Ambulatory Hemorrhoid Therapy with Radiofrequency Coagulation. Clinical Practice Paper

Pravin J. Gupta

Gupta Nursing Home, Nagpur, India

Abstract

Background. Despite availability of numerous surgical and non-surgical options for the treatment of hemorrhoids like sclerotherapy, rubber band ligation, cryosurgery, infrared photoocoagulation, bipolar diathermy, and electro coagulation, none of these therapies has been acclaimed as the ultimate. Coagulation of hemorrhoids using a radiofrequency device is a new therapy to be added to the list.

Patients and Methods. In the present retrospective study, the early and long-term effects of radiofrequency coagulation on patients presenting with hemorrhoids is described. An Ellman radiofrequency generator was used for this procedure. In a separate, randomized, and blinded study, a comparative evaluation was carried out between radiofrequency coagulation and rubber band ligation in terms of their effectiveness and patient comfort.

Results. Two hundred and forty patients with Grade I and II hemorrhoids were treated by radiofrequency coagulation technique and were followed up for a period of 16 months. While 33 patients reported persistence or recurrence of bleeding, only few complained of pain or discomfort. The comparative study showed that though rubber band ligation is an effective procedure, its pain quotient is greater than the radiofrequency coagulation.

Conclusion. This study shows that radiofrequency coagulation is an easy and effective alternative to conventional techniques employed in the treatment of bleeding hemorrhoids. It is easy to perform, is less painful, and has a low rate of complications. However, further results based on a longer follow-up of larger number of patients and its comparison with other conventional treatment techniques are called for.

Key words

Hemorrhoids - radiofrequency coagulation - bleeding - recurrence

Rezumat

Prezintă. În ciuda existenței a numeroase opțiuni chirurgicale și non-chirurgicale pentru tratamentul hemoroidelor, cum ar fi scleroterapia, ligaturarea elastică, criochirurgia, fotocoagularea cu înflăcării, diatermia bipolară și electrocoagularea, nici una dintre aceste metode nu a fost acceptată ca definitivă. Coagularea hemoroidelor este o metodă nouă de tratament.

Pacienți și metodă. În prezentul studiu au fost evaluate retrospectiv efectele imediate și de durată ale coagulării prin radiofreqvencă la pacienții cu hemoroidi. Pentru procedură a fost utilizat un generator de radiofreqvencă Ellman. Intr-un studiu, separat, și randomizat, a fost efectuată o evaluare comparativă a coagulării prin radiofreqvencă și a ligaturii elastică, sub aspectul eficienței și confortului pentru pacienți.

Rezultate. Au fost tratați prin coagulare cu radiofreqvencă 240 pacienți având hemoroidi de grad I și II, și apoi urmării pe o perioadă de 16 luni. În timp ce 33 au raportat persistența sau recurența săngerării, doar puțini au acuzat durere sau disconfort. Studiul comparativ a arătat că, deși ligatura elastică este un procedeu eficient, coeficientul de durere este mai mare decât în cazul coagulării prin radiofreqvencă.

Concluzie. Procedura de coagulare prin radiofreqvencă este o alternativă față și comodă față de tehnici convenționale utilizate în tratamentul hemoroidelor săngerării. Este ușor de efectuat, mai puțin durerosă, și are o rată scăzută de complicații. Cu toate acestea, este necesară urmărirea unui număr mai mare de pacienți, prin comparație cu alte tehnici convenționale, și pe o perioadă mai lungă, pentru stabilirea certă a acestor avantaje.

Introduction

Hemorrhoids are one of the most frequent anorectal disorders encountered in the primary care setting. They are
the most common cause of bleeding per rectum and are responsible for considerable patient suffering and disability (1).

A variety of treatment options for early grades of hemorrhoids, i.e. grade 1 and 2 are available. The treatment procedures commonly adopted are injection of sclerosant solution (sclerotherapy) and rubber band ligation. The other procedures described include chemical destruction of pile mass by direct current probe (Ultrroid), or by thermal destruction with bipolar diathermy (Bicap), cryoablation, and by infrared coagulation (2). Despite the presence of such therapies for hemorrhoids, none of these has established its superiority over the rest.

In modern times, a fast and painless procedure that could be carried out in the office practice gets a priority (3). Radiofrequency coagulation is one such technique that results in an immediate reduction of blood flow to the hemorrhoids followed by tethering of the mucosa to the underlying tissue, which subsequently induces healing by way of cicatrization (4).

**Principle of radiofrequency coagulation.** Radiofrequency unit generates a very high frequency radio wave of 4 MHz. The unit includes a plastic covered ground plate or antenna, and a ‘patient electrode’ attached to a handle over it, which is held by the operating surgeon. No electrical contact needs to be made between the patient and the ground plate, unlike operating theatre diathermy equipment. When this high frequency wave is released from the generator, it is focused at the affected tissue through an electrode end. The tissue resistance in the path of these high frequency waves produces heat that makes the intracellular water to boil, thereby increasing the cell inner pressure to the point of breaking it from inside to outside. This phenomenon is called cellular volatilization. This in turn produces coagulation and shrinkage of the tissues (5).

In radiofrequency contact coagulation, the tissue is coagulated in a manner that eliminates the disadvantages of electrocoagulation like grounding the patient and charring of the tissues which causes extensive and unpredictable lateral damage leading to subsequent fibrosis. There is an obvious risk of electric current passing through the body with the use of electrocoagulation, which may cause painful muscular spasms (6). Radiofrequency, on the other hand, being free from these hazards, is a more effective and safe method of treatment for early grade bleeding hemorrhoids (7-8).

The radiofrequency generator used for this study was an Ellman dual frequency 4 MHz (Ellman International Inc, New York). The amount of energy to be released by this unit can be pre set within the range of 1 and 100. A ball electrode having length of 11 cm, supplied with the unit proved handy and was exclusively used by us in the procedure.

**Aim of the Study.** The motto behind this study was to assess whether radiofrequency coagulation of hemorrhoids can be used as an alternative to other conventional modalities and if it has any advantage over rubber band ligation of hemorrhoids, which by far, is the most preferred procedure.

**Patients and methods**

Two separate studies were conducted. The first one was a retrospective study, in which the effect of radiofrequency coagulation on patients with hemorrhoids was observed over a period ranging from 15 to 23 months. In this study, 240 patients were treated with radiofrequency coagulation. This included 126 males and 114 females. The mean age of the patients was 34 yrs. (ranges 19 and 69 yrs).

The second study was a prospective, blinded study. In this, 60 patients with grade II bleeding hemorrhoids were randomly chosen. Radiofrequency coagulation was done in 28 patients and the remaining 32 patients were treated with rubber band ligation.

In the retrospective study, patients with grade I and II bleeding hemorrhoids were selected for the procedure. While 117 of the patients were having Grade I hemorrhoids, the remaining 123 patients had Grade II hemorrhoids. 197 patients from the study group had already undergone treatment in the past, but failed to respond to the conservative treatment.

**Exclusion criteria.** Patients having associated anal fissure or infectious anal pathologies like cryptitis or proctitis were excluded from the study.

An informed consent was obtained from all the patients. The procedure was approved by the local ethical committee and was performed according to the declaration of Helsinki.

In this procedure, no anesthesia was given. However, 5% xylocain ointment was infused in the anus about 10 minutes before the actual procedure to reduce the sensitivity of the area.

**Procedure of radiofrequency coagulation**

In most of the cases, lithotomy position was preferred. Left lateral position was opted in cases where lithotomy position was not possible.

A well-lubricated large size anoscope was gently inserted in the anal canal to visualize the hemorrhoids. Starting at the base of the pedicle, the whole pile mass was coagulated by gradually rotating the ball electrode of the radiofrequency electrode over the hemorrhoid. Shrinkage and gradual change of hemorrhoids to dusky white color (blanching) indicated a satisfactory coagulation necrosis.

Hemorrhoids at all the three principal positions i.e. at 3, 7, and 11’o clock were coagulated one after the other. There was no special preference for the positions of hemorrhoids to begin with; though the largest pile was dealt with first and so on. The time required for coagulation of each pile was 20 to 40 seconds depending on the size of the hemorrhoid mass. Care was taken to keep the coagulation above the dentate line, to avoid pain during application of the electrode.

The patients were assessed after an hour of the procedure and were sent home when they presented no complaints. The patients were asked to take 10 grams of psyllium husk at bedtime for a month. They were cautioned not to strain at stool and that they should expect a little bleeding in the first week of the procedure.
An independent observer, who was not from the operating team carried out the assessment of the postoperative findings. Pain was assessed using a visual analogue scale from 0 (no pain at all) to 10 (the worst pain the patient had ever experienced). The first follow up was made on the 7th post procedure day. Subsequent follow-ups were made after 1 month and then after minimum of 15 months of the procedure.

Results

Twenty-three patients (10%) complained of bleeding in the first 2 weeks. This most frequently occurred between day 5 and day 10 of the procedure. The bleeding was associated with defaecation.

However, 4 patients returned with heavy bleeding in the first week of the procedure. This bleeding was spontaneous, unassociated with defaecation. They were admitted in the hospital. Three of these patients had responded to conservative therapy with local compression and haemostatic medication. However, one patient needed examination under general anesthesia. The active bleeding source was located and duly secured. All of them had an uneventful recovery thereafter.

Twenty-nine patients complained of pain in the anal region. The intensity of pain was 1 to 2 on visual analogue scale. They were prescribed appropriate analgesics. The remainder of the patients did not complain of any pain.

Four patients complained of a brownish, foul smelling discharge from the anus soiling the clothes. This was noticed at the end of the first week of the procedure. No specific treatment was advocated. The discharge ceased of its own by the end of second week of the procedure.

Nine patients complained of itching in and around the anal canal. The itching was controlled using antihistaminic medication.

None of the patient developed any infective complications like suppuration in the operated area or perianal inflammation.

Follow-up findings

Follow-up was carried for a mean period of 18 months (range 15-23 months). Twelve patients were lost to follow up.

Bleeding

In this period, 33 patients had recurrence of bleeding. They were reexamined. All of them had hemorrhoids. They were asked to repeat radiofrequency coagulation. While 27 patients agreed, the remaining 6 patients refused to undergo the procedure again. While 3 patients undergoing the repeat procedure failed to achieve relief, no bleeding was reported in the remaining.

Result of comparison of radiofrequency coagulation and rubber band ligation

Both procedures were carried out by the same surgeon who had an experience of performing more than 300 procedures of each type.

Blinding was done by sealed envelope, which was opened by the hospital nurse. The post procedure assessment was carried out by an independent observer who was not from the operating team. The parameters measured included post procedure pain, rectal tenesmus, recurrence of bleeding and satisfaction grading. (It is defined as overall satisfaction with the surgical outcome using a visual analogue scale, 0 = dissatisfied, 10 = satisfied).

Radiofrequency coagulation was done at all the three principle positions of hemorrhoids i.e. at 3, 7, and 11 O’clock position. Rubber banding was also done at the similar places. None of the patients from either group was prescribed any analgesics.

Statistical analysis

Data was analyzed using Fisher’s exact test. Data were entered into a database and analyzed using statistical software (Graph pad Quick Calcs, San Diego, CA). A value of p <0.05 was considered statistically significant.

Results

It was found that though rubber band ligation was more effective than radiofrequency coagulation, it was necessarily associated with more pain and discomfort to the patients. The patients expressed greater satisfaction with radiofrequency coagulation. The comparative findings are given in Table I.

Discussion

Despite availability of numerous non-operative therapies, none is considered totally safe and efficacious for the management of early grade of hemorrhoids (9).

Radiofrequency coagulation is widely used in the field of ophthalmology, plastic surgery and for coagulation of hepatic tumors (10). The system of radio wave surgery involves the release of high frequency radio waves at 4.0 MHz, which vaporizes the tissues fluid. This vaporization of tissue fluid results in significant hemostasis without actually burning the tissue (11). This characteristic of the

Table I Comparative evaluation between radiofrequency coagulation and rubber band ligation in grade II bleeding hemorrhoids

<table>
<thead>
<tr>
<th>Treatment method</th>
<th>Rectal tenesmus</th>
<th>Anal pain</th>
<th>Bleeding</th>
<th>Vagal reaction</th>
<th>Recurrence</th>
<th>Satisfaction grading (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiofrequency coagulation (n=28)</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>none</td>
<td>4</td>
<td>9.1</td>
</tr>
<tr>
<td>Rubber band ligation (n=32)</td>
<td>6</td>
<td>1.6</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>8.2</td>
</tr>
<tr>
<td>p *</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

*Fisher’s exact test
radiofrequency wave attracted us to use it for coagulation of hemorrhoids.

While rubber band ligation has been proved to have a greater long-term efficacy, it is associated with a significantly higher incidence of post treatment pain (12). The most efficacious therapy, however, may not be the optimal one if the risks of potential complications outweigh the benefits of the treatment (13).

In contrast, radiofrequency coagulation is associated with both fewer and less severe complications. The anatomical results following radiofrequency coagulation suggest that progression of hemorrhoids and, probably, the need for surgery are prevented (14).

Band ligation is marked by a greater number of inflammatory complications (15-16). Various life threatening complications have been reported after banding of hemorrhoids (17). These include tetanus (18), liver abscess (19), pelvic cellulitis (20), rectovaginal fistula, and bacteremia. The septic complications are manifested with a clinical triad of pain, fever and retention of urine (21). None of these complications were seen with radiofrequency coagulation (14).

Radiofrequency coagulation was well tolerated by the younger patients with hyperactive anal sphincter, whereas rubber band ligation has reportedly caused conceivable pain after therapy (22).

Pain after banding occurs more often than previously recognized. It is suggested that patients should be given the opportunity to delay treatment if they wish so (23).

**Cryosurgery in hemorrhoids**

Cryosurgery is a fading alternative in the treatment of hemorrhoids (24) as it is associated with a higher rate of complications and less patient satisfaction (25). The various complications following cryodestruction of hemorrhoids include severe pain (26), lower gastro-intestinal tract bleeding (27), and development of external skin tags needing excision later (28).

In addition, serious septic complications (29) including tetanus (30) and meningitis (31) have been reported with cryosurgery of hemorrhoids.

**Direct current probe and heater probe treatment of hemorrhoids**

Complications in the form of perianal abscess and fistula requiring surgery have been reported following direct current probe application. The recurrence rate with this method was reported to be as high as 31% (32).

While the heater probe causes more pain during treatments (33), it results in damage similar to 3rd degree burns (34). The tissue damage caused with radiofrequency is very superficial and is comparable with lasers (35-36).

**Sclerotherapy**

This technique is associated with septic complications of mild to severe nature (37). Life threatening complications like retroperitoneal sepsis and necrotizing fascitis have been reported after submucosal injection therapy (38). Rarities that should be mentioned are pelvic infection and impotence (39). “Oleogranuloma” is another complication reported after sclerotherapy (40).

Such complications are not seen with radiofrequency coagulation.

**Infrared coagulation of hemorrhoids**

Photoocoagulation of hemorrhoids using an infrared coagulator has been in practice for almost 25 years and is supposed to be a safe and swift procedure for internal hemorrhoids (41).

However, the procedure is an indirect way of treatment of hemorrhoids where the pedicle of the pile mass is spot welded with the device to arrest blood supply to the pile mass. But today, when the mechanism of development of hemorrhoidal disease is established on the mechanical theory (42), the very basis of the coagulation of blood vessels at the pedicle of hemorrhoids to curb them does not hold true any longer.

Considering the above aspects, radiofrequency coagulation seems to be an effective, safe, and less painful alternative in comparison with other conventional modalities used for treatment of early degree of bleeding hemorrhoids.

The treatment cost of our procedure is limited to the acquisition of the radiofrequency generator; the running cost of the procedure is negligible.

**Conclusion**

The study shows that radiofrequency coagulation can be adopted as an effective alternative to conventional methods used for the treatment of early grades of symptomatic hemorrhoids.

Apart from the initial cost of the instrument, there are no recurring expenses. The application is easy and requires no special training. In comparison, it is better tolerated than band ligation, and more effective than other modalities of hemorrhoid treatment in practice.

**References**


