

. Video: Harmonic Scalpel & Laser Hemorrhoidectomy (5 minutes), Rick Shacket, DO.  
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. Video: Hemorrhoid Surgery Tutorial - The National Library of Medicine  
<http://www.nlm.nih.gov/medlineplus/tutorials/hemorrhoidsurgery/htm/index.htm>

. Video: General Anesthesia Tutorial - The National Library of Medicine  
<http://www.nlm.nih.gov/medlineplus/tutorials/generalanesthesia/htm/index.htm>

. Video: Preparing for Surgery Tutorial - The National Library of Medicine  
<http://www.nlm.nih.gov/medlineplus/tutorials/preparingforsurgery/htm/index.htm>

### Late Complications Include:

- 1) Anal stenosis.
- 2) Formation of skin tags.
- 3) Recurrence.
- 4) Anal fissure.
- 5) Minor incontinence.
- 6) Fecal impaction after a hemorrhoidectomy is associated with postoperative pain and narcotic use. Most surgeons recommend stimulant laxatives, or stool softeners to prevent this problem. Removal of the impaction under anesthesia may be required.
- 7) Delayed hemorrhage, probably due to sloughing of the vascular pedicle, develops in 1 to 2 percent of patients. It usually occurs 7 to 16 days postoperatively. No specific treatment is effective for preventing this complication, which usually requires a return to the operating room for one or more stitches.

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### Video References

1. Video: Overview: Anatomy of Prolapse and Hemorrhoids (3 1/2 minutes), Ethicon Endo-Surgery Inc. 2001, get > Real Player, <http://www.jnjgateway.com/home.jhtml?page=viewContent&contentId=09008b988004c944>
2. Video: View Actual Hemorrhoid Surgery using the Harmonic Scalpel (8 minutes), Ethicon Endo-Surgery Inc. 2001, <http://www.jnjgateway.com/home.jhtml?loc=USENG&page=viewContent&contentId=fc0de00100000325&parentId>



waveform of electrical current and a specialized electrical probe, the Atomizer Wand™, was created for this purpose (patent pending).

With a wave of the Atomizer Wand, the hemorrhoids are simply excised or vaporized one or more cell layers at a time. The hemorrhoids are essentially disintegrated into an aerosol of carbon and water molecules. Using the Atomizer, the tissue is sculpted into a desired shape and smoothness. As a

result, the surgeon operates with minimal bleeding, and gets better homeostasis than with traditional electrosurgical techniques. With the Atomizer, the patient gets better postoperative results, and fewer anal tags than with traditional operative techniques.

In the United States, the Ferguson hemorrhoidectomy is considered the gold standard by which most other surgical hemorrhoidectomy techniques are compared. A clinical study at the Hemorrhoid Care Medical Clinic, of thirty patients, compared the traditional Ferguson hemorrhoidectomy with the CO2 laser hemorrhoidectomy, and the Atomizer hemorrhoidectomy, and revealed the following:

The results of atomizing hemorrhoids are similar to that of lasering hemorrhoids, except that there is less bleeding using the Atomizer, and the Atomizer cost less. In both procedures, it is noted that there is less discomfort, less medication, less constipation, less urinary retention, and a hospital stay is generally not required. Complications using the Atomizer are rare, and excellent results are typical.

Atomizing hemorrhoids is offered exclusively in Arizona.

### **Complications of Hemorrhoid Surgery**

Early Complications Include:

- 1) Severe postoperative pain, lasting 2-3 weeks. This is mainly due to incisions of the anus, and ligation of the vascular pedicles.
- 2) Wound infections are uncommon after hemorrhoid surgery. Abscess occurs in less than 1% of cases. Severe necrotizing infections are rare.
- 3) Postoperative bleeding.
- 4) Swelling of the skin bridges.
- 5) Major short-term incontinence.
- 6) Difficult urination. Possibly secondary to occult urinary retention, urinary tract infection develops in approximately 5% of patients after anorectal surgery. Limiting postoperative fluids may reduce the need for catheterization (from 15 to less than 4 percent in one study).



By contrast, electrosurgery coagulates by burning (obliterative coagulation) at temperatures higher than 150°C. Blood and tissue are desiccated and oxidized (charred), forming eschar that covers and seals the bleeding area. The reduced postoperative pain after Harmonic Scalpel hemorrhoidectomy compared with electrocautery controls, likely results from the avoidance of lateral thermal injury.

### **Harmonic Scalpel Applied to Tissue Harmonic Scalpel Hemorrhoidectomy**

The protein coagulum caused by the application of the Harmonic Scalpel is superior at sealing off large bleeding vessels during surgery. It has been my experience that this method is useful on large hemorrhoids that may bleed during surgery, thus minimizing blood loss and reducing the time needed for surgery.

### **Laser Surgery for Hemorrhoids**

Skilled surgeons use laser light with pinpoint accuracy. The unwanted hemorrhoid is simply vaporized or excised. The infinitely small laser beam allows for unequalled precision and accuracy, and usually rapid, unimpaired healing.

The result is less discomfort, less medication, and faster healing. A hospital stay is generally not required. The laser is inherently therapeutic, sealing off nerves and tiny blood vessels with an invisible light. By sealing superficial nerve endings patients have a minimum of postoperative discomfort. With the closing of tiny blood vessels, your proctologist is able to operate in a controlled and bloodless environment.

Procedures can often be completed more quickly and with less difficulty for both patient and physician. Laser can be use alone or in combination with other modalities. For more detailed information on combining modalities in surgery, view our video on the performance of both a Laser & Harmonic Scalpel Hemorrhoidectomy. [Get > Real Player](#)

A study of 750 patients undergoing laser treatment for hemorrhoids reported successful results of 98%. The patient satisfaction was 99%.

### **Atomizing Hemorrhoids**

A new technique to remove hemorrhoids is called atomizing. The Atomizer™ is a medical device that was developed specifically to atomize tissue. The term "atomizing hemorrhoids" was coined because the hemorrhoids are actually reduced to minute particles into a fine mist or spray, which is immediately vacuumed away. An innovative



2) Patients experience a quicker return to normal activities compared to those treated with conventional techniques.

3) Mean inpatient stay was lower compared to patients treated with conventional techniques.

### **What are the Risks of PPH?**

Although rare, there are risks that accompany PPH:

4) If too much muscle tissue is drawn into the device, it can result in damage to the rectal wall.

5) The internal muscles of the sphincter may stretch, resulting in short-term or long-term dysfunction.

6) As with other surgical treatments for haemorrhoids, cases of pelvic sepsis have been reported following stapled haemorrhoidectomy.

7) PPH may be unsuccessful in patients with large confluent hemorrhoids. Gaining access to the anal canal can be difficult and the tissue may be too bulky to be incorporated into the housing of the stapling device.

8) Persistent pain and fecal urgency after stapled hemorrhoidectomy, although rare, has been reported.

9) Stapling of hemorrhoids is associated with a higher risk of recurrence and prolapse than conventional hemorrhoid removal surgery; according to a Canadian study of 537 participants.

The Harmonic Scaplel uses ultrasonic technology, the unique energy form that allows both cutting and coagulation of hemorrhoidal tissue at the precise point of application, resulting in minimal lateral thermal tissue damage. Because the Harmonic Scaplel uses ultrasound, there is less smoke than is generated by both lasers and electro-surgical instruments. The Harmonic Scaplel cuts and coagulates by using lower temperatures than those used by electro-surgery or lasers. Harmonic Scaplel technology controls bleeding by coaptive coagulation at low temperatures ranging from 50°C to 100°C: vessels are coapted (tamponaded) and sealed by a protein coagulum. Coagulation occurs by means of protein denaturation when the blade, vibrating at 55,500 Hz, couples with protein, denaturing it to form a coagulum that seals small coapted vessels. When the effect is prolonged, secondary heat is produced that seals larger vessels. Because ultrasound is the basis for Harmonic Scaplel technology, no electrical energy is conducted to the patient.



Also known as Procedure for Prolapse & Hemorrhoids (PPH), Stapled Hemorrhoidectomy, and Circumferential Mucosectomy.

PPH is a technique developed in the early 90's that reduces the prolapse of hemorrhoidal tissue by excising a band of the prolapsed anal mucosa membrane with the use of a circular stapling device. In PPH, the prolapsed tissue is pulled into a device that allows the excess tissue to be removed while the remaining hemorrhoidal tissue is stapled. This restores the hemorrhoidal tissue back to its original anatomical position.

The introduction of the Circular Anal Dilator causes the reduction of the prolapse of the anal skin and parts of the anal mucous membrane. After removing the obturator, the prolapsed mucous membrane falls into the lumen of the dilator.

The Purse-String Suture Anoscope is then introduced through the dilator.

This anoscope will push the mucous prolapse back against the rectal wall along a 270° circumference, while the mucous membrane that protrudes through the anoscope window can be easily contained in a suture that includes only the mucous membrane. By rotating the anoscope, it will be possible to complete a purse-string suture around the entire anal circumference.

The Hemorrhoidal Circular Stapler is opened to its maximum position. Its head is introduced and positioned proximal to the purse-string, which is then tied with a closing knot.

The ends of the suture are knotted externally. Then the entire casing of the stapling device is introduced into the anal canal. During the introduction, it is advisable to partially tighten the stapler.

With moderate traction on the purse-string, a simple maneuver draws the prolapsed mucous membrane into the casing of the circular stapling device. The instrument is then tightened and fired to staple the prolapse. Keeping the stapling device in the closed position for approximately 30 seconds before firing and approximately 20 seconds after firing acts as a tamponade, which may help promote hemostasis.

Firing the stapler releases a double staggered row of titanium staples through the tissue. A circular knife excises the redundant tissue. A circumferential column of mucosa is removed from the upper anal canal. Finally, the staple line is examined using the anoscope. If bleeding from the staple line occurs, additional absorbable sutures may be placed.

#### **What are the Benefits of PPH over other Surgical Procedures?**

1) Patients experience less pain as compared to conventional techniques.



anal canal after prolapsing, and fourth degree hemorrhoids consist of prolapsed tissue that cannot be manually replaced and is usually strangulated or thrombosed.

Symptoms associated with hemorrhoids include pain, bleeding, pruritus ani (itching) and mucus discharge. In IV degree prolapse, the area where the rectal mucous membrane meets the anal skin (the dentate line) is positioned almost outside the anal canal, and the rectal mucous membrane permanently occupies the muscular anal canal.

### **Traditional Surgery**

In many cases hemorrhoidal disease can be treated by dietary modifications, topical medications and soaking in warm water, which temporarily reduce symptoms of pain and swelling. Additionally, painless non-surgical methods of treatment are available to most of our patients as a viable alternative to a permanent hemorrhoid cure.

In a certain percentage of cases, however, surgical procedures are necessary to provide satisfactory, long-term relief. In cases involving a greater degree of prolapse, a variety of operative techniques are employed to address the problem.

### **Milligan-Morgan Technique**

Developed in the United Kingdom by Drs. Milligan and Morgan, in 1937. The three major hemorrhoidal vessels are excised. In order to avoid stenosis, three pear-shaped incisions are left open, separated by bridges of skin and mucosa. This technique is the most popular method, and is considered the gold-standard by which most other surgical hemorrhoidectomy techniques are compared.

### **Ferguson Technique**

Developed in the United States by Dr. Ferguson, in 1952. This is a modification of the Milligan-Morgan technique (above), whereby the incisions are totally or partially closed with absorbable running suture.

A retractor is used to expose the hemorrhoidal tissue, which is then removed surgically. The remaining tissue is either sutured or is sealed through the coagulation effects of a surgical device.

Due to the high rate of suture breakage at bowel movement, the Ferguson technique brings no advantages in terms of wound healing (5-6 weeks), pain, or postoperative morbidity.

Conventional haemorrhoidectomy can be performed as a day-case procedure. But due to poor post-operative care in the community and high level of pain experienced after the procedure, an in-patient stay is often required (average of 3 days).

### **Stapled Hemorrhoidopexy (PPH Procedure)**



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## **Surgical Treatment Options for Hemorrhoids**

### **Surgical Classification of Hemorrhoids**

Hemorrhoids (piles) arise from congestion of internal and/or external venous plexuses around the anal canal. They are classified, depending on severity, into four degrees. First degree hemorrhoids bleed but do not prolapse outside of the anal canal; second degree prolapse outside of the anal canal, usually upon defecation, but retract spontaneously. Third degree hemorrhoids require manual placement back inside of the



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- Posthemorrhoidal banding sepsis (rare complication characterized by fever and severe pelvic pain)

- No complications are associated with doing more than one band ligation of more than one site, and this can be more cost-effective.<sup>36,37,38,39,40,41,42,43</sup> Cryotherapy

- Pain

- Tissue necrosis

- Very long healing time

- Destruction of the anal sphincter muscle (can cause anal stenosis or incontinence; therefore, this method not frequently used<sup>44,45,46,43</sup> )

Other office treatments

- Anal stenosis

- Anal incontinence

Surgical treatment

- Bleeding and fecal impaction

Stapled hemorrhoidopexy

- Anovaginal fistulas

- Substantial hemorrhage

- Retroperitoneal sepsis

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## Stapled hemorrhoidopexy.

- Insert a circular anal dilator and anchor it to the skin with a heavy suture on a cutting needle. Apply countertraction to the skin to facilitate insertion.
- Introduce the purse-string suture anoscope through the circular anal dilator. The rotation effect of the suture anoscope allows the placement of purse-strings in a circular fashion at the correct height (3-4 cm above the dentate line) and depth (mucosa and submucosa).
- Place small bites close together with a 2-0 monofilament suture on a 25-30 mm curved needle. No "dog ears" or gaps should be present.
- Insert the fully open stapler head through the purse-string and throw one knot on the purse-string. Then, draw back the 2 tails of the suture through the lateral channels in the head of the anvil. Further secure the purse-string under direct visualization.
- Knot the tails or clamp them with forceps.
- Align the stapler along the axis of the anal canal and close it while maintaining downward tension with the lateral tails.
- The 4 cm mark should be at the level of the anal verge. If the patient is female, pass a finger into the vagina to ensure the posterior wall is not caught in the stapler.
- Fire the stapler, then open the head and remove the stapler. Inspect the staple line for bleeding and reinforce the staples, if needed.
- Multiple studies have shown that, when compared to open or closed hemorrhoidectomy, stapled hemorrhoidopexy results in less pain and faster return to normal activity.<sup>33,34,35</sup>
- Some authors have suggested that stapled hemorrhoidopexy presents an increased risk of septic complications such as rectal perforation, pelvic sepsis, persistent severe pain and fecal urgency, rectal stricture, rectal obstruction, and rectovaginal fistula. No evidence has suggested that prophylactic antibiotics are appropriate or helpful.

## Complications

### Rubber band ligation

- Bleeding (3%; higher rates in patient taking aspirin or nonsteroidal anti-inflammatory drugs [NSAIDs] and blood thinners)
- Thrombosed external hemorrhoids (2%)
- Bacteremia (0.09%)

- Cryotherapy uses a special probe that uses nitrous oxide to freeze the hemorrhoid. The temperature of the probe can get as low as  $-196^{\circ}\text{C}$  with liquid nitrogen, or  $-60$  to  $-80^{\circ}\text{C}$ .
- Considerable edema can result within 24 hours after the procedure. This swelling does not interfere with the patient's ability to have a normal bowel movement.
- Drainage of the area from the degradation and breakdown of tissue begins several hours after the procedure. It starts out fairly heavy for the first 3-4 days and decreases over the next 2-3 weeks.
- Instruct patients to use a clean or sterile pad, changed several times a day, for the first 3-4 days. This aids in the prevention of infection.
- By postoperative day 5 or 6, the hemorrhoid appears pale and black. Gangrenous areas may appear, but the necrosis is typically complete by postoperative day 7-9.
- By postoperative day 18, the area disintegrates completely, leaving a normal-appearing anus.

#### Open vs closed hemorrhoidectomy

- This procedure allows full-thickness excision of mucosa and submucosa without injuring the underlying sphincter muscle

#### Open hemorrhoidectomy.

- Make an elliptical incision at the perianal skin and continue it to the anorectal ring in a vertical fashion. The incision should include the internal and external hemorrhoids. The surgeon ensures at all times that the submucosa is lifted from the underlying sphincter complex without injury to the muscles.
- The resection can be performed with surgical scalpel, diathermy, laser, or with an ultrasonic scalpel.<sup>22,23,24,25,26,27,28,29,30,31,32</sup>
- If the mucosa is closed with an absorbable suture, the procedure is a closed hemorrhoidectomy; if the mucosa is left open, the procedure is an open hemorrhoidectomy.
- Patients are typically sore up to 3-10 days after surgery. Prescribe oral narcotics for pain control and, if necessary, a topical anesthetic cream.

#### Stapled hemorrhoidopexy

- In this procedure, a modified circular stapler resects the excess prolapsed hemorrhoidal tissue and fixes the rest of hemorrhoidal tissue to the distal rectal wall



- All hemorrhoids are typically treated in one session.
- This procedure is typically time-consuming and is not as popular as other treatment options.<sup>11,12,13,14</sup>

### Sclerotherapy

- This procedure uses the idea of injecting chemical agents into the hemorrhoids to create fibrosis and prevent prolapse. The solutions are phenol in oil, quinine urea, and sodium morrhuate.
- Attach a 10-mL syringe to a 25-gauge angled hemorrhoid needle (one standard size).
- Introduce the needle into the center mass of veins, through the mucous membrane. Take care not to enter the lumen of the vein or traverse to the sensitive margin of the dentate line. To ensure the needle is not in the lumen, draw back before injecting. No antiseptic is necessary.
- When the needle is in position, inject 0.5 mL of the sodium morrhuate or 5% phenol solution into the submucosa above the internal hemorrhoid, at the anorectal ring. Do not inject intravascularly. No more than 3 mL of the sodium morrhuate solution should be used in total. If the 5% phenol solution is used, up to 3 mL can be injected into each site.
- Sclerotherapy used to be the treatment of choice for hemorrhoid grades I, II, and III. It has been used with rubber band ligation with increased success rates.<sup>15,16,17,18,19,20,21</sup>

### Cryotherapy

- This procedure was once advocated by many surgeons and was associated with the least amount of pain.
- Insert the surgeon's fingers, a modified plastic proctoscope, or a vaginal speculum and use it to isolate one primary hemorrhoidal plexus at a time. A metal instrument is not recommended because it conducts cold, and the procedure is reliant on a water-soluble jelly that is used for contact between the probe and the hemorrhoid.
- Apply the cryoprobe, and the tissue freezes around the tip. The distance between the tip and the outer portion of the probe is equal to the depth of the probe. This allows the surgeon to visually determine how much tissue is being destroyed.
- Changes that occur in the margin of space between the tip of the probe and the normal tissue are reversible, so, theoretically, no destruction has taken place.

- The patient rarely experiences pain during the procedure. If the patient does experience pain, removal of the band is required immediately. Conventional suture-removal scissors can be inserted to cut the band from the hemorrhoids. Other methods of cutting the band can be used, such as a scalpel, but this tends to precipitate bleeding.

#### Infrared photocoagulation

- An infrared photocoagulator produces infrared radiation, coagulates tissue protein, and evaporates water in the cells.

- Infiltrate the area with 2-5 mL of 0.5% bupivacaine. The physician can visually determine the area to be treated, so dosing of the local anesthetic is adjusted accordingly.

- In this technique, an infrared probe is applied just proximal to the internal hemorrhoids through an anoscope.

- The recommendation is to use 1.5 seconds and repeat 3 times on each internal hemorrhoid.4,5,6,7,8,9,10 •The radiation causes protein coagulation in an area 3 mm wide and 3 mm deep, for a use of 3-5 pulses.

- The advantage of infrared coagulation is that the physician may treat one area at a time or ablate all hemorrhoidal areas.

- Following the coagulation, the tissue appears white and circular in nature. It progresses to a darker color over the following week.

- Eventually, a slightly elevated, pink-red eschar results.

#### Electrocoagulation

- Bipolar coagulation is similar to that of infrared photocoagulation (see image below). It is simple to use and is typically done as an outpatient procedure. No anesthesia is typically required.

#### Electrocoagulation.

- Using the anoscope, apply the side of the probe tip directly to the hemorrhoid, above the dentate line.

- Use the infinity setting on the electrode generator. This is activated by the physician with a foot switch.

- White coagulum stream is generated approximately 3 mm deep.

- Set the current to a maximal tolerable level and continue for 10 minutes.



## MANAGEMENT OVERVIEW

### Anesthesia

- Local anesthesia is used for office treatments.
- For surgical treatments, anesthesia used can be general or local combined with mild sedation. No matter what anesthesia is used, the procedure begins with local injection of the entire anal canal with bupivacaine or lidocaine that contains epinephrine.

### Equipment

- Any conventional anal retractor (eg, Parks or Fansler retractor)

### Additional equipment for hemorrhoidectomy

- Scalpel
- Scissors
- Diathermy
- Absorbable suture (if the open surgical wound is closed)

### Positioning

- For office and surgical treatments, place the patient in a jack-knife prone or left lateral decubitus position.

### Technique

#### Rubber band ligation

- The procedure is performed through an anoscope using a rubber band ligator

#### Banding procedure.

- Using a Lurz-Goltner suction hemorrhoidal ligator, draw the hemorrhoid mass into the cup with suction. The most prominent hemorrhoid with acute stigmata of bleeding is treated first.
- Place the band on the rectal mucosa at the base of the internal hemorrhoid. Ensure that the patient has no feeling of pain.
- Perform ligation one site at a time.
- Band consecutive hemorrhoids in similar fashion, going from largest to smallest.