Electric Treatment of Anal Hemorrhoids -- Rick Shacket, DO, MD(H)

Index

To Linda, Kara, and Heather.

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INTRODUCTION

There has never before been a comprehensive work published on the electric treatment of hemorrhoids. For physicians interested in office proctology, the timeless value of this work will be treasured. The equipment needed for the electric treatment of hemorrhoids is commercially available and relatively inexpensive. Now, even the most inexperienced clinician can understand, diagnose, and treat hemorrhoidal disease effectively without anesthesia, and without pain.

American physicians have treated hemorrhoids using electric modalities for more than 100 years using almost every conceivable electric modality available. Advocates claim some methods are more successful than others, but results vary in the hands of the medical practitioner. Varying factors include experience, duration, intensity of treatment, and a clinician's ability to selectively match a hemorrhoid with the electric modality best suited.

In 1987, I became aware of several rectal clinics in this country that specialized exclusively in the electric treatment of hemorrhoids. Most of these rectal clinics had recently opened, but some had been in business for over 30 years. Also in 1987, I became aware of several companies that were manufacturing and marketing electric medical equipment exclusively for hemorrhoids. Recent activity of this kind in the area of electric proctology has spurred renewed interest by physicians to treat hemorrhoids electrically.

HEMORRHOIDS: IN GENERAL

Hemorrhoids affect about 80 per cent of all Americans at some time in their lives. Hemorrhoids, according to one source, caused Napoleon to sit side-saddle, sent President Jimmy Carter to the operating room, and benched baseball star George Brett during the 1980 World Series. Over one half of all healthy people reporting for physical examination have some degree of hemorrhoids.

Hemorrhoids are simply varicose veins located in and around the rectal area. When they become inflamed, hemorrhoids can itch, bleed, and cause pain. Unfortunately a hemorrhoidal condition tends to get worse over the years. That is why safe, gentle and effective treatment for hemorrhoids is advocated as symptoms occur.

HEMORRHOIDS: ETIOLOGY

Many everyday activities cause tension and pressure within the veins of the body and rectum. This increased pressure can cause incompetence of the one-way valves inside the hemorrhoidal veins causing them to dilate. Combine these varicose veins with hereditary and environmental factors, predisposing or contributing factors, and a complicated hemorrhoidal condition exists.

ETIOLOGY OF HEMORRHOIDS

1. HEREDITY	2. PROLONGED STANDING
3. PROLONGED SITTING	4. IMPROPER DIET
5. CONSTIPATION	6. STRAINING AT STOOLS
7. HEAVY LIFTING	8. RIGOROUS EXERCISE
9. POOR ANAL HYGIENE	10. PREGNANCY
11. CHILDBIRTH	12. PORTAL HYPERTENSION

Hemorrhoids are so common that many doctors believe they are a normal consequence of the strain from man walking erect. Erect posture, a condition peculiar only to humans, can cause pressure and swelling in the rectal veins. Hemorrhoids do not exist in other animals. Only man suffers from hemorrhoids. Prolonged sitting, standing, and walking are all activities humans do in a substantially erect posture.

Heredity, the quality of the hemorrhoidal veins genetically derived from ones ancestors, may predispose an individual to developing hemorrhoids. It is well known that hemorrhoids tend to run in families.

An improper diet may consist of spicy or low fiber foods. A diet consisting of spicy foods, might taste good going down, but may burn and pain the rectum at defecation. Some spices are not digested completely and the resulting residue may cause inflammation of the rectal veins as it slowly accumulates in the stool.

Wherever low fiber diets are in vogue, such as in the United States, constipation reaches endemic proportions.

Constipation is a condition that results in straining during bowel movements. The major causative factor in the development of hemorrhoids is straining while at the stool. Straining at the stool, lifting, and rigorous exercise can cause increased pressure within the rectal veins. This may cause hemorrhoids to form by rupturing the one-way valves inside the rectal veins.

Poor anal hygiene from scratching and harsh wiping directly traumatizes the anorectal tissue and may induce hemorrhoid inflammation. Irritating substances such as soap and scented toilet paper, act in a similar manner. Patients frequently rub soap into their rectum to get it clean. This is bad. As a rule of thumb, "If you wouldn't put in your eye, don't put it your rectum." The rectum is a most sensitive area.

Pregnancy and childbirth are a leading cause of hemorrhoids in women. Childbirth causes the largest amount of swelling in hemorrhoids as the newborn infant passes through the vagina, parallel to the rectum. Pregnancy causes an increase in rectal venous pressure as the enlarged uterus presses against a major abdominal vein (*the inferior vena cava*). This is because the *inferior rectal* (Hemorrhoidal) *vein* and the *middle rectal* (Hemorrhoidal) *vein* both drain into the *internal iliac vein* which drains into the *common iliac vein*, which drains into the *inferior vena cava.*

When the portal venous circulation is impaired, this can also cause hemorrhoids. This is because the *superior rectal* (Hemorrhoidal) *vein* drains into the *inferior mesenteric vein* which drains into the *splenic vein*, which drains into the *portal vein*. When the pressure in the *portal vein* rises, as in liver cirrhosis, or other causes of portal hypertension, the circulation in the *superior rectal* (Hemorrhoidal) *vein* may be reversed, carrying portal blood through the *inferior rectal* (Hemorrhoidal) *veins*. The circulation in the *superior rectal* (Hemorrhoidal) *vein* may be reversed because of its peculiar absence of the one-way valves, common in other *rectal veins*. When this collateral venous circulation develops, owing to an increased blood volume and pressure, internal and external hemorrhoids occur.

HEMORRHOIDS: FOUR BASIC TYPES

C. M. Noll describes, in my opinion, the physiology of hemorrhoid formation better than anyone has done before in his book PROCTO BASICS:

"Hemorrhoids are progressive in their development with time, trauma, and infection contributing to their development. All types of hemorrhoids are progressive stages of internal hemorrhoids. The mucosa of the rectum becomes detached from its supportive structure above the *annulus hemorrhoidalis*, and begins it's descent in sliding fashion toward the anus. Enlargement of the veins behind the mucosa fills the space formed by the descent of the mucosa. This is hemorrhoid disease."

"When separation breaks through the anorectal muscle ring and descends further, an external hemorrhoid has developed. The vessels contained within an internal hemorrhoidal mass are those of the superior hemorrhoidal plexus."

Hemorrhoids develop in various degrees:

"First degree hemorrhoids are short projections of hemorrhoidal tissue into the anal canal. Second degree hemorrhoids prolapse with defecation but reduce spontaneously. Third degree hemorrhoids prolapse with defecation but recede only by manual reduction. Fourth degree hemorrhoids are permanently prolapsed and cannot be reduced into the anal canal."

HEMORRHOIDS: A COMMON MISDIAGNOSIS

Unfortunately, patients will assume they have "piles" or hemorrhoids whenever there is any symptom in the rectal area. This is a misconception. The diagnosis of hemorrhoids is frequently complicated by symptoms of the following: cancer, fissure, fistula, pruritus, prolapse, strictures, warts, and polyps.

Other diseases of the colon and rectum are commonly the cause of abdominal or anorectal pain, bleeding, diarrhea, and constipation.

Again, as noted in PROCTO BASICS:

"Too often the physician in general practice will take the patient's complaint of hemorrhoids as the given truth, without an examination, and give him some salve or medicine, not knowing what the trouble is. The proctologist does not usually see proctologic cases until others have failed to give the necessary relief."

The digital rectal examination is an important part of the patient's history and physical examination, but is not regarded as a good examination for the detection of hemorrhoids alone. Most cases of mild to moderate hemorrhoids will be missed by the physician performing only a digital examination. Symptoms from the above mentioned diseases can easily be misdiagnosed as hemorrhoids if an anoscopic examination is not performed.

HEMORRHOIDS: THE ANOSCOPIC EXAMINATION

An anoscopic examination is mandatory in any patient suspected of having hemorrhoids. A proctosigmoidoscopy or colonoscopy is strongly recommended, depending on the history and or the severity of the patient's symptoms. Unfortunately, not even the anoscopic examination is taught in most medical schools today.

Physicians in general practice are strongly encouraged to learn anoscopy. Just owning an anoscope does not make one qualified to use it. The best selling anoscopes today are disposable round plastic anoscopes, without a side-viewing slit. These items should be discarded into the nearest trash barrel. Any physician using one of these today does not know what he is doing. All anoscopes should have a side-viewing slit, like that which is common to the Brinkerhoff, or Hinkle-James model proctoscopes. Hemorrhoidal formation and rectal prolapse cannot be brought properly into view without a side-viewing slit.

Noll describes a proper technique for the proctologic examination and describes in detail his way to use a proctoscope (anoscope):

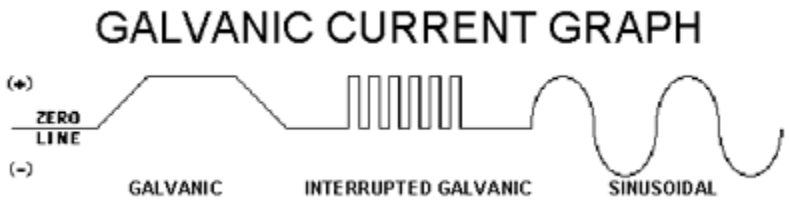
> "Digital examination should always precede instrumental examination to pave the way and to determine that no obstruction is present. The well-lubricated anoscope is directed towards the umbilicus, until the distal end is beyond the anorectal muscle ring. Then meeting no resistance, the direction is changed to occupy the rectal ampulla. The obturator or slide is then removed and the mucosa is noted for the presence of blood, fecal debris, polyps (pedunculated or sessile), hypertrophied papillae, or other masses. The mucosa is examined for ulcerations, varices, parasites, factitial ulcers, and other inflammatory processes. The scope is then maneuvered to bring any hemorrhoidal formation and excessive mucosal prolapse into the side viewing slit, noting the position, extent of involvement, flexibility or fixation. *Condyloma accuminata* may be noted, as well as carcinoid. Pus at the posterior pectinate line may indicate a deep post anal abscess. Fissure in Ano, anterior or posterior may be seen.
>
> If the scope is removed and is to be reinserted, the obturator or slide must be replaced before re-insertion and possibly re-lubrication, to avoid possible trauma and pain."

Although a digital rectal exam is important in the diagnosis of rectal disorders, it is this author's opinion a good anoscopic examination is more important. This is why only physicians trained in anoscopy should be called upon to confirm a diagnosis of hemorrhoids.

UNDERSTANDING ELECTROMEDICAL CURRENTS: BASIC PRINCIPLES

The transformation of the basic electrical energy into the different therapeutic currents is best visualized by the smile of a water system. Water can be applied either at high or low pressure, at a large rate of flow or in a fine spray running continuously or in abrupt squirts or waves. Similarly the flow of electrons may be even, or be interrupted, or reversed, frequently or infrequently, symmetrically or asymmetrically. The rate at which the current is increased from zero to maximum may be slow or rapid and it may remain at low tension or rise to very high tension.

Unidirectional currents are those which flow in one direction without reversal of polarity. The galvanic and the interrupted-galvanic are examples unidirectional currents. Alternating currents are those which reverse their direction of flow. This group includes the slow sinusoidal and high frequency electrosurgical currents.



Galvanic current, also described as the direct or constant current, is the basic and also the first known form of electrical current. The interrupted galvanic current, used in electro diagnosis, is usually produced by a mechanical device placed in a galvanic circuit that interrupts the current flow at regular intervals. Constant galvanic current can be manipulated to be made useful for electro medical purposes.

If a galvanic current passes through a rhythmically varying resistance, which at the same time periodically reverses the direction of flow of the current, a reversing galvanic wave or slow sinusoidal wave is produced. When a galvanic current treated in this way consists of rhythmical waves, each of which gradually increases in intensity and volume from zero to maximum and without a pause decreases to zero and then repeats the same process in the opposite direction, then it must also be classified as an alternating current.

When a constant galvanic current is changed into a slow sinusoidal wave, then alternating current electro medical principles come into play. It has been established that slow sinusoidal current, a mainstay in the treatment of paralysis, furnishes a stimulus of long duration to both smooth and skeletal muscle fibers. The low frequency alternating sinusoidal current used to treat paralysis differs significantly from the high frequency fulgurating current used to treat superficial skin lesions. High frequency current defined is an alternating current having a frequency of interruption or change of direction sufficiently high so that tetanic contractions are not set up when it is passed through living contractile tissue.

ELECTROMEDICAL CURRENTS: GENERAL BIOPHYSICAL EFFECTS

According to biophysical effects, electro medical currents can be divided in two groups: 1) currents causing ionic changes in the tissues and a minimum of thermal effects; 2) currents causing only thermal changes. The galvanic and low frequency currents belong in the first group, high frequency current in the second.

ELECTRIC CURRENT

DIRECT	VS.	ALTERNATING
1. GALVANIC CURRENT		1. HIGH FREQUENCY CURRENT
2. HAS POLARITY (+-)		2. HAS NO POLARITY
3. NON-ALTERNATING		3. ALTERNATING @ 60 CYCLES/SEC
4. THERAPEUTIC AT 5-10 MILLIAMPERES		4. THERAPEUTIC @ 120 VOLTS AT ≥100,000 ALTERATIONS/SEC.
5. ACTION ON TISSUE IS CHEMICAL		5. ACTION ON TISSUE PRODUCES HEAT

This comparison chart between direct and high frequency alternating current electricity will help the reader better understand the major electro medical differences. The two principle primary effects on living tissues are the ionic or chemical effect and the heating or thermal effect. Generally speaking, ionic effects are exerted by the galvanic and low frequency currents, while a primary heating effect is exerted by high frequency currents.

Amperage is simply the volume of electric current. Specifically, it is the volume expressed in amperes, a unit of electrical current in the meter- kilogram-second system. Volt is simply the force of electricity. Specifically, it is a unit of electric potential and electromotive force.

Specific biophysical affects of electro medical currents will be discussed in detail further in this treatise.

GALVANIC ELECTROMEDICAL CURRENT: BASICS

Galvanism refers to the therapeutic uses of direct current electricity. Galvanic current has polarity having both a positive and a negative pole. Current flows continuously in one direction having no alterations and therefore no frequency, unlike high frequency alternating current.

SPECIFIC BIOPHYSICAL EFFECTS OF NEGATIVE AND POSITIVE GALVANISM

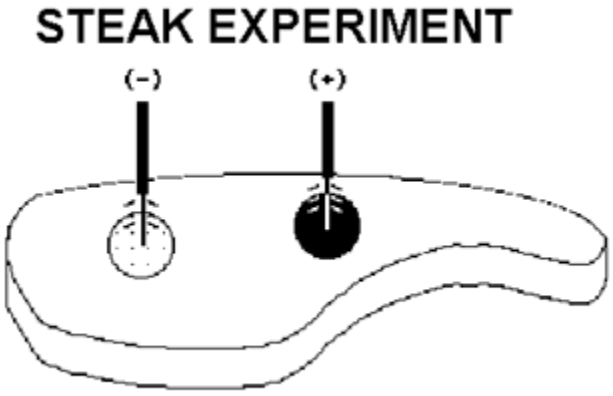
The human body may be considered, from the viewpoint of electrotherapy, as a bag of skin holding a solution of common (table) salt (Na+ Cl-). When the molecules of NaCl dissolve in water they dissociate into sodium ions (Na+) bearing a positive charge and chlorine ions (Cl-) bearing a negative charge. The flow of direct current through the salt solution causes these ions to move in a definite direction. The sodium ions migrate toward the negative pole (cathode) and the chlorine ions toward the positive pole (anode). The process is known as ion transfer or iontophoresis. When the positively charged sodium ions arrive at the negative pole, and the negatively charged chlorine ions at the positive pole, they lose their

charge and become free unelectrified atoms. These, in turn, cause a secondary chemical reaction in the water and form caustic sodium hydroxide while liberating hydrogen gas at the negative pole. It also forms caustic hydrochloric acid while liberating oxygen gas at the positive pole.

GALVANIC CURRENT[21]

POSITIVE POLE	VS.	NEGATIVE POLE
1. PRODUCES ACID REACTION		1. PRODUCES ALKALINE REACTION
2. IS COAGULANT		2. INCREASES HEMORRHAGE
3. IS VASOCONSTRICTIVE		3. IS VASODILATIVE
4. IS SEDATIVE		4. IS IRRITANT OR STIMULATIVE
5. REDUCES INFLAMMATION		5. INCREASES INFLAMMATION
6. IS GERMICIDAL		6. IS NOT GERMICIDAL
7. MAKES A HARD SCAR		7. LEAVES A SOFT SCAR
8. CORRODES STEAL NEEDLES		8. PRESERVES STEEL NEEDLES

The alkaline and acid reaction of the poles of galvanic current when increased to sufficient intensity will lead to the destruction of tissue by coagulation of protein at the positive pole and by liquefaction of protein at the negative pole. This is best illustrated by bringing two wires from the terminal of a galvanic generator to a piece of raw steak.



NEGATIVE GALVANIC CURRENT vs. POSITIVE GALVANIC CURRENT

In this experiment, the intensity of each reaction varies with the strength and relative density of the current at each pole. At the positive pole, the wire becomes adherent to the meat, and the tissue surrounding the wire hardens due to coagulation of protein at the positive pole. Around the negative pole, white foam appears (hydrogen gas) and the wire becomes loose, due to the liquefying action of sodium hydroxide on the protein around the wire. This experiment demonstrates that the positive pole of the galvanic current hardens tissue while the negative pole softens it, provided that a current of sufficient intensity is applied and bare metal electrodes are employed.

GALVANIC CURRENT ELECTROTHERAPY: HEMORRHOIDOLYSIS (INTRODUCTION)

Therapeutic galvanic treatment for hemorrhoids has recently come into vogue for physicians. A great deal of money and advertising has been poured into this technique to make it sound more attractive to the public. It is frequently publicized, and sometimes incorrectly so, as a viable alternative to a surgical hemorrhoidectomy. It is partly due to the public's perception that hemorrhoid surgery is undesirable, and partly to the failure of the medical profession to avail themselves of simpler and less disabling methods, that patients have been driven to seek so-called bloodless cures by irregular practitioners.

The procedure takes about 10 minutes. A galvanic current is painlessly introduced directly into the offending vein. The current, negative or positive, causes a chemical or thermal reaction within tissue that either destroys and/or obliterates the hemorrhoid.

This method of treating hemorrhoids electrically has been called by several names. It has been called the negative galvanic method, named after a type of current that may be used. It is called "Electrolysis" (by F. D. Stanton), because it causes destruction of tissue by passage of an electric current and the Keesey Procedure, named after Wilbur Keesey, who developed the technique in the 1930s.

All the above names are descriptive, but only the term hemorrhoidolysis is correct. Hemorrhoidolysis is defined as the dissolution of hemorrhoids by chemical or electrical means. And that is exactly what the procedure does. It dissolves hemorrhoids, by using an electric current to cause a chemical reaction within the hemorrhoidal tissue.

HEMORRHOIDOLYSIS: EFFECTIVENESS

Probably no method for treating selected cases of hemorrhoids will affect better results than those obtained by properly administered treatment with galvanic current.

Keesey reports early success with the hemorrhoidolysis procedure, having successfully treated cases that had been injected one or more times futilely with a sclerosing agent. According to Keesey, "The advantages of this method are its simplicity, safety, and apparent permanency of cure. It is a procedure requiring neither anesthesia nor hospitalization. There are no unfavorable sequelae."

Keesey's never saw a severe complication in over 700 individual treatments. He never encountered a case of rectal stricture or metastatic abscess associated with this procedure.

Dr. Daniel A. Norman (Lake Tahoe) performed a study on 42 patients using negative galvanic hemorrhoidolysis at Barton Memorial Hospital, S. Lake Tahoe, California. Nineteen patients had grade 3 hemorrhoids. Twenty patients had grade 4 hemorrhoids. Three patients had grades 1 & 2 hemorrhoids. The mean number of treatments for the complete resolution of symptoms was 2.65. All patients were successfully treated (ablation of all hemorrhoidal disease without scar tissue), and symptom free at a mean duration of follow-up (direct contact) of 18.2 months.

Ferris, a general practitioner in Riverton Wyoming, cooperated in a retrospective study of 26 patients, on whom he had performed the negative galvanic hemorrhoidolysis procedure. The average patient who completed the procedure had undergone 5.2 treatments. 24 out of 26 patients surveyed (or 92%) reported a significant improvement of their hemorrhoidal symptoms.

Ferris states that hemorrhoidolysis is effective for only grades one and two, and some grade 3 hemorrhoids. All but two patients were satisfied with the procedure performed by Dr. Ferris. A patient, who described the procedure as painful, received a shock during her fourth treatment. Another patient still suffered from hemorrhoidal symptoms after the procedure, but at a reduced level.

Many grade 3 and 4 hemorrhoids present with extensive involvement of the external hemorrhoidal venous plexus and with severe disruption of the anoderm (dermal tissue). In my opinion, hemorrhoids of this type may be helped by the hemorrhoidolysis procedure, but certainly not completely obliterated 100 per cent of the time.

HEMORRHOIDOLYSIS: HISTORY

Contrary to common belief, this electric galvanic method is not new, it being first employed in 1867. We are surprised that more attention was not given to the method described by Dr. Baker in a paper which he read before the Milwaukee Medical Society in 1892 (Treatment of Hemorrhoids by Electricity). Baker's

work inspired its adoption in certain localities, but many failures due to defective technique and unfamiliarity of its chemical action, migrated against it. We do not hear again of the treatment until a Chicago physician in 1899 made an attempt to use the method but failed.

The galvanic current with the electric needle or electrode had been used by a number of physicians with the report that poor results were being obtained. Ogden notes, "It is not the method which is at fault but the mode of application and the lack of close attention to details." A poorly designed electrode was undoubtedly the reason for the failure on the part of early galvanic current experimenters to successfully use that current for treatment of hemorrhoids.

In 1934, Dr. Wilbur Keesey published a treatise on the "Obliteration of Hemorrhoids with negative Galvanism." In this work, he describes the proper technique and equipment that should be used for the hemorrhoidolysis procedure.

Hemorrhoidolysis had not been well accepted by the medical community. Keesey noted, "The time consumed in administering treatment and lack of knowledge regarding methods of treatment were the chief reasons for its waning popularity. If galvanic current is used where only alternating current is available, such as in the United States, then a rotary converter, motor generator, or chemical storage battery is needed to supply the current. Some physicians purchased electric galvanic generators they did not know how to use, and discarded it without ever having learned how to use it." One problem early operators had, was an inability to change the setting of the generator while one hand was confined to holding the speculum and the other the needle, requiring, therefore, the service of an assistant.

Today, with great improvements in galvanic equipment technology, and medical instruction readily available, negative galvanic hemorrhoidolysis has gained widespread acceptance. Over the years, improvements have been made on electric galvanic generating equipment. In recent years, manufacturers have made available to physicians, government FDA approved hemorrhoidolysis equipment.

HEMORRHOIDOLYSIS: TECHNIQUE

The technique used today, paraphrased in this section, is adequately described by Keesey. Except for some minor modifications by Ogden & Stanton, the technique as it is described here, has changed little in over forty years.

The average case needs no other preoperative measure then evacuation of the bowels and a preparatory cleaning enema. Existing complications are best treated preoperatively. Fissures, ulcers, perirectal abscesses, or fistulae should be eradicated first. Proctitis and colitis commonly associated with hemorrhoids should be treated first.

The speculum is gently inserted to its full length, well above the dentate line, and the obturator withdrawn until the uppermost hemorrhoid comes into view. Slight rotation of the speculum while the patient strains, will expose the entire hemorrhoid. The needle electrode is now inserted into the internal hemorrhoid. True hemorrhoidal tissue has no sensory nerves, which fact enables the painless insertion of the needle.
Genuine hemorrhoid tissue is most often characterized by the brilliant red color of the submucous tissue appearing through a break or erosion in the mucous membrane. If the mucous membrane is intact the tumor will have a dark violacious appearance. The needle should be inserted wherever the bright red submucous tissue is observed. Normal mucous membrane is characterized by its pale, pink, translucent appearance and should never be touched with the electrode.

From the standpoint of pain and good end results, a successful treatment demands that the needlepoint be in the lumen of the vein. The patient is the best guide, for if he complains of burning pain the technique is improper. Anesthesia should be avoided in all cases, because it deprives us of this index. The current is now turned on very gradually, two to three minutes being required to bring the current up 5 to 15 milliamperes, according to the tolerance of the patient.

Ogden suggests that the hemorrhoid be injected with one percent Novocain®, so that it stands out full and distinct. He feels that the generation of hydrogen gas is much greater if the injection is employed. He is careful to remind us however, that the injection of Novocain® anesthetizes the tissue and that as a result the patient will be incapable of guiding or aiding you in determining whether you are introducing the electrode into mucous membrane, and you will be compelled to rely on your anatomical and pathological knowledge of the structure.

The needle electrode should always be inserted before the current is turned on. Upon termination of treatment, the current should always be slowly turned off before the electrode is withdrawn. A violation of these rules will produce a sudden shock. The maximum current tolerance is continued until a change of color occurs in the tissue. At first, light colored bubbles are seen under the mucosa which later changes into a dark red, and in some instances nearly black, color. Treatment is terminated at this point, the whole procedure lasting 10 to 12 minutes. The current is slowly turned off and the needle withdrawn.

Ogden notes, "In turning on the galvanic current, be sure to turn it on slowly to avoid shock to your patient. The same rule is to be observed when turning off the current. Do not remove the electrode from the hemorrhoid until you have shut off the current." "If the patient complains of discomfort or pain," Ogden continues, "it will be due to too rapid building up or reduction of the current. Better results are obtained if the amperage is kept low and the time of treatment correspondingly lengthened, as by not using more than 10 milliamperes, but for a full 15 minutes."

If the hemorrhoid is large, one or two other insertions are made one-fourth to one-half inch away from the first and the process is repeated. However, in all punctures subsequent to the first, the current is continued for only five minutes, because discoloration appears much sooner. The evidence of successful treatment is complete discoloration of the entire hemorrhoidal mass, the number of insertions required for each tumor depending on its size.

Not more than one hemorrhoid is treated at a séance to avoid nervousness or fatigue of the patient. Transitory nervousness and excitement may be controlled by general conversation during treatment. Complaint of burning pain is significant, but other sensations are due to pressure and require no attention. Treatments are given every third day, the average case requiring about six treatments for complete obliteration of all hemorrhoids.

Except for a peculiar feeling of fullness for about twelve hours following treatment, there is no painful reaction. If a thorough treatment has been given, the individual area will retract well within the rectum and carry the loose, redundant folds of perianal integument with it. This dynamic result never fails to impress the patient who has suffered with protruding hemorrhoids for a long period.

The hemorrhoid undergoes a rapid change, the mucosa assuming a normal condition in 7 to 10 days. If the hemorrhoid is then not completely obliterated, insufficient current has been used. In such a case a second treatment of shorter duration (5 minutes) should be given. At no time does the patient have to be recumbent.

Following each treatment, a small quantity of Nupercaine® ointment, (one percent), is injected into the lumen of the rectum. No other postoperative treatment is necessary, as the after effects are negligible. Bleeding, pain, and protrusion usually cease after the first treatment. All symptoms are promptly relieved.

HEMORRHOIDOLYSIS: SPECIFIC BIOPHYSICAL EFFECTS OF NEGATIVE AND POSITIVE GALVANISM

Authors of the hemorrhoidolysis procedure evenly disagree about the type of current that should be used. H. E. Bacon, J. P. Nesselrod, and F. D. Stanton, advocate the steady passage of unidirectional current from a large pad, which is the negative pole, to a small positive pole needle that is inserted into the hemorrhoid. Whereas, both W. E. Ogden and W. E. Keesey advocate just the opposite, dedicating the small needle electrode to the negative pole.

Stanton is the only author found that claims to effectively use both positive and negative galvanic currents. He states that, "positive galvanism is best for treating hemorrhoids. In treating growths other than hemorrhoids, the negative pole is used." Dr. Stanton suggests that negative galvanic current is best used for the removal of papillomas and removal of both sessile and pedunculated neoplastic growths.

When a positive galvanic technique is used, deterioration of the needle electrode may occur. Stanton says, "Positive galvanism causes a steel needle to disintegrate and causes discoloration of the tissue. In the treatment of hemorrhoids, discoloration will, of course, make no difference. Because of erosion of steel needles there is a danger of the tip eroding and becoming lost in the tissue; therefore each steel needle is used but once and discarded. To avoid erosion a gold (or platinum iridium) needle is used; such needles do not disintegrate."

When a negative galvanic technique is used, the concern is more for the production of hydrogen gas, than for the physiologic electro-thermal properties listed above. Again, from Stanton, "The galvanic current introduced into the interior of the hemorrhoid and contacting with the water content of the blood, generates hydrogen gas which destroys the organized structure and capillary circulation of the hemorrhoid. This produces first, liquefaction, and then a hardening of the hemorrhoidal body."

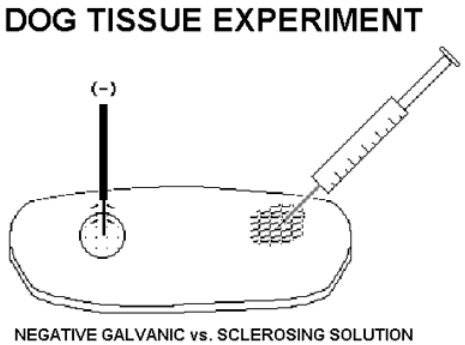
Actual obliteration of the hemorrhoid is accomplished by absorption, if it is small, as occurs in any simple contusion. If a large, thin-walled hemorrhoid is treated, it ruptures, causing a discharge of thrombosed elements into the rectum. Following this, there is contraction of underlying tissue with hemostasis, absence of pain, and rapid healing of the parts. Because the chemical action of negative galvanism is on the liquid content of the mass instead of the tumor wall, it has one great advantage over all other methods. That is, the resultant normal resiliency of the mucous membrane after obliteration.

When applied to hemorrhoids, the negative pole produces first a hydrolytic decomposition and then a contraction of the tissues. In 1866, Althaus made microscopic observations of the changes in animal structures due to the electrolytic action of the negative galvanic needle. He found that the tissues were markedly contracted, and that there was no inflammation, suppuration nor sloughing. When the current was applied to the blood vessels they became changed into solid strings due to disintegration of the blood and deposition of lamellated fibrin. Thus, it was determined that the current could be safely and successfully applied to contract and disintegrate tissue, and obliterate blood vessels for surgical purposes.

HEMORRHOIDOLYSIS: COMPARISONS

HEMORRHOIDOLYSIS AND SCLEROSING SOLUTION

In the dog tissue experiment described here, Anderson observed microscopically, the differences in canine rectal tissue twelve hours after application of: negative galvanism at 15 ma. for 10 minutes and: injection of one ml. of 5 per cent phenol in oil.



Microscopic observation of canine rectal tissue 12 hours after injection with sclerosing solution, reveals a contracted distorted mucous membrane, which has lost its elasticity, and presents with a hardened "washboard" appearance. There is a marked sclerosis of the muscularis mucosa, contraction of Goblet cells and marked contraction of surface membrane. Anderson concluded that these changes represent an effort of the tissues to repair an injury.

Microscopic observation of canine rectal tissue 12 hours after application of negative galvanic current reveals integrity of muscle fibers with complete destruction of connective tissue and vascular elements. Complete tissue disintegration is evidenced by absence of nuclei. There is thickening of thrombosed capillary walls and also of the intramuscular glands. The surface membrane maintains a smooth appearance.

The rationale of the injection method is based on an inflammatory sclerosing reaction. The negative galvanic current does not produce such an inflammatory sclerosing effect because the chemical action is on the liquid content of the mass instead of the hemorrhoidal wall. Advocates of each technique claim their method to be the most effective.

HEMORRHOIDOLYSIS: ELECTRODE CONSTRUCTION

The active needle electrode is a most important factor because it must deliver the current to the interior of the hemorrhoid while preventing escape of hydrogen from the tissue and allow clear visibility of the operative field. Anderson notes, "It must be carefully constructed with two objects in view. The first of these is the sure delivery of the current to the interior of the hemorrhoid; and second, the prevention of the escape of the electrically generated hydrogen gases from the interior of the hemorrhoid. Undoubtedly the lack of an electrode which would perform these two functions was the reason for the failure on the part of early galvanic current experimenters to successfully use that current for treatment of hemorrhoids."

Needle makers of early galvanic generating equipment used a glass bead at the base of the electrode needle. Today's galvanic needle makers use a rubber or plastic seal tapered at the base of the needle in a manner to prevent escape of hydrogen gas. "This provides a wider surface area to present to any possible apertures occurring between the needle and the tissue, after insertion of the electrode. This surface closes the apertures and prevents the escape of the hydrogen gas. Since the electrode must under no circumstances pass through the hemorrhoid and pierce the opposite side, electrodes tips today, are made short in length," according to Anderson.

The typical hemorrhoidolysis electrode used today is a set of twin parallel needles connected to a single handle. Both needles are insulated up to the tip. They are approximately five inches long by 1/8 inch in diameter and function in exactly the same manner. The double needle uses two needles 3 mm apart to affect a larger tissue area than a single needle. Both needles function as one and are placed into the hemorrhoid simultaneously during treatment.

The use of a leather-covered copper electrode in combination with a copper sulfate solution and galvanism, although acting to shrink hemorrhoids, is slow and tedious work. Although this modality has value, it is time-consuming and the results obtained are no better than those obtained by other methods.

HEMORRHOIDOLYSIS: DISADVANTAGES

1. External hemorrhoids cannot be treated with hemorrhoidolysis.
2. The comparative length of time required for each application has been the subject of objectionable comment.
3. Complaint also has been made that due to exactness of technique, the procedure was too tedious for the operator to steadily support the needle.

4. This author has personally observed a single type 3 (right lateral) anorectal fistula develop, in a 34 year-old male patient receiving negative galvanic hemorrhoidolysis treatments. This patient did not have any signs or symptoms of abscess on a prior proctologic examination. It is uncertain, however, whether or not negative galvanism was directly responsible.

HEMORRHOIDOLYSIS: ADVANTAGES

1. The hemorrhoidolysis procedure never causes more then a well-tolerated discomfort to the patient.
2. Anesthesia is not required with hemorrhoidolysis in contrast with surgery.
3. Hemorrhage following hemorrhoidolysis rarely, if ever, occurs.
4. Infection following hemorrhoidolysis, rarely if ever takes place. The method itself is self-sterilizing.
5. Sequelae and complications following hemorrhoidolysis have not been reported in the literature.
6. Mortality following hemorrhoidolysis has never been reported.
7. Recurrence after hemorrhoidolysis is uncommon; less than one per cent in selected cases. Redundant mucosa becomes obliterated, although normal mucous membrane retains its original elasticity and tonicity without scar tissue formation.
8. There is no loss of time from work for the patient receiving hemorrhoidolysis treatment.
9. Hemorrhoidolysis being an ambulatory office procedure is a self-evident economic advantage. The same applies to the avoidance of expenses incident to hospitalization for surgery.
10. With hemorrhoidolysis there is no need for restriction of diet, before, during, or after treatment, usually required with surgical procedures.
11. Treatment of hemorrhoids by hemorrhoidolysis offers a large field for qualified general practitioners. The majority of all hemorrhoids are amenable to such treatment.
12. Hemorrhoidolysis is an effective and painless method of obliteration. The technique is comparatively simple. Many patients today demand ambulant treatment that should be accorded by ethical physicians.
13. The hemorrhoidolysis treatment for hemorrhoids is not new, but its technique has been greatly developed on a scientific basis.
14. No special preoperative or postoperative treatment is required for this procedure.
15. Comparison of hemorrhoidolysis with other methods of treatment proves it to be the method of choice because of physiological end results, and the absence of serious complications.

ALTERNATING ELECTROMEDICAL CURRENT BASICS

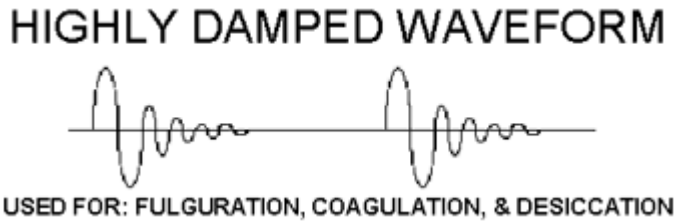
High frequency current is alternating current. It does not have polarity. There are no positive and negative poles. The terminals of a high frequency current are the same. “The regular service current supplied by an electric service company is usually 60 cycles, alternating current, and between 110 and 120 volts; 60 cycles means 120 alterations of polarity per second. This rate is considered to be a low or slow frequency. This slow rate of oscillation renders such current more lethal than therapeutic. The shock from the make and break of the alterations of such current if applied to the body would be intolerable and promptly fatal. Therapeutic alternating currents are of high frequency, running upward from 100,000 alterations per second,” as noted by Anderson.

Anderson reports, "The wave form of an alternative electrical current refers to its visual appearance as shown on an oscillograph or an oscilloscope. Reversing its direction of flow from several times to millions of times per second, the current traces a wavy line which constitutes its wave form." Pictures of these waveforms are presented, whenever possible, to help illustrate the principles of alternating current electrotherapy.

ALTERNATING ELECTROMEDICAL CURRENT: WAVEFORM ANALYSIS

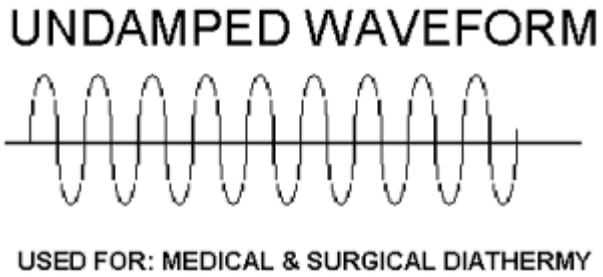
The waveform analysis paraphrased in this section is adequately described by J. F. Otto in his book "Principles of Minor Electrosurgery."

The earliest and simplest high-frequency alternating current generators employed the principle of condenser discharge across a spark-gap. This type of oscillator produces what is known as a damped wave form; that is, with each condenser discharge a series of oscillations are set up, the voltage peak of the first being highest and then each subsequent oscillation of the series diminishing in voltage down to zero.
Each series of oscillations in this waveform picture is called a wave train, and you will notice that there are distinct "no voltage" separations between the wave trains.



A high-frequency current, of a highly damped waveform, is ideal for coagulation, desiccation and fulguration. It produces the most dependable hemostasis, the greatest precision and application with the surest results.

With the invention of the vacuum tube oscillator by DeForest, a new high-frequency current different waveform was demonstrated. The vacuum tube oscillator was capable of producing continuous wave oscillations with equal voltage and without interruption.



This current, producing an undamped waveform on an oscilloscope, produced an entirely new effect on tissue. When bi-terminal electrodes of equal or near equal size are used, the current density is quite evenly dispersed within the intervening tissue with a corresponding temperature rise adequate for medical diathermy, and without concentration sufficient to cause cell destruction. The ability of medical diathermy to penetrate heat deep into tissue has many therapeutic uses.

When the undamped waveform current is concentrated at the active electrode; it cuts. When bi-terminal electrodes of greatly different sizes are used, the current density is unevenly dispersed within the intervening tissue, with a corresponding temperature rise adequate for surgical diathermy and with a concentration of heat at the active electrode sufficient to cause cell destruction.

Concentrated at the active electrode, these continuous wave oscillations produce intense heat very quickly. The cells are volatilized (exploded), producing a hole, if the electrode is held stationary, or an incision if the electrode is moved. It is almost completely devoid of dehydration or homeostatic effect. Its usefulness is confined, therefore, to cutting only in non-vascular areas. Surgical diathermy has not adapted for use by modern surgeons, because it appears to have no advantage over that of a scalpel.

MODERATELY DAMPED WAVEFORM

FOR USE: CUTTING WITH HEMOSTASIS

Dr. Bovie, the physicist, succeeded in generating a moderately damped oscillating current in which wave trains were placed closely enough together for effective cutting, but with sufficient damping to retain the desired dehydrating or hemostatic effect. It is this current, refined over the years, which is still the typical cutting current of all Bovie brand (and other electrosurgical) units.

From the foregoing, it is obvious that the two distinct types of high-frequency currents are essential to successful electric surgery. These are the currents provided by standard hospital electrosurgical surgical units. They are: the moderately damped waveform current; and the highly damped waveform current.

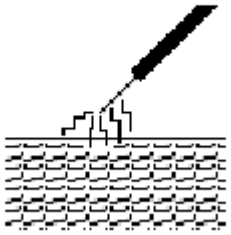
The four surgical effects resulting from the use of these currents are:

1) Fulguration (electro-charring)
2) Desiccation (electrodessication)
3) Coagulation (electro coagulation)
4) Cutting with hemostasis (electro section).

ALTERNATING CURRENT ELECTROTHERAPY: FULGURATION

Mono-terminal application of high-frequency current is used in electrosurgery. The current will flow from a pointed active electrode into the tissue because the patient represents sufficient capacitance to attract the current to "ground." If the electrode is held slightly away from the tissue surface, the superficial dehydrating effect caused by the resulting "sparking" is called fulguration.

FULGURATION



· HIGH FREQUENCY ELECTRICAL CURRENT
· DESTRUCTION OF TISSUE BY ELECTRIC SPARKS
· MONOTERMINAL OR BITERMINAL NEEDLE ELECTRODE

Fulguration is commonly a mono-terminal technique with the most superficial effect. Fulguration can also be a bi-terminal technique for convenience for, and connection with, the application of electro coagulation to produce a somewhat what more penetrating dehydration.

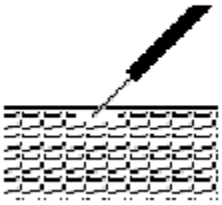
For proper fulguration technique, do not contact the tissue. Hold the needle one or two millimeters away from the tissue, allowing the current to spark to the surface being treated. When using fulguration or desiccation techniques, applying more current then is necessary will produce little more effect, because the surface will dehydrate and carbonize quickly, electro-charring the tissue, forming an effect layer of

insulation against penetration of the current to the underlying structure. H. E. Stewart states that fulguration, with a short spark jump through the air, is used alone in the treatment of small hemorrhoids.

ALTERNATING CURRENT: DESICCATION

Desiccation is always a mono-terminal technique; that is, no indifferent electrode plate is used. This of course, limits its effectiveness in elevated or deep growths. For desiccation, the coagulating current of the electrosurgical unit is used, with the needle held in contact with the tissue or the point inserted.

ELECTRODESICCATION



· HIGH FREQUENCY ELECTRICAL CURRENT
· DEHYDRATION OF TISSUE
· MONOTERMINAL NEEDLE ELECTRODE

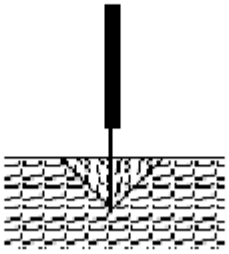
In treating external hemorrhoids, Clark desiccates a line across the hemorrhoid similar to the primary scalpel incision in the usual technique. The needle is then inserted into the clot and the vein destroyed. The hemorrhoid is then incised without hemorrhage and the clot curetted out.

For the treatment of internal hemorrhoids, after sufficient anesthesia is employed; each hemorrhoid is grasped by a forceps and clamped at its base in the direction of muscle fibers, the needle is inserted and the growth destroyed. Clark notes, "For the treatment of hemorrhoids with electrodessication, the usual technique consists of applying a needle-point electrode connected to the high-voltage terminal, either on the hemorrhoid (desiccation) or at sparking distance from its surface (fulguration). Subsequent drying, shrinkage and sloughing occur, depending on the strength of the current and the depth of penetration which in large hemorrhoids must be considerable. Electrodessication should not be used in advanced cases of hemorrhoids or those complicated by other ano-rectal pathology."

ALTERNATING CURRENT: ELECTROCOAGULATION

The technique of electro coagulation is always bi-terminal. An indifferent plate or a special bi-terminal electrode is always used. Coagulation tends to produce more necrosis of tissue then desiccation, and its destructive effects are not as quickly limited by his own dehydration. This current is often advantageous or necessary in the treatment of relatively large or deep growths.

ELECTROCOAGULATION



· HIGH FREQUENCY ELECTRICAL CURRENT
· COAGULATION OF TISSUE
· BITERMINAL NEEDLE ELECTRODE

The amount of coagulation around the electrode is dependant upon: 1) The amount of current, and: 2) The length of time it is applied. Of these two, the time is the more important factor. Contrary to what one would expect, heavy current for a short time will not coagulate as great amass of tissue as will lesser power over longer period of time.

This is because with a lower current, the tissues in contact with the active electrode are not as rapidly dried out; thus permitting the current to be applied longer and coagulation carried to a greater depth. With a greater current, dehydration of the tissue occurs so fast that a high resistance to current flow is introduced, thereby reducing the current strength and limiting the depth in which coagulation can be carried.

The coagulating needle has been in use for several decades, and is widely used by those who claim to have certain secret methods which are painless and which "dissolve" the hemorrhoid instead of cutting it out. Electro coagulation of hemorrhoids may be performed with a single pointed electrode as the active electrode. Some authorities advocate that the hemorrhoids be individually distended with a fluid solution, before a series of coagulations are performed. In this procedure, plunge the electrode into the depth of the hemorrhoid. The current is controlled through a foot switch and its strength and duration determined by the previous experience of the operator. The neophyte should experiment with strips of meat beforehand.

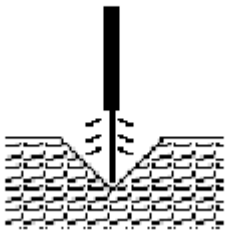
Obviously, the depth of current penetration is difficult to control.

The technique of the bi-terminal clamp method consists of freely and firmly grasping the pile along its basis parallel to the bowel, just as in the usual clamp and cautery operation. The current is controlled as described above, through the foot switch. Sufficient current strength is used to coagulate the entire base of the pile. Theoretically the desired degree of coagulation is determined by the tissue turning to a light gray color; actually the tissue cannot be seen between the jaws of the clamp. The portion of the pile above the clamp is excised. Each of the hemorrhoids is removed in turn and a small piece of petrolatum gauze inserted into the rectum. The skin should never be included in the jaws of the clamp.

ALTERNATING CURRENT: CUTTING

As explained under the section "Alternating Electrosurgical Currents," the waveforms of the cutting current are distinctly different from that of the coagulating current. Its effect is to explode the cells in the path of the electrode with parting of the tissues. The heat of the electrode also creates a shallow zone of dehydration on the severed edges, which seals off the minute vessels and prevents vascular oozing from the surfaces. The degree of hemostasis with the cut is directly proportional to the depth of dehydration, and is variable with the speed of the cut, thickness of the electrode edge, and the amount of power used. The greatest amount of dehydration to the wound edges, with the greatest amount of hemostasis to the cut; occurs when the electrode edge is thick, the cut is slow and the power is low.

ELECTROSECTION



· HIGH FREQUENCY ELECTRICAL CURRENT
· CUTTING OF TISSUE
· BITERMINAL NEEDLE ELECTRODE

Using the cutting current, the electrosurgical instrument is used to cut away and remove hemorrhoidal tissue. According to R. V. Gorsch, “the cutting current has no place in the surgical treatment of any type of hemorrhoid." As the scope of this monograph deals only with the palliative treatment of hemorrhoids, the surgical removal of hemorrhoids will not be further expounded.

ALTERNATING CURRENT: DIATHERMY

In the treatment of hemorrhoids and other anorectal ailments, medical diathermy has proved to be a useful tool. Gorsch notes, "Diathermy has afforded considerable relief to those afflicted, with sometimes intractable cases of anal neuralgia, sphincteralgia and coccygodynia, frequently associated with hemorrhoids. It has also proved useful in aiding the decongestive process of hemorrhoids following pregnancy."

According to Gorsch, the principle upon which medical diathermy works is as follows: “Alternating current of sufficiently high frequency to avoid nervous and muscular response can be passed through living tissue with no effect other than the production of heat. This heat is produced as a direct result of the resistance offered to the passage of the current.”

For the treatment of hemorrhoids and other anorectal ailments with medical diathermy, a rectal probe is inserted into the anal canal. The rectal probe should be as large as a "small to medium" size anal speculum. One of the bi-terminal electrodes is this probe, and the other patient ground plate electrode is a flat pad covering a large surface area of the body. Gorsch says, "When bi-terminal electrodes of equal or near equal size are used, the current density is quite evenly dispersed among the intervening tissue. An exceptionally high frequency current is used, greater than 10 million cycles per second. A current flow at 1,000 to 1,500 milliamperes should be continued over a period of twenty to thirty minutes, twice a week. Insulated electrodes may be preferable when short wave diathermy is used."

In the 1940's, diathermy was commonly used as a surgical cutting tool. The principle of surgical diathermy works when one of the bi-terminal electrodes is a small needle, and the other patient ground plate electrode covers a larger surface area of the body. This uneven electrode size causes the current density to be concentrated at the tip of the needle making an effective cutting tool.

Today, diathermy is no longer used as a cutting tool for the electro section of tissue. This is because the undamped waveform current, is the only current available from a short wave surgical diathermy unit. These high frequency waves, above 10 million cycles per second, as used in surgical diathermy, are unsuited for Electrosurgery surgery because the energy is transferred to the operator through the electrode handle, making it virtually impossible to attain an acceptable level of precise power control.

ALTERNATING CURRENT: CAUTERIZATION

The modern cautery is a device consisting of a wire like element (filament) of high electrical resistance that becomes hot when a current is passed through it. A silver, flattened (pencil like) tip, is fashioned over this wire filament, for the sole purpose of conducting heat to the tissue. This hot silver tip is used during electrosurgery to sear (cut) away tissue. A rheostat controls the temperature.

Heat cauterization in the treatment of hemorrhoids, has been used since ancient times. Early medical writings describe a technique of plunging heated instruments into protruding pile masses to destroy them. Voillemeir in 1875 described a method of linear cauterization in which the hot cautery was applied to the mucous membrane within the anus in four areas - anterior, posterior, right, and left, but not directly on the hemorrhoids themselves. Gant, as late as 1896, applied the cautery directly to the dilated hemorrhoidal veins. The benefit derived from early cauterization, was from the contraction of the cicatrix produced.
The electric cautery device has fallen out of favor in recent years. One major problem with it was "burn out." The length of life of its heating coil is as uncertain as in any other device where a wire is maintained at incandescent temperature, be it lamp bulb, toaster, or soldering iron.

CONCLUSION

The electric treatment of hemorrhoids is a topic that covers a vast array of electrophysiology and technique. The science of electricity is diverse and it's application to proctology titanic. Rarely do we see an evolution in medicine like that which has taken place with the prevalent use of the electric modalities in the treatment of proctologic conditions. Electric methods for treating hemorrhoids have withstood the test of time, and are well documented. In recent times, multinational proctology clinics been established, devoting themselves exclusively to the treatment of hemorrhoids by electrical methods.

For physicians proficient at the proctologic examination, the timeless value of this work will be treasured. The equipment needed for the electric treatment of hemorrhoids is commercially available and relatively inexpensive. For the first time ever assembled in a single volume, are everything a clinician will need to know and understand about hemorrhoids; including etiology, diagnosis, and the treatment of hemorrhoids using most all known electrical modalities.

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