² to 15%²²             | 2%                                   |
| Bleeding                       | 7.6%²                     | 0.5%                                 |
| Anal Thrombosis                | 3.8%³                     | 3%                                   |
| Stricture                      | 0.8%¹³ to 2%²⁹            | 0%                                   |
| Fissure formation              | 0.9%²                     | NONE                                 |
| Skin tags                      | 4% to 8%²⁶ to 20%³¹       | 2.6%                                 |
| Recurrence of symptoms         | 2.3%¹⁸ to 15%¹³           | 3%                                   |

Table 4- Comparative evaluation of postoperative events in patients with Doppler guided hemorrhoidal artery ligation (DGHAL) and radiofrequency ablation and fixation of hemorrhoids.

| Observations                  | DGHAL                     | Radiofrequency ablation and fixation |
|--------------------------------|---------------------------|--------------------------------------|
| Hospital stay                 | 8-19.8 hrs²¹              | < 1 day                              |
| Return to activity            | 3 days²¹                  | 7-14 days                            |
| Effectiveness of the procedure| 61.2%²² to 90%³³          | 98%                                  |
| Operation time                | 27 minutes²⁶ (range 18-43) | 7 minutes (range 5-9)                |
| Control of bleeding           | 88%-90%⁴ to 98%⁵⁴        | 98%                                  |
DISCUSSION
Postoperative pain has always been the main adversary of the surgical treatment of hemorrhoids. Great attention has been paid in the development of surgical procedures, aimed at reducing this pain and to shorten execution time and the hospital stay. This had led the surgeons to modify the known surgical techniques by using various innovative approaches. Surgical or medical means to reduce sphincter muscle spasm, different types of analgesia and anesthesia and use of antibiotics to reduce pain have also been tried. Despite these approaches however, the primary cause of pain, the trauma to the pain sensitive perianal skin and the anoderm during excision of hemorrhoids persisted and reduction in pain was possible only to a limited level.

In contrast to the techniques involving excision, the procedure of radiofrequency ablation and fixation of hemorrhoids was successful in avoiding any trauma to the perianal skin. While the anal mucosa is exposed to the treatment, because the area of application being proximal to the sensitive dentate line, the postoperative pain is minimal. Moreover, wound care is hardly necessary.

Two techniques namely, stapled hemorrhoidectomy and Doppler guided hemorrhoidal artery ligation have been proposed as less painful treatment options for hemorrhoids. Various controlled trials have demonstrated that these techniques can be accomplished with minimum postoperative pain and an earlier return to normal activity. However, some problematic areas surrounding these procedures have found mention in various other studies. The enthusiasm generated by these techniques is repeatedly tempered by serious concern relating to long-term efficacy and life threatening complications reported from various parts of the world.

It is presumed that with the removed strip of rectal mucosa, the hemorrhoidal vessels will also be disrupted to help arresting vascular supply to the hemorrhoids. However, a vascular Doppler study by Kolbert noticed that in 80% of patients who had undergone a stapled hemorrhoidectomy, few uninterrupted branches of the hemorrhoidal vessels were found still present. If this study is to be believed, then the mechanism of control of hemorrhoidal bleeding by staplers remains questionable.

While some distinguished authors state that stapled hemorrhoidectomy (SH) is the best surgical technique for symptomatic hemorrhoids, other surgeons have concluded that it does not seem to offer significant advantages in terms of reduced hospitalization or symptom control in long term.

While most surgeons agree that, the convalescence after SH is shorter, few others could not demonstrate an earlier return to work. The operation is defined as “easy” by some authors whereas for few others described it as “demanding”.

Rates of complications after SH range from 6% to 31%, and surprisingly, complications reported after SH are similar to those of open hemorrhoidectomy and in addition, other complications like hemorrhoidal thrombosis, rectal anastomotic leakages with pelvic sepsis, rectal obstruction, retrorectal hematomas, rectal perforation, retroperitoneal sepsis, Fournier gangrene, proctitis, fecal peritonitis and anemia due to bleeding from seam insufficiency have also been reported.

Such complications were not encountered in any of the patients treated with our technique of hemorrhoidal ablation and fixation.

Another non excisional procedure is a Doppler guided hemorrhoidal artery ligation, which was introduced by Morinaga and his associates. The technique proposes to be a painless office procedure, useful in all grades of hemorrhoids with a negligible period of convalescence.
The concept of this procedure is based on the presumption that arterial ligation causes reduction of blood flow to, and decongestion of, the haemorrhoidal plexus.  

While it has been accepted that hemorrhoidal disease results from the pathological enlargement and distal displacement of the hemorrhoidal cushions, the concept of ligation of hemorrhoidal artery to curb the hemorrhoids becomes questionable. While studying the branching pattern of the superior hemorrhoidal artery, it was found that the hemorrhoids were being supplied by few additional branches of hemorrhoidal artery entering from the posterior wall of the rectum that were not accessible to ligation by the doppler method. It is known that a free anastomosis exists between branches of superior, middle, and inferior hemorrhoidal vessels. Thus, mere ligation of branches of superior hemorrhoidal artery could not ensure complete blockage of blood supply to the hemorrhoids.

While it is agreed that the convalescence period with DGHAL is very short, there is no unanimity that it could be performed without the aid of anesthesia, and that it does not require hospitalization. The procedure is not found effective in controlling prolapse of hemorrhoids, and it does require additional procedure like rubber band ligation for fixation of the hemorrhoids to eliminate their prolapse. The success rate reported with this technique varies between 62% and 90% on a short-term follow-up of less than one year.

It can be gathered from the above discussion that both SH and DGHAL are modalities of treating hemorrhoids that leave behind the pathology (the hemorrhoids) partly unattended. When a patient complains again of hemorrhoidal symptoms after SH or DGHAL, the symptoms could not be called recurrent. This is because the hemorrhoids in fact are not fully removed. What is recurrent is that the patient still complains of the problem that brought him to the doctor in the first place. They fail to deal with the external hemorrhoids or associated anal canal problem unlike the conventional hemorrhoidectomy or the radiofrequency procedure.

In conclusion, it seems that the only advantage of SH or DGHAL is the lesser postoperative pain. As this generally is the main cause for fear for those who undergo an operation of hemorrhoids, the patients themselves strongly feel inclined to opt for these procedures.

The procedure of radiofrequency ablation followed by suture fixation achieves the goals, which are commonly considered necessary in attending an advanced hemorrhoidal disease. Hemorrhoidal suturing helps attaching the hemorrhoidal cushions to the underlying internal sphincter and thereby it reduces the hemorrhoidal prolapse. It also minimizes the hemorrhoidal blood flow.

The surgical treatment of hemorrhoids nonetheless, is also aimed at removal of the dilated submucus anal venous plexus and fixation of the anal mucosa to the underlying muscle to obliterate submucus space. The procedure of radiofrequency coagulation serves this purpose. Unlike staplers and Doppler guided ligator, which are useful only in dealing with hemorrhoids, radiofrequency instrument can be used for performance of other proctological surgery too.

As can be judged from the description of the operative technique, the procedure is easy to learn and simple to perform, and obviates the need of a ‘learning curve’.

The cost of this procedure is limited to acquisition of the radiofrequency generator. The unit does not require any recurring maintenance except the normal care during its handling and use. The running cost of the instrument is negligible. Moreover, with its multidisciplinary usage, the unit could profitably be used by multi specialty clinics for a variety of applications. Unlike the staplers, no costly disposables are involved.
comparable with, but also gives better results than these two procedures. [Tables 2,3 and 4]

CONCLUSION
The procedure of radiofrequency ablation and fixation of hemorrhoids is a safe and effective day-care procedure for the treatment of advanced grades hemorrhoids. It ensures less postoperative pain, shorter hospital stay, less time off work, and in the end, a more satisfied patient with no perineal wound.

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