

## CLINICAL STUDY

## Radiofrequency coagulation: a new option for early grade bleeding hemorrhoids

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**Background:** The treatment of hemorrhoids has undergone significant changes after introduction of new techniques during last years. Radiofrequency coagulation is a new approach for treating grade I and II hemorrhoids. In this procedure, the hemorrhoidal tissue is coagulated by a high frequency radio wave. The author describes his experience using 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 months follow-up was carried out to assess a relief in bleeding episodes, complications, and recurrence rate.

**Results:** While 13 % of patients experienced persistence or recurrence of bleeding, 2 % of patients needed readmission for secondary hemorrhage. None has reported an infective complication. Overall ratio of comfort and patient contentment with pain and bleeding was satisfactory.

**Conclusion:** The treatment of bleeding hemorrhoids using the radiofrequency coagulation is technically simple, therapeutically effective and virtually complication free. The equipment is portable, easy handling, long lasting, and needs only little maintenance. Long-term follow-up is necessary to justify reliability of 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 patient's suffering and disability (1).

A variety of treatment options for early degree 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 include chemical destruction of pile mass by a direct current probe (Ultroid), or by thermal destruction using a bipolar diathermy (Bicap), cryoablation, hemorrhoidal artery ligation and infrared coagulation (2). Yet, despite of the presence of numerous non-surgical therapies, none of them has established its superiority.

Nowadays, a fast and painless procedure that could be carried out in the office practice under local anesthesia will be preferred and accepted (3). Radiofrequency coagulation is one such technique that results in immediate reduction of blood flow to the hemorrhoids followed by tethering of mucosa to the underlying tissue, which subsequently induces healing due to cicatrization (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 electrode' attached to a handle, which is held by the operating surgeon. No electrical contact is made between the patient and ground plate, unlike operating theatre diathermy equipment. When the high frequency wave is released from the generator, it is focused at the affected tissue through an electrode end. The focused energy produces steam within the cells thereby first vaporizing the fluid and then coagulating the tissues. The tissue resistance in the course of the high frequency wave produces heat that makes the intracellular water to boil, thereby increasing the cell inner pressure to the point of break-

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ing it from inside (5). This phenomenon is called as cellular volatilization.

In radiofrequency contact coagulation, the tissue is coagulated in a way eliminating the disadvantages of electro coagulation like grounding the patient, charring the tissues what causes extensive and unpredictable lateral damage leading to subsequent fibrosis. There is an obvious risk of electric current passing through the body using the 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 treatment method of early grade bleeding internal hemorrhoids (7, 8).

The radiofrequency generator used in this study is called the Dual frequency 4 MHz. The amount of energy released by this unit is set within the range of 1 and 100. A ball electrode having length of 11 cm, supplied with the unit proved handy, was exclusively used in this procedure.

#### **Aim of the study**

The aim of this study was to show that radiofrequency coagulation is an effective, safe, and less painful alternative compared to other conventional modalities used for the treatment of early degree bleeding hemorrhoids.

#### **Patients and method**

In the presented retrospective study, the effect of radiofrequency coagulation in patients with hemorrhoids was observed during follow up period ranging from 12 to 18 months. Totally 240 patients were treated by radiofrequency coagulation. This group of patients 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 based on anoscopic examination and patients with first and second degree bleeding hemorrhoids were selected for the procedure. 117 of the patients have Grade I hemorrhoids. Remaining 123 patients have Grade II hemorrhoids, which use to prolapse during defecation and reduce by their own. 197 patients from the study had already undergone treatment in the past, but have failed to respond to the conservative treatment.

#### *Exclusion criteria*

Patients with associated anal fissure or infective anal pathologies like cryptitis or proctitis were excluded from the study.

All the patients received a written explanation of the technique including potential drawbacks, such as relapses and a possible need to repeat the procedure or to resort to other 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 in the anus about 10 minutes before the actual procedure to reduce the sensitivity of the area.

#### *Procedure of Radiofrequency coagulation*

In most cases, lithotomy posture was preferred as it gave the surgeon enough ease maneuver. Left lateral position was opted in cases where lithotomy position was not possible.

A well-lubricated 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 probe 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 one. There was no special preference for the positions of hemorrhoids to begin with; though the largest pile was dealt first. 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 and were sent home when they didn't complain. 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 at 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 after a minimum of 15 months after the procedure.

#### **Results**

23 patients (10%) complained of bleeding during first 2 weeks. This has most frequently occurred between day 5 and day 10 of the procedure. The bleeding was associated with defecation. It 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 during the first week of the procedure. This bleeding was spontaneous, unassociated with defecation. They were admitted to the hospital. 3 of these patients have responded to conservative therapy using local compression and haemostatic medication. However, one patient needed an examination performed under general anesthesia. The active bleeding source was located and duly secured. Thereafter all of them had an uneventful recovery.

29 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. Rest of the patients did not complain of pain.

4 patients complained of a brownish, foul smelling discharge from the anus soiling the clothes. This was noticed at the end of the first week. While the exact cause of this discharge could not be determined, probably it was due to shedding of necrotic mu-

cosa over pile. No specific treatment was advocated. The discharge ceased spontaneously by the end of second week.

Nine patients complained of itching in and around the anal canal. The itching stopped in a few days spontaneously.

None of the patient developed an 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 dropped out from follow up.

#### *Bleeding*

During this period, 33 patients experience a bleeding recurrence. They were re-examined. All of them presented with hemorrhoid. They were asked for repeated radiofrequency coagulation. While 27 patients agreed, 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. In the rest of patients, no bleeding was reported.

#### *Other complaints*

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

### **Discussion**

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

The trend is to prefer an improved ablation technique rather than opting for hemorrhoids excision. The radiofrequency coagulator works on the same principle as the CO<sub>2</sub> laser. This method has many advantages (10) for the treatment of hemorrhoids. The system of radio wave surgery uses high frequency radio waves at 4.0 MHz, which deliver low temperature through RF micro-fiber electrodes and is similar to the frequency of marine band radios. The treated tissue itself resists the course 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, radiofrequency coagulation is associated with fewer and less severe

complications. The most efficacious therapy, however, may not 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 if the area of coagulation is kept above the dentate line. While application of band needs training for placing the band at the right place, failing of which 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 the need for surgery are prevented (14).

Band ligation is marked by a great number of inflammatory complications (15, 16). Rubber band ligation has been associated with life threatening complications (17) like tetanus (18), liver abscess (19), pelvic cellulitis (20), rectovaginal fistula, and bacteremia. Septic complications are manifested by clinical triad: pain, fever and retention of urine (21). None of such complications has been seen in radiofrequency coagulation (14).

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

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

#### **Cryosurgery in hemorrhoids**

Cryosurgery is a fading alternative in the treatment of hemorrhoids (24) as it is associated with a higher rate of complication and less patient satisfaction (25). Though it is still 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), lower gastro-intestinal tract bleeding (29), and development of external skin tags needing later excision (30).

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

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

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

Similarly, complications like fissures, bleeding, and rectal spasm had occurred with the bipolar probe and with the heater probe. The heater probe caused more pain during treatments (36).

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

### Sclerotherapy

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

### Infrared coagulation of hemorrhoids

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

However, this procedure is an indirect way of hemorrhoids treatment wherein the pedicle of the pile mass is spot welded with the device to arrest blood supply to 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 distention of the hemorrhoidal sinusoids leading to various symptoms of hemorrhoids. Under these circumstances, the basis of arresting the blood supply to 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 got additional uses in performing various 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 bleeding recurrence (47).

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

### Conclusion

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

Except 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 the band ligation and more effective when compared to other modalities of hemorrhoid treatments in practice.

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