THERAPY

Radiofrequency coagulation: a new option in early grades of bleeding hemorrhoids

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Abstract

Background: **The treatment for hemorrhoids has undergone significant changes on introduction of new techniques in the last few years. Radiofrequency coagulation is a new approach for treating grades I and II of hemorrhoids. In this procedure, the hemorrhoidal tissue is coagulated by means of high-frequency radio wave. The author has described his own experience with this new technique.**
Materials and methods: **The procedure was performed using an Ellman radiofrequency generator. Over a period of 18 months, patients with bleeding hemorrhoids were treated with this technique and a 16-month follow-up was carried out to assess relief in bleeding episodes, complications, and recurrence rate.**
Results: **While 13 % of patients had persistent or recurrent bleeding, 2 % of patients needed readmission for secondary hemorrhage. None had reported with any infective complication. The overall ratio of comfort, and patient's satisfaction due to relief of pain and bleeding were quite satisfactory.**
Conclusion: **The treatment of bleeding hemorrhoids by using radiofrequency coagulation is technically simple, therapeutically effective and virtually complication-free. The equipment is portable, easy to handle, durable, and needs little maintenance. Long-term follow-up is necessary to justify the reliance on this method *(Ref. 49)*.**
Key words: hemorrhoids, radiofrequency coagulation, bleeding, office procedure.

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

A variety of treatment options for early degrees of hemorrhoids i.e. grades 1 and 2 are available. The treatment procedures commonly adopted are injection of sclerosant solution [sclerotherapy] and rubber band ligation. The other procedures used in practice include chemical destruction of pile mass by means of direct current probe (Ultroid), or by thermal destruction with bipolar diathermy (Bicap), cryoablation, hemorrhoidal artery ligation and by infrared coagulation (2). Yet, despite the presence of numerous non-surgical therapies for hemorrhoids, none of these has established its superiority over the rest.

In modern times, a fast and painless procedure that can be carried out on an outpatient basis under local anesthesia will surely be preferred and accepted (3). Radiofrequency coagulation is such a technique resulting in immediate reduction of blood flow toward the hemorrhoids followed by tethering the mucosa to the underlying tissue, which subsequently induces healing by way of cicatrisation (4).

Principle of radiofrequency coagulation

Radio frequency unit generates a very high frequency radio wave of 4 MHz. The unit includes a plastic covered ground plate or antenna, and a ‚patient's 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 the electrode end. The focused energy produces steam within the cells thereby first vaporizing the fluid

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within and then coagulating the tissues. The tissue resistance in the path of high-frequency wave produces heat that makes the intracellular water boil, thereby increasing the inner cellular pressure to the point of breaking it from inside to outside (5). This phenomenon is referred to as cellular volatilization.

In radiofrequency contact coagulation, the tissue is coagulated in a manner that eliminates the disadvantages of electrocoagulation like grounding the patient, charring of the tissues causing 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, has proved to be an effective and safe method of treatment for early grade bleeding internal hemorrhoids (7, 8)**.**

The radiofrequency generator used in this study is referred to as Ellman Dual frequency 4 MHZ (from Ellman International Inc. NewYork, USA). The amount of energy to be released by this unit can be pre-set within the range of 1 and 100. A ball electrode in length of 11 cm, supplied with a unit proved to be handy, and was exclusively used by us in the procedure.

Aim of the study

The motto behind this study was to show that radiofrequency coagulation is an effective, safe, and less painful alternative in comparison with other conventional modalities used in the treatment of early degrees of bleeding hemorrhoids.

Patients and method

In the present retrospective study, the effect of radiofrequency coagulation on patients with hemorrhoids was observed over a follow-up period ranging from 12 to 18 months. In all, 240 patients were treated with radiofrequency coagulation. This included 126 males and 114 females. The mean age of the patients was 34 yrs (range between 19 and 69 yrs). The study was conducted at Gupta Nursing Home, Nagpur between July 2001 and December 2002.

The diagnosis of hemorrhoids was made on anoscopic examination and patients having first or second degrees of bleeding hemorrhoids were selected for the procedure. 117 of the patients were having Grade I of hemorrhoids. The remaining 123 patients had Grade II of hemorrhoids, which used to prolapse during defecation and get reduced on their own. 197 patients from the study group had already undergone treatment in the past, but have failed to respond to the conservative treatment.

Exclusion criteria

Patients having associated anal fissure or infective anal pathologies such as cryptitis or proctitis were excluded from the study.

All the patients received a written explanation of the technique including the potential drawbacks, such as relapses and a possible need to repeat the procedure or to resort to another mode of treatment. 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 into 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 posture was preferred as it gave the surgeon enough ease to maneuver. Left lateral position was opted in cases where lithotomy position was not possible.

A well-lubricated anoscope was gently inserted into 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 probe over the hemorrhoid. Shrinkage and gradual change of hemorrhoids to dusky white color (blanching) indicated 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.

The patients were assessed after an hour of the procedure and were sent home when they presented no complaint. The patients were asked to take 10 grams of psyllium husk [Naturolax] at bedtime for a month. They were also advised to apply Xylocain 5% ointment locally just before and after defecation to relieve the pre and post-defecation discomfort and the possible burning sensation in the operation site. They were cautioned not to strain at stool and that they should expect little bleeding in the first week of the procedure.

An independent observer not belonging to 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 in a minimum of 15 months after the procedure.

Results

23 patients (10 %) complained of bleeding in the first 2 weeks. This most frequently occurred between the days 5 and 10 after the procedure. The bleeding was associated with defecation. This was attributed to sloughing of the tissue at the base of hemorrhoids and oozing from the raw area thus created.

However, 4 patients returned with heavy bleeding in the first week after the procedure. This bleeding was spontaneous and not associated with defecation. They were admitted to the hospital. 3 of these patients had responded to conservative therapy with local compression and haemostatic medication. However, one patient needed to be examined under general anesthesia. The

active bleeding source was located and duly secured. All of them had an uneventful recovery thereafter.

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

4 patients complained of a brownish foul-smelling discharge from the anus soiling their clothes. This was noticed at the end of the first week after the procedure. While the exact cause of this discharge could not be determined, it is supposed to have been possibly caused by shedding of the dead mucosa over the pile. No specific treatment was advocated. The discharge ceased on its own by the end of the second week after the procedure.

Nine patients complained of itching in and around the anal canal. In a few days, the itching stopped on its own.

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

Follow up findings

This was carried at a mean period of 18 months (range 15–23 months). 31 patients have failed to appear at follow-ups.

Bleeding

Between this period, 33 patients had recurrence of bleeding. They were re-examined. In all of them hemorrhoids were present. They were asked to undergo repeated radiofrequency coagulation. While 27 patients agreed to go for this, the remaining 6 patients refused to undergo the procedure again. As 3 patients undergoing a repeated procedure failed to achieve relief, they were subjected to band ligation of hemorrhoids. In the remaining, no bleeding was reported.

Other complaints

While none of the patients had any pain in the anal region, a few complained of minor discomfort during defecation. On being implored, the discomfort was found relatable to their faulty dietary habits. They were instructed about the appropriate diet.

Discussion

Numerous non-operative treatments have been proposed and are being extensively used for the management of 1st and 2nd degrees of hemorrhoids. However, despite the availability of such therapies, none is considered totally safe and efficacious (9).

The developing trend is to prefer an improved technique for the ablation of hemorrhoids rather than opting for their excision. The radiofrequency coagulator works on the same principle as the CO_2 laser. This method has many advantages (10) for the treatment of hemorrhoids. The system of radio wave surgery involves using high frequency radio waves at 4.0 MHz, which deliver low temperature through RF micro-fiber electrodes and is akin to the frequency of marine-band radios. The tissue under treatment itself resists the path of the waves and gets heated, thereby leaving the RF micro-fiber electrode in a cool state. The intracellular tissue water resisting the waves vaporizes. This vaporization of tissue fluid results in significant hemostasis without actually burning the tissue (11).

The results of radiofrequency coagulation of hemorrhoids are comparable or even better than the conventional procedures in vogue, namely, rubber band ligation, cryoablation, sclerotherapy, bipolar and heater probe and infrared coagulation.

Rubber band ligation

Although, 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)**.** In contrast to the latter, the complications of radiofrequency coagulation are both less frequent and less severe. The most efficacious therapy, however, does not have to be the optimal one if the risks of potential complications outweigh the benefits of the treatment (13).

No special training is required to carry out coagulation provided the area of coagulation is kept above the dentate line. While the application of the band needs training for placing it into the right place, the failure to do so can lead to complications like pain, strangulation of pile, necrosis, or even sepsis. The anatomical results following RFC suggest that the progression of hemorrhoids and probably, the need for surgery are prevented (14).

Band ligation is marked by a great number of complications of inflammatory character (15–16). Rubber band ligation has been associated with life threatening complications (17), namely 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 such complications had been seen with radiofrequency coagulation (14).

Radiofrequency coagulation is also well tolerated by younger patients with hyperactive anal sphincter, where rubber band ligation had reportedly caused conceivable pain after therapy (22).

Pain after RBL occurs more often than previously recognized. It is suggested that informed consent be obtained before RBL and that patients should be given the opportunity to delay their treatment if they wish to do so (23).

Cryosurgery in hemorrhoids

Cryosurgery is a fading alternative in the treatment of hemorrhoids (24) as it is associated with high complication rate and low satisfaction rate (25). Though it is still being used by many surgeons in India, it is almost never justified. The main drawback of the procedure is a profuse and foul smelling discharge from the treated area over a long period causing irritation and discomfort to the patient (26, 27).

The various complications following cryodestruction of hemorrhoids include severe pain (28), mild gastro-intestinal tract bleeding (29), and development of external skin tags needing excision later (30).

In addition, serious septic complications (31) including tetanus (32) and meningitis (33) have been reported with cryosurgery of hemorrhoids.

Direct current probe and heater probe treatment of hemorrhoids

Direct current probe (Ultroid, Homeron) application is used to destruct the hemorrhoids on a chemical basis. However, the procedure takes a very long time to be performed (about 10 minutes for each hemorrhoid). Complications in form of perianal abscess and fistula requiring surgery have been reported following this mode of treatment (34). The recurrence rate after the direct current probe treatment is reported to be as high as 31 % (35).

Similarly, complications like fissures, bleeding, and rectal spasm were occurring after the bipolar probe and heater probe treatments. The heater probe caused more pain during treatments (36).

While the heater probe causes damage similar to the 3rd degree of burns (37) the tissue damage that does occur with RFC is very superficial and is comparable to that which occurs with Lasers (38). The amount of tissue destruction caused by such probes is simply unpredictable.

Sclerotherapy

Injecting sclerosant solutions into the submucosa of pile mass to produce aseptic inflammation and fibrosis is a century-old procedure, which is still favoured by many proctologists. However, this technique is associated with septic complications of mild to severe nature (39). Life-threatening complications such as retroperitoneal sepsis and necrotizing fascitis have been reported after submucosal injection therapy (40). Few others to be mentioned are pelvic infection and impotence (41). ‚Oleogranuloma' is another complication reported with sclerotherapy (42). Such complications are not found with RFC.

Infrared coagulation of hemorrhoids

Photocoagulation of hemorrhoids by means of using an infrared coagulator has been used in practice for almost 25 years and is supposed to be a safe and swift procedure for internal hemorrhoids (43).

However, the procedure is an indirect way of treatment of hemorrhoids wherein the pedicle of the pile mass is spot-welded with the device to arrest blood supply toward the pile mass. Today, the mechanism of development of hemorrhoidal disease focuses on the mechanical theory (44). It has been established that the laxity of the supportive tissue results in the distention of hemorrhoidal sinusoids leading to various symptoms of hemorrhoids. Under these circumstances, the very basis of arresting the blood supply toward the hemorrhoidal mass by infrared coagulation to achieve its regression is open to debate.

While the infrared coagulator is useful in merely coagulating the hemorrhoid pedicle, radiofrequency generator has added some uses in performing various other proctological procedures (45).

Pregnancy is not a contraindication for radiofrequency coagulation (46). It is a safe and swift procedure, which can be repeated in case of recurrence of bleeding (47).

The cost of radiofrequency coagulation is limited to the acquisition of the radiofrequency generator. It is maintenance-free, if care is taken during its disinfections and use. The running cost of the procedure is negligible. Moreover, with its multidisciplinary usage, the unit can be used by a multi-specialty clinic for a variety of applications (48, 49).

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.

Save the initial cost of the instrument, there are no expenses of a recurring nature. The application is easy and requires no special training. In comparison, it is better tolerated than the band ligation, and more effective when compared to other modalities of hemorrhoid treatments in practice.

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