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## Hemorrhoid from Its Basic Etiopathogenesis to Management – A Comprehensive Review



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**Riya P. Patel<sup>1\*</sup>, Pranjal P.Gujarathi<sup>2</sup>, Achla K. Vyas<sup>2</sup>**

<sup>1</sup> Master Student, Department of Pharmacology, Shree Dhanvantary Pharmacy College, Kim, Surat, India.

<sup>2</sup>Assistant professor, Department of Pharmacology, Shree Dhanvantary Pharmacy College, Kim, Surat, India.

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### ABSTRACT

This review discusses anatomy and physiology, classification grading, etiology, pathophysiology, epidemiology, differential diagnosis, and management of hemorrhoids. Hemorrhoids are defined as the symptomatic and abnormal enlargement of normal anal cushions. Hemorrhoids classified into two types: internal hemorrhoids and external hemorrhoids. Pathophysiology of the hemorrhoid disease includes prolapse of the cushions and the surrounding connective tissue, aberrant distention of the arteriovenous anastomosis, and abnormal dilatation of veins of the internal hemorrhoidal venous plexus. Hemorrhoid causes by increased anal sphincter pressure. Therefore, factors such as straining, a lack of fiber intake, prolonged bathroom use, constipation, diarrhea, and illnesses like pregnancy and pelvic space-occupying lesions that are linked to high intra-abdominal pressure have all been hypothesised to play a role in the development of the disease. Examination of hemorrhoids is aside-viewing anoscope, flexible sigmoidoscope or colonoscope, Detailed patient history, and Physical examination to evaluate the anal sphincter to determine which surgical treatment option is best. Hemorrhoids are treated with Lifestyle modifications (such as More fiber and Laxatives for some), medication-based (such as Oral medication and Topical treatment), Office-based treatments (such as Rubber band ligation, Infrared coagulation, and Sclerotherapy), and surgical treatments (such as Open or closed hemorrhoidectomy, stapled hemorrhoidopexy, and Doppler-guided artery ligation).The aim of this review to provide information of hemorrhoid from its pathophysiology to its management to find out new treatment approaches for hemorrhoid.



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## INTRODUCTION

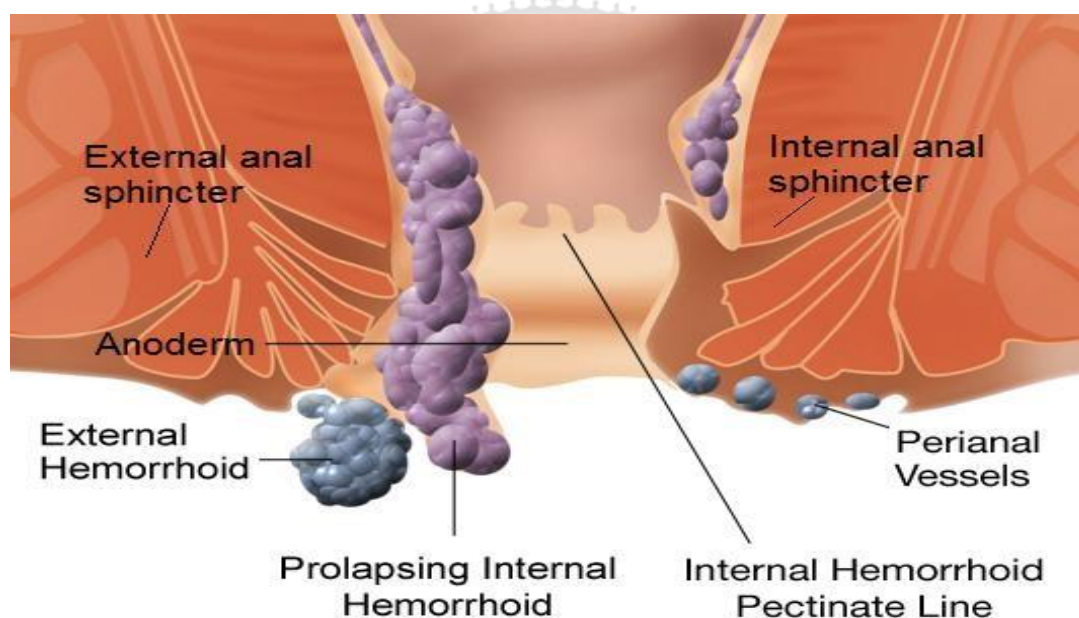
A fairly frequent anorectal condition known as hemorrhoids is characterized by the symptomatic expansion and/or distal displacement of anal cushions [1, 2]. which are anal mucosa prominences made up of venous and arterial vessels, smooth muscle, and loose connective tissue [3]. They are significant medical and economical issues that affect millions of individuals worldwide. Constipation and prolonged straining have both been suggested as possible etiological factors for the development of hemorrhoids. One of the most important symptoms of hemorrhoidal illness is the aberrant dilatation and distortion of the vascular channel together with damaging alterations in the supporting connective tissue within the anal cushion [4]. Hemorrhoid sufferers and those who were mistakenly diagnosed with hemorrhoids tended to self-medicate rather than seek appropriate medical care [5]. In the United States, hemorrhoids ranked above gastroesophageal reflux disease and sexually transmitted diseases as the most popular health concern. Regrettably, there was a wide range in the quality of websites that provided information regarding treating hemorrhoids, with approximately 50% having subpar content [6]. The standard of care and evidence-based medicine should be used by clinicians to counsel and treat patients with hemorrhoids. Realistically, a primary care physician, gastroenterologist, or general surgeon can successfully treat the majority of individuals with low-grade hemorrhoids in an outpatient environment using nonoperative methods. High-grade hemorrhoids should only be treated surgically, or if non-operative measures have failed or problems have developed [2]. This article discusses some basic information and current approaches to treating both simple and complex hemorrhoids from the perspective of a coloproctologist.

### **Anatomy and Physiology**

Although the mucosal and submucosal tissues have been better understood relatively lately, many aspects of the normal anatomic anatomy of the anal canal have been recognized for years [7]. Highly vascular submucosal cushions known as hemorrhoids typically form three columns in the anal canal in the positions of the right anterior, right posterior, and left lateral. These vascular cushions are made up of elastic connective tissue and smooth muscle, but because some do not contain muscular walls, these cushions may be considered sinusoids instead of arteries or veins. Hemorrhoids contribute 15 to 20% of the resting anal canal pressure and serve a crucial physiological role in protecting the anal sphincter muscles by enhancing the closure of the anal canal during periods of elevated abdominal pressure (such

as coughing or sneezing) and preventing incontinence. When the pressure in the inferior vena cava rises due to an increase in abdominal pressure, these vascular cushions engorge and stop leaking. This tissue may also aid in the anal canal's ability to distinguish between liquid, gas, and feces [8].

Thomson asserts that the anal canal's submucosa forms a discontinuous sequence of vascular cushions rather than a continuous ring of thickened tissue. These cushions have an abundant supply of blood arteries and muscle fibers in their submucosal layer. These fibers, which originate from the internal sphincter and the attached longitudinal muscle, are in charge of preserving the adhesion of mucosal and submucosal tissues to the internal sphincter and the submucosal blood vessels. The anal canal may be protected from damage by these vascular cushions by filling with blood during feces. The terminal branches of the superior hemorrhoidal artery and branches of the middle hemorrhoidal arteries deliver blood to the vascular cushions in the anal canal. The network of interconnecting vessels of the anal cushions also includes terminal branches of the inferior hemorrhoidal arteries, which supply the lowest half of the anal canal. The superior, middle, and inferior hemorrhoidal veins establish the venous outflow from the anal canal [9-12].



**Fig.1 Anatomy of both internal and external hemorrhoids [13].**

### **Classification**

Hemorrhoids can often be divided into two categories, internal and external, according to

where they are located in the dentate line. The anoderm cells, a modified squamous epithelium, which lines the external hemorrhoids, are situated distally to the dentateline. These structures have a significant amount of innervation from the pain nerve tissue, which causes the external hemorrhoids to thrombose and become excruciatingly painful. When a blood clot forms inside the anal skin membrane surrounding the hemorrhoids, this condition is known as thrombosis of external hemorrhoids. Blood clot formation results in enlargement in the outer anal canal, which leads to ongoing bleeding and excruciating discomfort that often subsides within 48 hours.

On the other hand, internal hemorrhoids are bordered by columnar epithelium and are situated close to the dentateline. Internal hemorrhoids that are just beginning to grow typically do not hurt or feel sensitive to touch because the overlaying columnar epithelium is viscerally innervated. However, one may feel excruciating discomfort when the internal hemorrhoids have fully prolapsed. Internal hemorrhoids can be graded from I through IV, which will further affect the patient's therapy strategy.

Depending on how far the prolapse has gone, internal hemorrhoids are further divided into four classes. Hemorrhoidal tissue that is in the first degree protrudes into the anal canal's lumen but does not extend outside of it. The anal canal's veins have grown in size and number, and some of them may bleed during evacuation. When being evacuated, second-degree hemorrhoids may prolapse past the external sphincter and become visible, but they often spontaneously retract to lie in the anal canal. Hemorrhoids in the third degree that protrude outside the anal canal must be manually reduced, and Hemorrhoids in the fourth-degree prolapsed continuously and are irreducible [14, 15].

### **Pathophysiology and Etiology**

The three basic explanations for the pathophysiology of the hemorrhoidal disease include prolapse of the cushions and the surrounding connective tissue, aberrant distention of the arteriovenous anastomosis, and abnormal dilatation of veins of the internal hemorrhoidal venous plexus. One of the suspected etiologic causes for the condition is increased anal sphincter pressure [16]. It is unclear if the hemorrhoids themselves are the source of these anorectal physiology alterations or if they are only a symptom [17]. The function of mucosal prolapse in hemorrhoidal disease is controversial; some surgeons consider this entity to be a completely separate pathology, while others believe mucosal prolapsed to be a necessary

component of the hemorrhoidal disease [18].

As part of the typical physiology of evacuation, voluntary sphincter contraction transfers any leftover fecal matter from the anal canal to the rectum during evacuation. Only the vascular cushions become clogged when trying to achieve total evacuation. Therefore, factors such as straining, a lack of fiber intake, prolonged bathroom use, constipation, diarrhea, and illnesses like pregnancy, ascites, and pelvic space-occupying lesions that are linked to high intra-abdominal pressure have all been hypothesized to play a role in the development of the disease. Although there is no proof of a hereditary tendency, it has also been hypothesized that a family history of the hemorrhoidal disease may contribute to the disease's development. Additionally, nutrition and bowel habits are also influenced by social mores and the environment [19-21].

It's common to think of hemorrhoids as internal or exterior varicosities [22]. Because the term varicose (varices) is used to describe the tortuous extension and dilation of superficial veins, it is deceptive (usually in the lower extremities). Rectal varices, a collateral circulation in which blood from the portal system enters the systemic circulation through the middle and inferior hemorrhoidal veins, are possible in patients with portal hypertension. However, rectal varices and hemorrhoids are two distinct conditions, and numerous investigations have been unable to show that patients with portal hypertension have a higher incidence of hemorrhoidal illness [23].

### **Epidemiology**

The actual incidence of this disease cannot be determined because many people suffer it without seeking medical attention; patients are frequently unwilling to seek medical attention due to shame or the fear, discomfort, and agony involved with the therapy. Studies examining the epidemiology of hemorrhoids revealed that 10.2 million Americans, or 4.4% of the population, reported having the condition. Hemorrhoids rarely develop before the age of 20, and Caucasians are more frequently affected than African Americans. In both sexes, the frequency peaks between the ages of 45 and 65 [24, 25].

## Diagnosis

### 1. Differential diagnosis

Most of the time, a physical examination and, ideally, an anoscopy are sufficient to make a diagnosis. In patients with uncomplicated hemorrhoidal illness, acute anal pain during examination is uncommon in the absence of thrombosis and may indicate the presence of another disease, such as an abscess, fissure, or trauma to the examination site. An examination under anesthesia in the operating room may be necessary for acute pain. The best and most accurate tool for assessing hemorrhoids is a side-viewing anoscope because it permits tissue to prolapsed into the instrument's barrel, unlike a retroflexed end-viewing instrument (such as a flexible sigmoidoscope or colonoscope) [26, 27]. A higher percentage of lesions in the anorectal region is found by an anoscope as compared to flexible sigmoidoscopy. To rule out inflammatory bowel disease or malignant illnesses, further flexible sigmoidoscopy, barium enema, or colonoscopy may be necessary [26-35]. The list of indications for a full colon examination is in **TABLE-1**.

**Table 1: Indications for Complete Colon Evaluation in Patients with Hemorrhoidal Symptoms.**

<b>Iron deficiency anemia</b>
<b>Positive fecal occult blood test</b>
<b>Age ≥ 50 y, with no complete colon evaluation within 10 y</b>
<b>Age ≥ 40y, with positive family history for a single first-degree relative with adenoma Or colorectal cancer diagnosed at age &gt; 60 and no complete examination within 10y</b>
<b>Age ≥ 40y, with positive family history for two or more first-degree relatives with Adenoma or colorectal cancer diagnosed at age &gt; 60 and no complete examination within 3–5y</b>
<b>Any history or physical finding indicating malignancy or inflammatory bowel disease</b>

When assessing individuals who exhibit urinating and incontinence symptoms, endo rectal ultrasonography and anorectal physiologic testing (such as manometry) is crucial. Prolapsing hemorrhoids that partially hinder feces can cause swelling and incontinence and might damage the sphincter mechanism [36]. Due to the increased risk of post-operative incontinence in patients with a history of incontinence who may need surgical treatment for

hemorrhoids it is crucial to evaluate the anal sphincter in these individuals. The results will determine which surgical treatment option is best [37].

## **2. Detailed patient history**

A thorough patient history is crucial. The intensity, severity, and length of symptoms, the regularity of bowel movements, any accompanying symptoms (such as constipation or fecal incontinence), daily dietary routines, and specifics of bowel movements should all be included (eg, time spent during each bowel movement and concomitant cell phone use) [38]. Some patients have lifelong constipation or diarrhea, depending on their bowel habits. As a result, it is important to check what a patient believes to be normal bowel behavior [39]. Additionally, it's critical to rule out conditions like Crohn's disease, anal fissure, anal abscess, and externally thrombosed hemorrhoids [40].

## **3. Physical examination**

The second phase involves a digital rectal examination. Look for synchronous anal lesions, sphincter tone, perianal hygiene, and skin tags throughout the examination [38]. It should be noted that the Valsalva technique can be carried out while performing a digital rectal exam.

A tumor with or without hemorrhoidal sacs and a bleeding source above the level of internal hemorrhoids are both warning signs of colorectal cancer during a digital rectal examination. Patients with recurrent abscesses, fistulas, or skin tags (especially those that resemble cauliflowers) should have their Crohn's disease evaluated.

## **4. Endoscopy**

Reviewing any prior endoscopic findings is crucial since rectal bleeding may be an indication of several illnesses, including colorectal cancer. Colonoscopies, flexible sigmoidoscopies, or rigid proctoscopies should be performed on patients who are at high risk for colon cancer [38, 39]. In our clinic, rectal bleeding in patients over 40 is advised to undergo endoscopic assessment, particularly if there is a family history of colorectal cancer [41].

## **Management**

The grade and severity of the condition, its effects on quality of life, the level of pain it produces, the chance that the patient will follow the prescribed course of action, and the

patient's personal preferences should all be taken into account when selecting a hemorrhoid treatment.

Regardless of severity, a high-fiber diet and other lifestyle changes, such as bowel movement habits, are usually always the first steps in treatment. Regardless of the nature or severity of the ailment, practitioners must invest a lot of time in educating patients.

Lifestyle modifications, Medication, office-based, medication-based, and surgical treatments can all be divided into these four categories. The patient should be thoroughly informed of all the possibilities, with the benefits and drawbacks of each option being highlighted [41].

### **1. Lifestyle modifications**

The therapy for hemorrhoidal illness includes lifestyle changes. As part of a thorough treatment plan and as a preventive strategy, they must be made available to patients with hemorrhoidal illness at all stages. These adjustments include bettering anal cleanliness, boosting dietary fiber and fluid consumption, and preventing constipation or diarrhea. Some of these steps were discovered to have therapeutic and preventive effects; for example, increasing dietary fiber may reduce pain, bleeding, and prolapse [42, 43]. While sitz baths are beneficial for reducing anal pain and preserving anal hygiene [44, 45].

#### **More fiber**

Fiber increases the water content of the stool by drawing water into the colon's lumen. For women, a daily fiber intake of 28 g is advised, while for men it is 38 g [46]. When following a traditional American diet that includes a lot of fast food, it might be challenging to reach this high level of intake without supplements.

According to a Cochrane analysis, fiber supplements are strongly advised in practice guideline 3 published by the American Society of Colon and Rectal Surgeons (ASCRS) [47]. In this meta-analysis, the relative risk of continuing or not improving symptoms was 0.53 (95% confidence interval [CI] 0.38-0.73) and the relative risk of bleeding was 0.50 (95% CI 0.28-0.89) when fiber supplements were used. The ideal daily dosage of psyllium husk is unknown, however, it is a cheap supplement that forms bulk. For women, we advise consuming at least 28 g of fiber daily, while males should consume 38g. Psyllium husk can help with this need.



## **Laxatives for some**

When an organic bowel problem rather than a nutritional problem exists, laxatives like docusate are used to alter the consistency of the stool. They can be utilized in conjunction with fiber treatments to increase their effectiveness [41].

## **2. Medication**

### **Oral medication**

Hemorrhoids are treated with oral vasotopic medications in Europe and Asia. Varicose veins, venous ulcers, and edema were the first conditions for which these treatments were mentioned. A Phytochemical called "purified flavonoid fraction" citrus juice extract. It affects both sick and healthy people. Vascular tone, lymphatic drainage, and capillary resistance; it is also believed to have anti-inflammatory actions and promote healthy blood vessels, intact vasculature, enhancing vascular tone, and wound recovery. The effectiveness of oral micronized, purified flavonoid fraction in the management of hemorrhoidal bleeding has recently been examined in several randomized controlled experiments [48-50]. In every study, bleeding was quickly controlled, and no problems were noted. In a different recent randomized controlled trial, using micronized, purified flavonoid fraction postoperatively along with short-term standard antibiotic and anti-inflammatory therapy decreased the length and severity of postoperative symptoms as well as wound bleeding after hemorrhoidectomy when compared to using antibiotic and anti-inflammatory treatment alone [51]. In the United States, the Food and Drug Administration (FDA) currently disapproves of the use of micronized, pure flavonoid fractions [28].

### **Topical treatment**

Hemorrhoids are commonly treated with over-the-counter medicines, including pads, topical ointments, creams, gels, lotions, and suppositories. Local anesthetics, corticosteroids, vasoconstrictors, antiseptics, keratolytic, protectants (such as mineral oils, and cocoa butter), astringents (substances that produce coagulation, such as witch hazel), and other ingredients may be present in these formulations. Local anesthetics, corticosteroids, vasoconstrictors, antiseptics, keratolytics, protectants (such as mineral oils, a n d cocoa butter), astringents (substances that produce coagulation, such as witch hazel), and other ingredients may be present in these formulations. Most of these items assist the patient in maintaining personal

hygiene and may ease discomfort and pruritus signs. They do not appear to lessen bleeding or prolapsed according to prospective randomized trials [52, 28].

### **3. Office-based treatments**

For grade, I, II, and III hemorrhoids that have not responded to conservative management, office-based therapies such as rubber band ligation, infrared photocoagulation, and sclerotherapy are frequently employed. Reduced blood flow into the hemorrhoidal sac is the main objective of these treatments.

Even though serious problems are rare and office-based therapies are very effective, recurrence rates can be substantial and force patients to undergo further treatments. Patients should be constantly watched for fever and urine issues in ce sepsis complications can happen. Following office-based treatments, pain is frequently experienced, and bleeding canals happen.

For patients with grade I, and II, and some with grade III hemorrhoids, the ASCRS recommendations strongly advise office-based therapies [38].

#### **Rubber band ligation**

Ligating the hemorrhoidal cushion's apex prevents blood from flowing into the arteries and leads to necrosis of the hemorrhoidal tissue. Since the ligation is carried out above the dentate line, where the sensory nerve fibers are different from those found below the line, the procedure is less painful than may be anticipated. One or more hemorrhoidal cushions may be ligated simultaneously, however multiple banding during a single surgery has been associated with greater pain, bleeding, and vasomotor responses [53, 54].

Iyeretal [55] according to a study, patients taking aspirin had a risk of post-procedural bleeding that was upto 3 times higher than that of those taking warfarin, which increased the risk by upto 9 times. Therefore, it is uncertain if individuals receiving anticoagulant treatment should have this operation.

A Cochrane database review [56] However, some patients with grade III hemorrhoids may benefit more from excisional hemorrhoidectomy, which is linked to a lower recurrence rate than rubber band ligation. This procedure is effective for hemorrhoid grades I through III.

Brown et al [57] performed a randomized controlled trial in 372 patients with grade II and III hemorrhoids to compare rubber band ligation and hemorrhoidal artery ligation for symptomatic hemorrhoids. Rubber band ligation resulted insignificantly lower post operative pain scores on days 1 and 7, but recurrences were more frequent (49 versus 30,  $P=0.0005$ , respectively).

In conclusion, rubber band ligation is a great alternative for grade II hemorrhoids because it is simple to do, has a low pain threshold, and can be utilized to treat recurrences.

### **Infrared coagulation**

In this treatment, heat is generated by an infrared probe to cause coagulation, fibrosis, and finally necrosis of the projecting tissue in the hemorrhoidal cushions [58]. Although it was initially intended to treat grade I and II hemorrhoids, current studies have shown that it is also effective on grades III and IV [59, 60]. Infrared photocoagulation and rubber band ligation were both shown to be extremely effective and well-acceptable treatments in a randomized controlled trial involving 94 patients. However, patients reported less discomfort with photocoagulation in the first 24 hours following the procedure ( $P<0.05$ ) [61].

### **Sclerotherapy**

To treat hemorrhoids, a procedure known as sclerotherapy involves injecting a sclerotic agent into the submucosa of the hemorrhoidal sac. This procedure triggers an inflammatory response that eventually forms fibrotic tissue, which prevents blood flow to hemorrhoids. There are many sclerotic treatments available, such as quinine, ethanolamine, and hypertonic saline, as well as 5% phenol in almond or vegetable oil [58].

Although uncommon, the injection can result in sepsis and prostatic abscess [62]. However, patients with a high fever and post operative discomfort should be closely monitored.

The success rates for grade I hemorrhoids have been higher than for grades II and III hemorrhoids despite the fact that there have been few randomized trials using sclerotherapy [63-65]. For individuals with bleeding anomalies brought on by drugs or other illnesses, it is the preferable technique (eg, cirrhosis).

#### 4. Surgery

Surgery is the most successful and strongly advised course of therapy for individuals with high-grade internal hemorrhoids (grades III and IV), external and mixed hemorrhoids, and recurrent hemorrhoids, despite the fact that nonsurgical options have significantly improved. Open or closed hemorrhoidectomy, stapled hemorrhoidopexy, and Doppler-guided hemorrhoidal artery ligation are the most common surgical options. Each has a varied likelihood of success and a unique set of complications, which should be shared with the patient.

Overall, compared to office-based treatments or medical management, surgery is associated with more negative side effects. Although postoperative pain is the most common complaint, excessive tissue removal and injury to the sphincter muscles can also cause anal stricture (rare) or incontinence. Maintaining the usual anoderm between excisions, delaying the removal of all hemorrhoid sacs at once if the patient has vast lesions, and conducting a thorough dissection in the submucosal plane can all help prevent these complications. Surgical procedures carried out in an operating room are the most effective ways to treat patients with excessive bleeding or an underlying abnormality of the bleeding process.

##### **Excisional surgical hemorrhoidectomy**

The most common surgical procedure, excision of the hemorrhoidal sac, is typically only used for prolapsing illness. Excisional hemorrhoidectomy has a considerably lower recurrence rate than any other method [66].

Excisional hemorrhoidectomy can be done in one of two ways: openly, in which case the borders of the mucosal defect are not reapproximated, or closely, in which case they are. In a thorough investigation, Bhatti et al [67] evaluated the effects of closed vs. open approaches and discovered that the closed technique produced less postoperative discomfort, better wound healing, and less bleeding. Both procedures had comparable rates of recurrence, postoperative complications, surgical site infections, and durations of stay.

Generally, excisional hemorrhoidectomy has the highest pain ratings of any surgical procedure [66]. Recently, the general level of patient satisfaction has increased thanks to the use of electro-diathermy energy devices, also known as electrosurgical vessel-sealing devices [68].

A careful surgical approach is necessary when treating many painful hemorrhoidal sacs since excessive excision may result in widespread fibrosis and stricture. Fecal incontinence can be avoided, just like anal stricture, by thorough dissection. Existing incontinence is not a contraindication to surgery, though.

### **Doppler-guided hemorrhoidal artery ligation**

A Doppler probe is used to locate and ligate specific hemorrhoidal arteries during Doppler-guided hemorrhoidal artery ligation. To move the prolapsing tissue, mucopexy (transanalrectoanal repair) is also done. Avital et al [69] recurrence rates were 5.3% for grade II hemorrhoids and 13% for grade III hemorrhoids one year following this surgery, according to the study. Grade II and III had recurrence rates of 12% and 31%, respectively, at five years.

Although grade II hemorrhoids seem to respond well to this surgery so far, further research is required to establish their effectiveness and recurrence rates for more advanced lesions. Although this procedure has a high morbidity rate (18%), mostly due to discomfort or tenesmus, it has a lower post-operative pain rate than other surgical techniques [70]. Overall, it could eventually become a popular treatment.

### **Stapled hemorrhoidopexy**

In this treatment, the rectal mucosa is stapled immediately above hemorrhoid to raise the prolapsing portion of the internal hemorrhoidal cushion. Those who have either external or internal hemorrhoids cannot choose this treatment.

Although stapled hemorrhoidopexy results in lower pain scores than excisional hemorrhoidopexy, it is not more effective at preventing recurrences [71,72]. Also, medical professionals need to be aware of unique stapled hemorrhoidopexy side effects including recto vaginal fistula, anal stenosis, and sphincter damage. Patients should be given the information they need at discharge as well as a detailed explanation of these specific complications. With this particular patient population, the primary care physician must also be cautious regarding fistulas and stenosis.

## CONCLUSION

Hemorrhoidal disease is a long-standing issue that is frequently seen in our culture, and patients frequently visit for a better understanding of Anatomy and physiology, Classification and grading, pathophysiology and etiology, assessment and treatment for a gastroenterologist. The treatment of hemorrhoids from dietary and lifestyle modification to surgery, depending on the degree and severity of symptoms, and this Information was provided to assist in the evaluation and final treatment of these patients. A variety of medical and non-surgical approaches are available. Hence this review improvements in the treatment of hemorrhoids are needed to encourage the development of novel and creative ways for the treatment of hemorrhoids.

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## CONFLICT OF INTERESTS

Declared none

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