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Comparative Study between Conventional Hemorrhoidectomy versus Stapled Hemorrhoidopexy at Ja Group of Hospitals Gwalior

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I. Introduction

Hemorrhoids are fibrovascular cushions containing arteriovenous communications that are located in the subepithelial space of anal canal and are a normal part of human anatomy[1]. Hemorrhoids are a very common anorectal condition defined as the symptomatic enlargement and distal displacement of the normal anal cushions. They affect millions of people around the world, and represent a major medical and socioeconomic problem. Multiple factors have been claimed to be the etiologies of hemorrhoidal development, including constipation and prolonged straining. The abnormal dilatation and distortion of the vascular channel, together with destructive changes in the supporting connective tissue within the anal cushion, is a paramount finding of hemorrhoidal disease[2]An inflammatory reaction[3] and vascular hyperplasia[4,5] may be evident in hemorrhoids.

Hemorrhoids are a common disease in western societies affecting all age groups and gender. Hemorrhoids are very commonly encountered in 5% of general populations and 50% of individual over age of 50 yrs have complaint of hemorrhoids.

This disease has been known since ancient era with treatment modalities evolving from red hot poker to infrared photocoagulation.

Rubber band ligation, Injection sclerotherapy, Infrared photocoagulation, and cryotherapy have been used with some success. But all have been shown inferior to surgery in management of 3rd and 4th degree hemorrhoids.

Conventional methods of hemorrhoidectomy (Milligan-Morgan or Ferguson) produce excellent results with very less recurrence rates but wounds produced have contribute to postoperative pain and infection.

In the 1980s several authors proposed hemorrhoidectomy with mechanical suturing devices. Surgeons have used circular staplers to excise reluctant rectal mucosa in partial rectal mucosa. More recently Longo has advocated its use in treatment of relapsing hemorrhoids.

Several modifications to traditional techniques have been proposed aiming to reduce postoperative pain including lateral internal sphinterotomy,anal dilatation, diathermy hemorrhoidectomy, and use anal sphincter relaxants or metronidazole.However none have resulted in significant decrease in postop complications to gain universal acceptance.

Stapled hemorrhoidectomy was introduced in 1993 as an alternative to traditional techniques for management of hemorroidal disease. This method which was defined and refined by Longo in 1998.[6] It use as transanal circular stapler to excise a complete circular strip of rectal mucosa above the dentate line which lifts the prolapsed hemorrhoidal tissue reducing the reductant rectal mucosa and stapling of certain branches of superior rectal artery by avoiding multiple excision and suture lines on the sensitive anal mucosa. The initial experience of many surgeons was pain will be far less than conventional techniques.

It may, therefore be useful to compare and evaluate conventional surgical procedures with stapler devices in providing a more efficient and informed choice of procedure for hemorrhoids.

II. Aims And Objectives

This study was conducted in Department of Surgery, G.R. Medical College and J.A. Group of Hospitals, Gwalior with the following aims and objectives:

- To compare, evaluate and analyse the immediate, early, and delayed postoperative complications of conventional hemorrhoidectomy and stapled hemorrhoidopexy
- To compare the duration of resumption of daily activities.

III. Review Of Literature

Anatomy Of Anal Canal

The anal canal is the lowest part of the alimentary canal. Above it is continuous with the lower end of the rectum. Below it opens to the exterior at the anus. The anal canal is about 4 cm in length. It is distinctly narrower than the rectum. While the lower part of the rectum is directed downwards and forwards, the anal canal is directed downwards and backwards. Posteriorly, the anal canal is separated from the coccyx by a mass of fibromuscular tissue that is called the anococcygeal ligament (or body). In front of the anal canal there is another similar mass called the perineal body. A number of muscles of the perineum gain attachment to this body and make it a region of importance for maintaining the integrity of the pelvic floor. The perineal body separates the anal canal from the membranous urethra and the bulb of the penis in the male and from the vagina in the female. Lateral to the anal canal there is a triangular depression called the ischiorectal fossa. The upper 15 mm is lined by mucous membrane. This mucous membrane shows six to ten longitudinal folds. These folds are called anal columns. The lower ends of the anal columns are united to each other by short transverse folds of mucous membrane. These folds are called the anal valves. Above each anal valve there is a depression in the mucosa that is called an anal sinus. The anal valves together form a transverse line that runs all round the anal canal. This is called the pectinate line.

The next 15 mm or so of the anal canal is also lined by mucous membrane, but anal columns are not present here. The mucosa has a bluish appearance because of a dense venous plexus that lies between it and the muscle coat. The mucosa is less mobile than in the upper part of the anal canal. This region is referred to as the pecten or transitional zone. The lower limit of the pecten often has a whitish appearance because of which it is referred to as the white line (of Hilton). The third, or lowest, subdivision of the anal canal is about 8 to 10 mm long. It differs from the upper and middle parts in that it is not lined by mucous membrane, but by skin. The epithelium lining the upper 15 mm of the anal canal is columnar (or stratified columnar); that lining the middle part (pecten) is stratified squamous, but is distinguished from skin in that there are no sebaceous or sweat glands, or hair, in relation to it. The epithelium of the lowest part resembles that of true skin in which sebaceous and sweat glands are present.

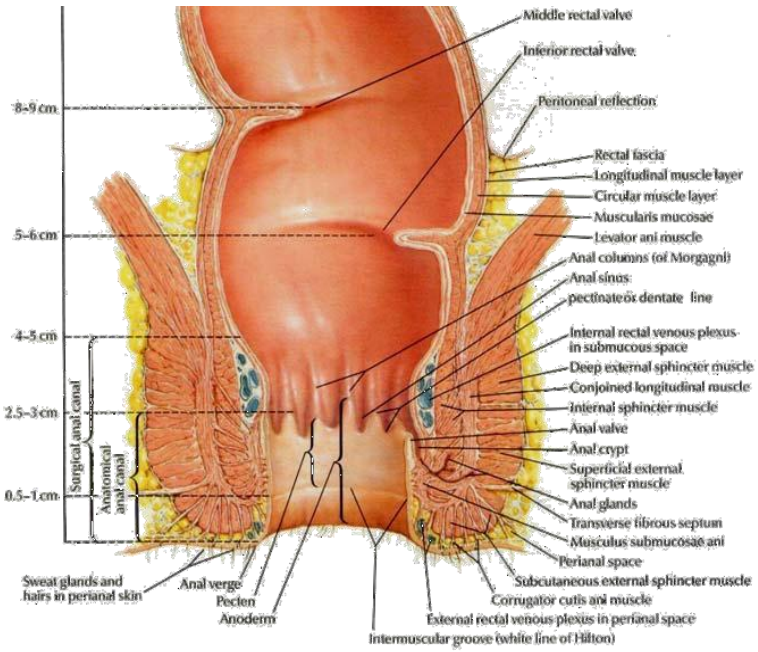

Figure 1: Anatomy Of Anal Canal

Anal Glands

Above each anal valve there is a space called the anal sinus. Opening into the sinus there are anal glands that extend into the submucosa. Some of them extend into the muscle layer. The openings of the glands on the anal mucosa are referred to as anal crypts.

The Anal Musculature

The internal anal sphincter is formed by thickening of the circular muscle coat of the gut. It is, therefore, made up of smooth muscle. It extends from the upper end of the anal canal up to the white line. The external anal sphincter is made up of striated muscle. It is subdivided as follows. The subcutaneous part lies

below the level of the white line i.e., inferior to the level of the internal sphincter. The superficial part of the external sphincter lies external to the lower part of the internal sphincter between the levels of the pectinate line and the white line. The fibers of this part are attached posteriorly to the coccyx and anteriorly to the perineal body. The deep part of the external sphincter lies external to the upper half of the internal sphincter (above the level of the pectinate line).

Blood Supply Of Anal Canal

Arterial Supply of anal canal

1. Superior hemorrhoidal artery (continuation of the Inferior Mesenteric Artery) supplies the mucous membrane of the anal canal up to the anal valves.
2. Inferior hemorrhoidal artery (branch of Pudendal Artery) supplies anal sphincters and entire thickness of the anal canal below the anal valves.
3. Branches of Median Sacral Artery supplies posterior part of the anorectal junction and the anal canal

Venous drainage of anal canal begins in two plexuses.

1. The internal rectal plexus lies in the submucosa is drained mainly by the superior rectal vein, which is continued into the inferior mesenteric vein, a tributary to the portal vein.
2. The external rectal plexus lies lateral to the muscle coat drained mainly into the middle and inferior rectal veins.

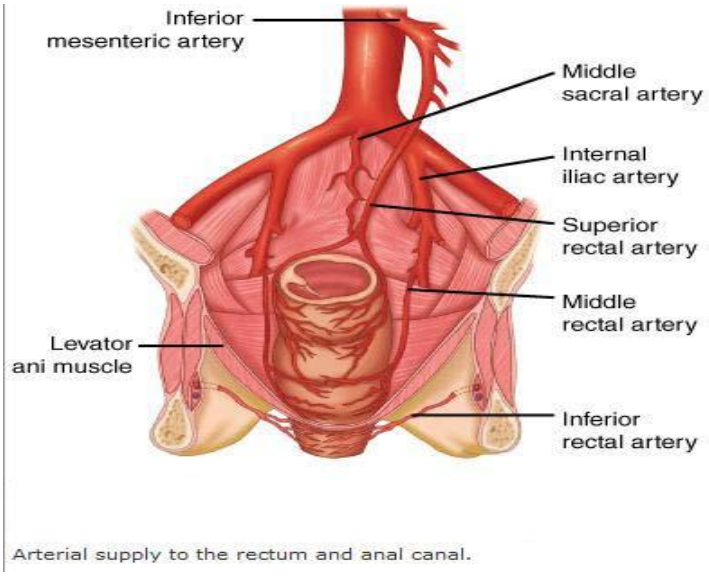

Figure 2: Arterial Supply of Anal canal

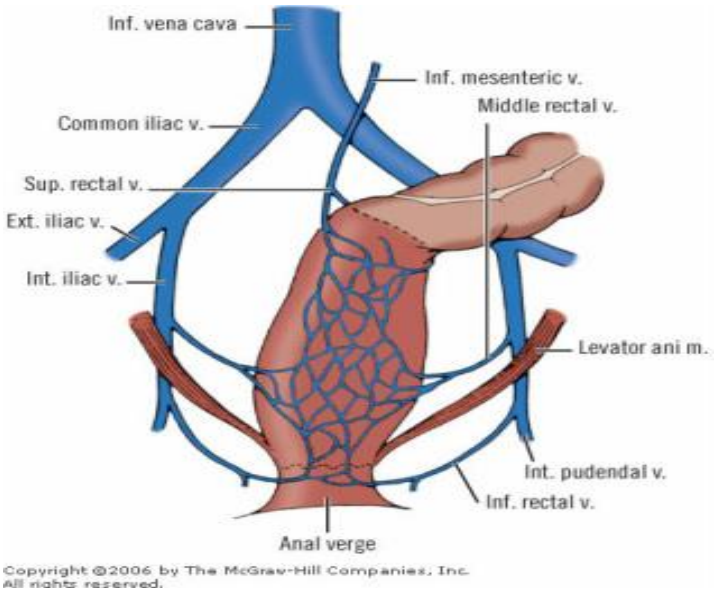

Figure3 : Venous drainage of anal canal

IV. Examination

General Principles

Examination is primarily directed to the region of the body responsible for the presenting problem, but someone not seen in the past year should undergo a more generalized physical examination. Along with a general survey and recording of vital signs, this procedure typically includes an examination of the eyes, mouth and pharynx, thorax and lungs, heart, peripheral vascular system, gross neurologic function, and mental status. Patients examined for colorectal symptoms should have a digital rectal examination. An abdominal examination is required and is conducted with the patient supine. Particular attention to scars, deformities, distention, and masses will detail this examination from the xiphoid to the pubis. Auscultation characterizes the quality of the bowel sounds and identifies any bruits. Percussion helps differentiate among distended bowel, ascites, and solid masses and identifies hepatomegaly or splenomegaly. Palpation of all four abdominal quadrants should identify abnormal masses that are evaluated for size, mobility, and pulsation. Last, the groins and all incisions should be palpated for hernias. Inguinal adenopathy may be very important in the evaluation of anorectal disorders and should always be interrogated. Patients with a disease of the colon, rectum, or anus bear the burden of embarrassment in addition to concerns about their symptoms, likely diagnosis, and prognosis.

A professional attitude, consideration to covering sensitive areas, and a minimal number of observers in the room are appreciated. A nurse should be present during the examination and ideally should be of the same gender as the patient. Gentleness in examination is paramount to minimizing discomfort, especially when performing anal examinations. Maximum information can be gleaned only if the patient is able to tolerate the examination and relax. Anoscopy allows visual evaluation of anal complaints, and proctosigmoidoscopy is similarly important if rectal symptoms predominate. Occasionally a vaginal or scrotal complaint will be interpreted as an anorectal problem. Being prepared to perform a genitourinary examination is essential.

Position

Most patients undergo anorectal examination in the prone jackknife or left lateral decubitus position. The former position provides the examiner with the greatest comfort, whereas the latter is easiest for the patient.

The prone jackknife position requires a special examination table that can be flexed to 90 degrees and tilted head-down. The patient kneels on a shallow ledge that is
height adjusted to allow comfortable hip flexion and lowers his or her clothing and undergarments while shielded from direct view by a sheet held between the patient and examiner. The patient then lays his or her chest flat on the table, and the table is tilted to bring the anoperineum into clear vision after adjustment of the sheet. This position allows the rectum to fill with air while the liquid and solid luminal contents dependently settle into the rectosigmoid region. If a specialized table is unavailable, colonoscopy is planned, or the patient is more easily positioned from prior abdominal examination, a left lateral decubitus position is recommended. With the patient covered with a sheet and lying in the left lateral decubitus (Sims) position, the hips and knees are flexed, and the patient's hips are positioned on the edge of the table. The head, knees, and feet are situated opposite the examiner, angling the patient's body across the table. The anoperineum is then undraped to allow isolated exposure of the examination area.

Lithotomy position allows for an excellent examination of the vagina, rectovaginal fascia, and perineal body. However, anal inspection in lithotomy can be more difficult than with the patient in prone or decubitus.

Inspection And Palpation

Examination of the perineum and anus must be systematic, incorporating both inspection and palpation, and the patient should be informed of all maneuvers before
they occur to minimize anxiety, discomfort, and the potential for harm. The physician and assistant should position themselves on opposite sides of the patient and then gently separate the buttocks, with the examiner leaving his or her dominant hand free. The sacrococcygeal region is first surveyed to exclude pilonidal disease.The skin overlying the ischioanal fossae is then inspected for abnormalities that include excoriation, maceration, ulceration, drainage sites, lesions, and masses. The perianum is observed for external hemorrhoids, skin tags, scarring, and deformity. Last, retraction allows inspection of the anal verge and distal canal for a fissure, ulcer, and prolapsing anal papillae or internal hemorrhoids. If rectal procidentia is suspected, the patient is asked to perform the Valsalva maneuver while the examiner watches for prolapsing mucosa or rectal wall. The position of the anus and quality of the perineal body, including descent of these structures, should be consciously noted when a woman is inspected, especially when the presenting complaint is seepage, urgency, or incontinence.

Palpation of the perineum is performed next. This tactic may elicit tenderness and detect fluctuance or induration suggestive of an abscess. Fistula tracts can be felt as they course from an external os toward the anal canal. After palpation of the skin overlying the

external sphincter, an anal wink is elicited by drawing a finger quickly across the sphincter while applying light pressure. A well-lubricated finger is then gently and slowly inserted into the anal canal to assess sphincter tone. As the pad of the finger passes along the anoderm above the intersphincteric groove, the canal should feel smooth and nonulcerated. The examiner might encounter scarring or stricturing at this level; pain may preclude further examination except under anesthesia. The dentate line can be appreciated as the mucosa transitions into more irregular tissue. Hypertrophied anal papillae and masses can be best appreciated by slowly rotating the digit around the circumference of the canal. Internal hemorrhoids are rarely palpable unless they are hypertrophied due to chronic prolapse. Before the examination continues above the anorectal ring, the patient is asked to squeeze around the examining finger to assess external sphincter and puborectalis function. The thumb of the examining hand should be placed into the posterior vaginal fourchette to permit bidigital appreciation of an anterior anal sphincter defect. For patients who complain of nonspecific pelvic pain, the puborectalis and levators should be firmly palpated bilaterally and the coccyx bimanually manipulated, while the patient is asked whether the various maneuvers reproduce his or her presenting pain.

The distal rectum is examined last, beginning with palpation of the prostate or cervix through the anterior rectal wall; laxity of the rectal wall with significant anterior bulging is suggestive of a symptomatic rectocele. Bidigital examination of the rectovaginal septum often allows the identification of an enterocele that is palpable with straining. Like the anal canal, the rectum is circumferentially palpated to exclude tenderness, induration, polyps, and masses. The velvety soft texture of a large, sessile villous adenoma can be easily missed if the examiner is unaware of the subtle mucosal changes associated with these lesions. Any neoplasms that are encountered should be characterized according to size, position, and location relative to the anorectal ring to assist in planning the appropriate operative approach. In addition, palpation of the tumor for firmness, mobility, and ulceration that predict wall invasion and palpation of the posterior rectal wall for retrorectal lymph nodes that suggest local nodal metastases are pivotal for accurate clinical staging.

Bleeding

Perineal excoriation, anal fissure, internal hemorrhoids, or a low-lying neoplasm can cause outlet rectal bleeding. Excoriation and fissures can be identified through simple inspection of the perineal skin and anal verge. Inspection of the perianum may reveal grade III or IV internal hemorrhoids, especially if the hemorrhoids remain prolapsed after an enema. Although they are occasionally associated with external skin tags, internal hemorrhoids are rarely palpable unless they are hypertrophied because of chronic prolapse. Instead, symptomatic internal hemorrhoids are best diagnosed with anoscopy and appear as bulging mucosal cushions, often with prominent veins or arteries that tend to lie anteriorly and posterolaterally on both sides of the anal canal. Chronically prolapsing internal hemorrhoids develop a whitish-gray lining termed *pseudoepitheliomatous hyperplasia*.

Suspicious rectal bleeding has a wider differential diagnosis than outlet bleeding. Internal hemorrhoids are still a likely cause, so anoscopy is important. Rectal mucosal prolapse, occult full-thickness rectal procidentia, and even solitary rectal ulcer may present in this way. Proctoscopy may show erythematous, redundant rectal folds that descend into the anus with a Valsalva maneuver. Suspicious bleeding may also herald neoplasia, and evaluation of the proximal colon is required. It is always important to recall that rectal bleeding is never normal and invariably requires further investigation because it should never be assumed that the cause is "merely" hemorrhoids.

Anoscopy

Inspection of the anal canal is best performed with an anoscope. Various types of anoscopes are manufactured but are described on the basis of size and whether they are disposable, lighted, and bivalved, slotted, or beveled. Regardless of the type of instrument that is used, digital examination should always precede insertion of the anoscope. Telling the patient each step of the planned procedure, the examiner gently applies the well-lubricated anoscope against the anus. Constant gradual pressure allows the scope to pass into the canal. If resistance is encountered because of increased sphincter tone, the patient is asked to strain. This will involuntarily relax the sphincter and allow passage of the anoscope. Continued difficulties are suggestive of anal stenosis, mandating the use of a smaller-caliber anoscope, or of anal pathology that necessitates examination under anesthesia. Once the anoscope is appropriately inserted, it is used to circumferentially inspect the anal canal and distalmost rectum. The scope is partially withdrawn in each quadrant to allow visualization of all mucosa.

Rigid Proctosigmoidoscopy

Historically, rigid proctosigmoidoscopy was used for routine visualization of the rectum and distal sigmoid colon. Rigid endoscopy remains the procedure of choice for evaluation and treatment of distal rectal lesions. In addition to allowing visualization without advanced equipment, rigid proctoscopy provides a much

more accurate localization of rectal pathology compared to flexible endoscopy. Patients with rectal tumors at the University of California at Los Angeles were studied from 2001 to 2006, comparing localization of disease between rigid and flexible endoscopy. Twenty-five percent of patients had a therapy algorithm change based on the results of rigid proctoscopy compared to flexible. Interestingly, flexible endoscopy underestimates the distance between the anus and distal tumors, but tends to overestimate the distance between the anus and middle or upper rectal lesions.

The rigid instruments are 25 cm long and have a diameter of 11, 15, or 19 mm. The smaller instruments are used in patients with strictures, whereas the larger proctosigmoidoscopes enable the evacuation of stool or blood and the treatment of larger polyps. The scope is inserted after anoscopy has been completed and is passed similarly to the anoscope. After the rigid proctosigmoidoscope has passed through the sphincters while typically directed toward the umbilicus, the obturator is removed, and the scope is advanced under direct visualization. Luminal contents that obscure adequate
inspection are aspirated or swabbed as the examination progresses, but close mucosal examination is best performed during scope withdrawal. If stool obscures significant segments of mucosa, the procedure is halted until an enema is delivered to clear the lower bowel. Although the direction of rigid proctosigmoidoscope passage must be individualized, the general route is directed posteriorly along the sacral hollow, around the inferior (left posterior), middle (right anterior), and upper (left posterior) valves of Houston. The rectosigmoid junction will come into view after the proctosigmoidoscope
has been inserted 17 to 19 cm. At this point, further insertion will cause many patients to experience crampy visceral pain that resolves with instrument withdrawal. The angulated rectosigmoid may appear as a blinded end to the rectum with no visible rectum. Gentle
manipulation to the left and then to the right will often open the sigmoid lumen to inspection. Moderate air insufflation facilitates the procedure, but excessive use is painful and interferes with the examination. Examination is performed during withdrawal while sweeping the scope around to allow careful inspection of all mucosal surfaces, flattening the rectal valves to survey their cephalad components.

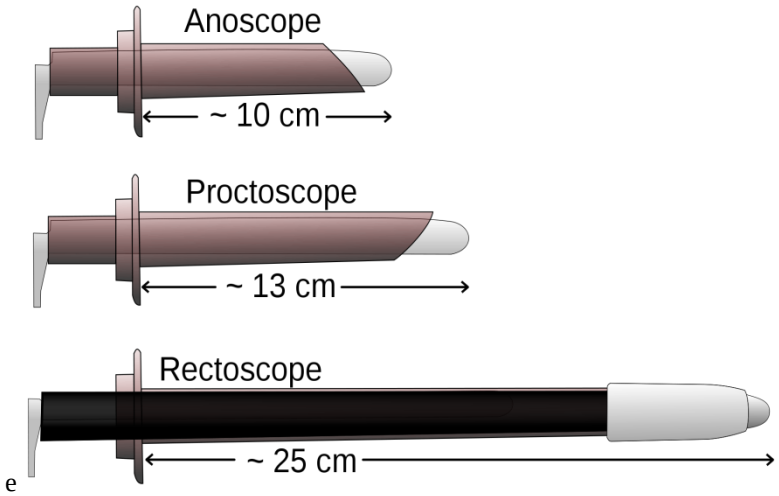

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Figure 4- Diagram representing anoscope, rectoscope, and, proctoscope

Biopsy samples are obtained posteriorly along the folds of the valves if possible to minimize the risk of perforation. Small lesions can be fulgurated, and larger polyps can be excised with a snare. Anterior biopsies above the middle rectal valve are especially prone to intraperitoneal perforation because this area is situated above the peritoneal reflection; perforation complicates 0.005% to 0.01% of rigid procedures.12 Perforation by the tip of the scope occurs at areas of angulation, bowel wall weakness, and intestinal fixation. Bleeding after biopsy with the larger forceps or snare rarely occurs and usually spontaneously ceases. In the event that hemorrhage persists, a small artery is usually implicated, but it can be controlled by a combination of pressure and coagulation.

Hemorrhoids (Historical Aspects)

There are few diseases more chronicled in human history than symptomatic hemorrhoidal disease. References occur in ancient texts dating back to Babylonian, Egyptian, Greek, and Hebrew cultures.[7,8] Included in many of these writings are multiple recommended treatment regimens, including anal dilation, topical ointments, and the intimidating red hot poker.[9,10] Although few people have died of hemorrhoidal disease, many

patients wish they had, particularly after therapy, and this fact led to the beatification of St. Fiachre, the patron saint of gardeners and hemorrhoidal sufferers.[11]

Anatomy And Etiology Of Hemorrhoids

The hemorrhoidal cushions appear predictably in the right anterior, right posterior, and left lateral positions, although there may be intervening secondary hemorrhoidal complexes that blur this classic anatomy[12]. The blood supply is similarly constant, deriving from the superior rectal artery, a branch of the inferior mesenteric; the middle rectal arteries arising from the internal iliac arteries; and the inferior rectal arteries arising from the pudendal arteries. The venous drainage transitions from the portal venous system above the level of the dentate line to the systemic venous system below this level[12]. It was originally reported that the vascular cushions from the termination of the vascular supply within the anal canal contributed to the maintenance of anal continence[12]. Hemorrhoidal disease occurs as the result of abnormalities within the connective tissue of these cushions, producing bleeding with or without prolapse of the hemorrhoidal tissue[13]. This can occur as the result of excessive straining, chronic constipation, or low-fiber dietary intake[14]. A clear understanding of the pathophysiology is important when considering therapeutic interventions. At the earlier stages of disease progression, when the major manifestation is transudation of blood through thin-walled, damaged veins and/or arterioles, ablation of the vessels should be adequate. Conversely, in late stages of the disease, when there is significant disruption of the mucosal suspensory ligament, a technique requires fixation of the mucosa to the underlying muscular wall for effective therapy[15]. Internal anal sphincter dysfunction may play a role, and a number of investigators have demonstrated increased internal anal sphincter tone in patients with hemorrhoidal disease[16-18]. In reality, probably a combination of all of these factors is important for the ultimate development of large prolapsing hemorrhoidal disease.

The standard classification for hemorrhoidal diseases[19] is as follows:

• Grade I = bleeding
• Grade II = protrusion with spontaneous reduction
• Grade III = protrusion requiring manual reduction
• Grade IV = irreducible protrusion of hemorrhoidal tissue

Although this staging system tends to correlate with patients' symptoms, it is unclear that it can be completely relied on when making therapeutic decisions. As outlined later, it is important to consider the relative role of internal hemorrhoidal tissue, prolapsing anoderm, and external skin tagging when choosing a modality for complete
resolution of all of the patient's symptoms[13].

Clinical Evaluation

Bleeding, protrusion, and pain are among the most common symptoms associated with hemorrhoidal disease. While many patients associate anorectal complaints with hemorrhoids only one third are found to have significant hemorrhoidal disease[20]. Hemorrhoidal bleeding typically results in bright red blood either on the toilet paper or actually into the commode after bowel movements, generally painless in nature. More vigorous bleeding can occur, however, as the hemorrhoids enlarge and particularly in advanced stages when a portion of the complex is fixed externally, allowing the blood to drip or spurt into the commode. Usually, prompt reduction of the protruding mass causes this symptom to abate. Acute thromboses of internal or external hemorrhoids are usually associated with severe pain in association with a palpable perianal mass. These patients are generally quite uncomfortable, and the diagnosis is immediately obvious on clinical examination.

Examination of the patient with hematochezia, although tailored by the age of the patient, should include sufficient investigations to rule out a proximal source of bleeding such as inflammatory bowel disease and neoplasia. Hemorrhoids should not be dismissed as the cause of iron-deficiency anemia as this is an uncommon occurrence.

We prefer to examine the patient in the left lateral position with the knees drawn up toward the chest as high as possible. This approach allows relative patient comfort and the ability to clearly inspect the perianal skin and perform anoscopy and proctosigmoidoscopy. A careful digital examination of the anal canal and distal rectum should be performed to include the prostate in men. An anoscope is essential to clearly inspect the hemorrhoidal tissue and anal canal. The three common locations for hemorrhoids should be inspected, and the size, friability, and ease of prolapse of these areas should be recorded. Next, the degree of hemorrhoidal prolapse can be ascertained quite accurately by asking the patient to strain on the toilet. Following this, the decision regarding the need for more proximal colorectal evaluation should be considered, although rigid proctoscopy would be the minimum in all patients. After the hemorrhoids
are appropriately graded, a discussion can be enjoined with the patient regarding treatment options.

Nonexcisional Options

Most patients evaluated for hematochezia that ultimately proves to be hemorrhoidal in origin can be managed with fiber supplementation and a variety of available anal ointments. Although it is not clearly proven that constipation is causal, it appears of practical utility to improve bowel function and thereby reduce hemorrhoidal complaints in most early-stage patients. Similarly, the ointments available, although homeopathic, may minimize ongoing trauma to the hemorrhoidal cushions and similarly
reduce symptoms. The remaining nonoperative and operative interventions should be reserved for patients with advanced hemorrhoidal disease who are unresponsive to conservative medical management.

Sclerotherapy

Sclerotherapy of symptomatic internal hemorrhoidal disease was first advocated by Mitchell in 1871 and has enjoyed significant experience[13]. The purpose of sclerotherapy is ultimately to scar the submucosa, resulting in atrophy of the tissue injected and scarification with fixation of the hemorrhoidal complex within its normal location in the anal canal. A variety of solutions have been advocated, although it appears that sodium morrhuate and sodium tetradecyl sulfate predominate currently. This modality is most effective in situations with minimal enlargement of hemorrhoidal complexes where the primary complaint is bright red rectal bleeding. The procedure is performed with the patient in the left lateral decubitus position. An anoscope is inserted to clearly identify the symptomatic complex and a 25-gauge spinal needle is used to instill the sclerosant into the submucosal space. The syringe should be aspirated before injection to avoid a direct intravascular injection. Typically 1 to 2 mL of sclerosant is adequate. The surgeon can inject as many locations as desired because the procedure is essentially painless. It is important, however, not to circumferentially inject the anal canal because this may induce stricture formation.

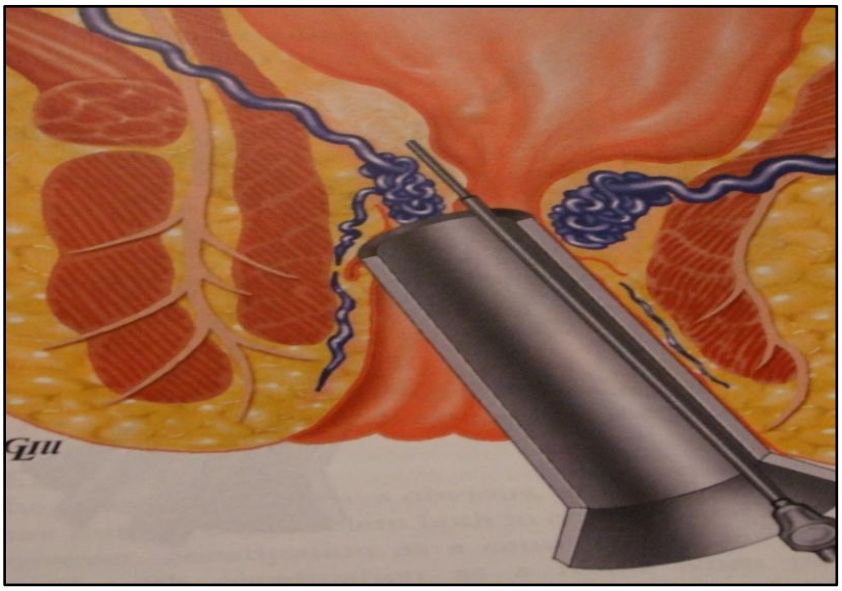


Figure 5- Diagram representing Sclerotherapy

Bipolar Diathermy

Bipolar diathermy employs electrical current to coagulate the hemorrhoidal tissue, including the mucosa and submucosa[21,22]. The machine generates a 2-second pulse of energy to accomplish the treatment. Once again, this approach is applicable for small bleeding hemorrhoids and probably has no greater efficacy than does sclerosing.

Other variations on the use of energy to destroy internal hemorrhoids includes infrared coagulation and Ultroid (direct-current) therapy[22,23]. Infrared coagulation employs a tungsten halogen lamp that generates heat energy generally for a 1.5-second period resulting in destruction of the mucosa and submucosa at the application site. The depth of penetration of this injury is usually 3 mm. Conversely, the Ultroid uses electrical current that is applied for up to 10 minutes per complex treated. Ultimately, all of these modalities are a variation on the theme of local tissue destruction and fixation of the hemorrhoidal tissue at the appropriate level. There is probably no advantage of one technique over the other; however, sclerotherapy offers an advantage to the physician since minimal instrumentation is required.

Hemorrhoidal Ligation With Rubber Bands

Barron was the first to describe hemorrhoidal banding using rubber bands in 1963[24]. Since this original description, there have been a number of reports that have documented the significant efficacy banding offers for the management of most patients with grades II and III internal hemorrhoids[25-29]. The procedure is generally well tolerated without the need for prescription analgesia if the band is placed above the level of the dentate line. It is important to ask patients if they experience any pain during placement of the bander, before deployment of the band. If they have pain before placement of the bander, it will worsen after deployment. Discomfort immediately after band placement may be reduced by the injection of a local anesthetic agent; however, this does not appear to be a long-lasting benefit[30]. Banding does carry the rare but frequently fatal complication of post-banding sepsis, which is heralded by the symptoms of increasing rectal pain, fever, and inability to void[31-34]. It is essential to treat these symptoms early and aggressively with early antibiotic treatment coupled with aggressive surgical drainage[34].

Bayer et al reported a series of 2934 patients with 79% of patients achieving complete relief of symptoms following a single session of banding at only one or two locations[31]. Using this approach, patients required multiple sessions for control of symptoms (two sessions, 32%; three sessions, 17%; four sessions, 25%; and five or more
sessions, 20%). Although the multiple sessions required are a negative aspect of this technique, only 2.1% of patients required excisional hemorrhoidectomy. It may be possible to achieve a similar outcome with a shorter duration of therapy, albeit at the expense of greater posttreatment pain, by banding all symptomatic hemorrhoidal sites at the initial visit[35-40]. Banding techniques appear to be durable after initial control of symptoms, with 69% of patients maintaining long-term relief and only 7.5% ultimately requiring excisional hemorrhoidectomy[29]. This method is cost effective in treating grade II hemorrhoids as shown by McKenzie et al in a randomized controlled trial comparing banding to stapled hemorrhoidopexy (SH). The mean cost for SH was £1483 greater than rubber band ligation (95% confidence interval [CI] = 1339 to 1676) and there was no evidence of statistical difference in quality of life-years despite higher recurrence rates for banding (odds ratio [OR] =0.18, 95% CI = 0.03 to 0.86) at 12 months[37].

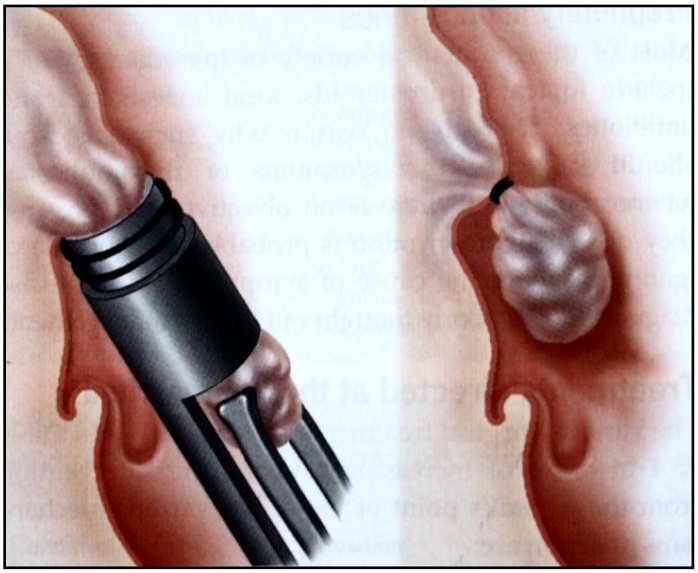


Figure 6- Diagram representing Band ligation

Excisional Hemorrhoidectomy

The decision to proceed to excisional hemorrhoidectomy requires a mutual decision by the physician and patient that medical and nonexcisional options have either failed or are not appropriate. The usual clinical symptoms that lead to surgical excision are frequent prolapsing of the internal hemorrhoids that result in discomfort and anal seepage. Alternatively, the thickened and prolapsing internal/external hemorrhoidal complexes may make anal hygiene difficult for the patient and may make excision preferable. The final indication for excisional hemorrhoidectomy, although debatable, is the development of acutely thrombosed and gangrenous internal hemorrhoids. Surgical excision of acutely thrombosed external hemorrhoids may also be warranted, primarily for more rapid pain relief and avoidance of a residual skin tag. These external thromboses are usually easily managed in the office setting with local anesthesia and complete excision with or without skin closure.

Options for excisional hemorrhoidectomy include the following techniques: Milligan-Morgan hemorrhoidectomy; Ferguson closed hemorrhoidectomy; Whitehead hemorrhoidectomy; and the more recently described SH. The procedures are usually performed in the operating theater after minimal preoperative preparation of the bowel. The use of lasers for excisional hemorrhoidectomy offers no advantage and in fact causes delayed healing, increased pain, and increased cost[38]. Anesthetic selection is usually left to the anesthesiologist and patient; however, local anesthesia supplemented by the administration of intravenous narcotics and propofol is highly effective and short-acting. The use of spinal anesthesia, although effective, may increase the risk of postoperative
urinary retention partially because of a higher intraoperative administration of intravenous fluids.

The Milligan-Morgan hemorrhoidectomy, which is widely practiced in Europe, was originally described in 1937, and its efficacy has been documented in many series subsequently[39-41]. This technique includes resection of the entire enlarged internal hemorrhoid complex, ligation of the arterial pedicle, and preservation of the intervening anoderm[38]. The distal anoderm and external skin are left open to minimize the risk of infection in the wounds. Results from this technique have shown this to be a safe and effective means for managing advanced hemorrhoidal disease[38]. However, the fact that the external wounds are left open for delayed healing can be a cause of considerable discomfort and prolonged morbidity after this procedure. The closed Ferguson hemorrhoidectomy was proposed as an alternative to the Milligan-Morgan technique and enjoys a similar large body of evidence regarding its safety and efficacy[42-45]. This technique employs an hourglass-shaped (centered at the midportion of the anoderm) excision of the entire internal/external hemorrhoidal complex, preservation of the internal and external anal sphincters, and primary closure of the entire wound. Occasionally, it is necessary to undermine flaps of anoderm and perianal skin to allow removal of intermediate hemorrhoidal tissue while preserving the bridges of anoderm between pedicles. This technical adjustment avoids postoperative strictures.

The Whitehead hemorrhoidectomy, described in 1882, was devised to eradicate the enlarged internal hemorrhoidal tissue in a circumferential fashion and to relocate the prolapsed dentate line that is often a component of prolapsing hemorrhoids[46]. Although this technique enjoyed a long period of widespread application, it was subsequently largely abandoned because of the high rates of mucosal ectropion and anal stricture[47-50]. The technique has enjoyed renewed support, with several authors documenting minimal stricture rates and no occurrences of mucosal ectropion[47-52]. Despite these promising reports, the Whitehead procedure is technically demanding because of the need to accurately identify the dentate line and relocate it to its proper location.

Instrumentation For Excisional Hemorrhoidectomy

The specific techniques for excisional hemorrhoidectomy were reviewed earlier, and this section discusses the relative benefits of scalpel and the available energy delivering excisional tools. Cold scalpel or scissor excision has long been the mainstay of surgical hemorrhoidectomy, and the data on outcomes are well validated. Over the past 10 to 15 years, a variety of new devices have been advocated for hemorrhoidectomy. These energy-based cutting devices have been devised to allow simultaneous tissue division and coagulation. The main advantage proposed for these devices is provision of hemostasis without need for suture ligation and therefore reduction in postoperative pain. However, these benefits must be interpreted in the context of the significant cost of acquisition of the devices as compared to the low cost of a disposable scalpel blade.

The first energy cutting tool applied to hemorrhoidectomy is standard monopolar electrocautery. The tool has been reported widely for the two dominant types of hemorrhoidectomy. Surgeons using this tool have also employed various degrees of wound closure by suture, ranging from pedicle ligation only to complete wound closure[53-55]. Despite the value of hemostasis, the thermal spread leaves patients with significant postoperative pain compared to SH. The STOPP trial study group compared diathermy hemorrhoidectomy to stapled hemorrhoidopexy in a randomized clinical trial for grade III and IV hemorrhoids. Hemorrhoidal prolapse was corrected equally by either operation at 1 year but total pain scores were significantly higher in the first 14 days using diathermy (daily: 25.2 vs. 36.8, $P = 0.002$; peak: 41.7 vs. 61.1, $P < 0.001$).[56] Similar findings were reported by Thaha et al looking at grade II, III, and IV hemorrhoids, but the superiority of diathermal excision was related to prolapse control at 1 year ($P = 0.087$) [57].

Laser technology has been evaluated both as a means of cutting hemorrhoidal tissue and as a technique for ablation. Zahir et al evaluated the role of the Nd-YAG laser for excision and coagulation of residual tissue and reported a reduction in postoperative pain and a greater percentage of patients returning to work at 1 week[58]. Alternatively, we found delayed wound healing, increased cost, and increased pain scores with Nd-YAG hemorrhoidectomy compared with scalpel excision[38]. Hodgson and Morgan evaluated a series of patients with secondand third-degree hemorrhoids managed by CO2 excision, with only one patient readmitted for postoperative hemorrhage[59]. The data suggest that either Nd-YAG or CO2 laser excision may be performed; however, it is not clear that the added expense or benefits are superior to scalpel or scissor excision[60].

A bipolar cautery device capable of simultaneous tissue division and blood vessel coagulation is the LigaSure. This device has been compared to monopolar diathermy hemorrhoidectomy, with most of the data suggesting reductions in operative time and early postoperative pain[61,62]. Chung and Wu compared a sutureless LigaSure technique to the standard closed Ferguson hemorrhoidectomy and confirmed a reduction in operative time and pain reduction during the first 48 hours[61]. However, there were no significant differences in wound complications or time to full recovery. Fareed et al found improvement in pain over 2 weeks compared to the Ferguson hemorrhoidectomy in addition to shorter hospital stay and shorter time to achieve complete wound healing (4.4 ± 0.7 vs. 6.4 ± 1.0 weeks; $P = 0.001$). Postoperative manometric testing and squeeze pressures were significantly decreased in the Ferguson group at the 6-week followup[63]. Similarly, a comparison of LigaSure to a standard Milligan-Morgan hemorrhoidectomy confirmed reduction in operating time and early postoperative pain[62]. A metaanalysis from 2008 compared hemorrhoidectomy with Ligasure to conventional excisional techniques and found similar cure rates but shorter operative time, decreased pain, wound healing time, and time off from work were all in favor of the Ligasure excision for hemorrhoidal disease[64].

A competing technology is the Harmonic Scalpel, which relies on a rapidly reciprocating blade to generate heat for coagulation and tissue transection. The largest reported experience was provided by Armstrong et al with 500 consecutive excisional hemorrhoidectomies[65]. They reported a low postoperative hemorrhage rate (0.6%). The overall postoperative complication rates were low, with urinary retention in 2%, fissure in 1%, and abscess/fistula in 0.8%. Several subsequent prospective, randomized comparisons of diathermy to Harmonic Scalpel failed to confirm any advantages between the two tools [66-68]. A randomized controlled trial by Abo-hashem et al compared bipolar electrocautery hemorrhoidectomy to Harmonic Scalpel and found favorable results in regard to pain scores and returns to work but complications were similar, except for urine retention, which was significantly less frequent in the Harmonic Scalpel group (9.4% vs. 34.4%, $P < 0.05$). Follow up was 6 weeks[69]. Probably the best guidance on this topic is the study by Chung et al, who evaluated scissor/Milligan-Morgan, Harmonic Scalpel, and bipolar scissors for hemorrhoidectomy: Harmonic Scalpel demonstrated superior early pain scores to scissor; however, the long-term recovery was similar between the groups[70]. Therefore, the cumulative data suggest that patient benefits are modest for any
of the energy-delivering techniques and the cost differential is significant.

Procedure For Prolapsing Hemorrhoids

Another option for advanced hemorrhoidal disease is a nonexcisional hemorrhoidectomy or pexy procedure referred to as the procedure for prolapsing hemorrhoids (PPHs) or SH[71]. The technique uses a circular, transanally placed purse-string suture placed 4 cm proximally from the dentate line and within the enlarged internal hemorrhoids. A 31-mm stapler is then placed transanally to perform a circumferential excision of rectal mucosa just rostral to the hemorrhoidal columns. The procedure provides for a repositioning of both the anoderm and hemorrhoidal columns to the appropriate locations within the anal canal and fixation of these structures via the rectal staple line.

Since the introduction of the PPH technique, there have been a large number of prospective randomized trials comparing this approach to excisional hemorrhoidectomy[72-76]. Most of the data support the concept that PPH is associated with a lesser degree of early postoperative pain and a general reduction in the duration of pain after surgery[72-76]. A multicenter trial comparing PPH to Ferguson closed hemorrhoidectomy confirmed similar benefits and reported a reduction in the need for early reoperation for complications in the PPH group[77]. Most recently, several metaanalyses have been published comparing PPH to the Ferguson closed hemorrhoidectomy and the Milligan-Morgan open hemorrhoidectomy. There was significant heterogenicity of trials and followup was short but publications concluded that PPH is associated with less pain and reduced operative time and hospital stay in addition to earlier return to normal activity. Complications did not differ but the rate of recurrence appears to be higher in PPH[78,79]. Two analyses have looked at long-term outcomes after SH. A Cochrane systematic review looked at all randomized controlled trials from 1998 to 2006 comparing SH to conventional excisional hemorrhoidectomy. SH patients were significantly more likely to have recurrent hemorrhoids in long-term followup than those receiving conventional hemorrhoidectomy (seven trials, 537 patients; OR = 3.85; 95% CI = 1.47 to 10.07; $P = 0.006$). In trials where there was followup of 1 year or more, SH was associated higher recurrence rates (five trials, 417 patients; OR = 3.60; 95% CI = 1.24 to 10.49; $P = 0.02$). A significantly higher proportion of patients with SH complained of the symptom of 79rolapsed (eight studies, 798 patients; OR = 2.96; 95% CI = 1.33 to 6.58; $P = 0.008$). Followup longer than 1 year yielded similar results. Nonsignificant trends in favor of SH were seen in pain, pruritus ani, and fecal urgency. All other clinical parameters showed trends favoring SH[80]. Giordano et al looked at long-term outcome for PPH in a separate analysis looking at all randomized controlled trials that had followup of 1 year or longer comparing PPH to conventional hemorrhoidectomy. Fifteen articles met their inclusion criteria, for a total of 1201 patients. Outcomes at 1 year showed a significantly higher rate of 79rolapsed recurrence in the PPH group (14 studies, 1063 patients; OR = 5.5; $P < 0.001$) and patients were likely to undergo further treatment

to correct recurrent prolapses compared with conventional hemorrhoidectomy (10 studies, 824 patients; OR = 1.9; $P < 0.002$) and concluded rightly that it is a matter of discretion whether to accept a higher recurrence rate to take advantage of the short-term benefits of PPH, but as pointed out in the Cochrane review patients need to be educated about the pros and cons of techniques available[81]. The final publication took into account the cost and found that because of shorter operative time and hospital stay, the cost of the stapling gun was offset and the techniques did not differ[82]. Similar findings have been published comparing Ligasure to PPH[83].

Figure 7- Illustrative diagram showing Stapler device used for hemorrhoidopexy

Although the bulk of the data supports the safety of this new technique, there have been several reports of complications. Early complications after 150 consecutive SHs by Bove et al were 6.6%: 5 bleeding, 4 acute urinary retention, 1 external hemorrhoid thrombosis, and 1 hematoma of the rectal wall. Late complications were 10%: 5 fecal urgency (improved after 6 months), 6 moderate asymptomatic strictures, and 4 persistent skin tags. Recurrences were 5.1% and all were in grade III and IV patients and occurred within the first 24 months[84]. Festen et al have shown that recurrences can be successfully treated with redo PPH as more than 90% of their recurrence treated with redo PPH achieved prolapse reduction[85]. In a retrospective review, Jongen et al looked at reoperations for 1233 patients undergoing SH over a 10-year time frame. Reoperation rate was 10%, with the majority stapler-related, recurrent/persistent hemorrhoidal symptoms, or other anorectal issues not addressed by the circular SH procedure. No life-threatening complications occurred, and the need for both early and late reoperations decreased significantly over time ($P < 0.05$) [86]. Case reports have been published on severe pelvic sepsis after SH. Van Wensen et al reported a case requiring exploratory laparotomy with presacral drainage and diverting ileostomy. On reoperation, a digital examination revealed a dorsolateral rectal perforation. It is unclear in their publication whether this was at the staple line or not[87]. Martellucci et al reported a double rectal perforation after SH. The more distal perforation was related to a staple line dehiscence, and they theorized that the more proximal perforation at the rectosigmoid junction may have been related to a sigmoidocele trapped in the stapler during the initial operation[88]. Molloy and Kingsmore reported a case of severe pelvic sepsis, likely resulting from an inadvertent rectal injury[89]. Cheetham et al also raised concern over persistent severe anorectal pain as a possible sequela of PPH[90].

Hemorrhoidal Arterial Ligation

A new technique that is gaining popularity is Doppler guided hemorrhoidal artery ligation, or transanal hemorrhoidal dearterialization (THD). The guided reduction in arterial blood flow can be coupled with a mucosopexy when there is significant prolapse—so that this aspect can be corrected and venous outflow improved. This technique was first described by Morinaga et al in 1995 and is based on closure of the hemorrhoidal blood flow that feeds the hemorrhoidal plexus via the terminal branches of the superior rectal artery[91]. A specifically designed proctoscope is used coupled with a Doppler transducer. At the distal end, there is a small window that allows suturing of the rectal mucosa 2 to 3 cm above the dentate line. The reduction of blood flow is thought to lead to shrinkage of the hemorrhoidal complex. In addition, a mucosopexy can be performed that lifts up the prolapsing tissue into its normal anatomic
position. Giordano et al published an extensive review of the current evidence on THD, looking specifically at safety and effectiveness of the technique. Sixteen of the 17 articles that met inclusion criteria were observational studies, and the study quality ranged from low to very low. The majority of patients treated had grade II or III

disease. Of the 1996 patients who were involved in these studies, the most common early postoperative event was postoperative pain (18.5%). Residual protrusion, bleeding, and fever were complications documented with an incidence higher than 3%. When the studies with a followup of 1 year or more were analyzed (6/17 publications), the incidence of prolapse was 10.8%, bleeding 9.7%, and pain on defecation 8.7%[92].

Postoperative Management After Hemorrhoid Surgery

Regardless of the excisional technique used for treatment of advanced hemorrhoidal disease, the key to effective patient management is avoidance of postoperative complications. Pain is the most frequent complication and is the most feared sequela of the procedure from the patient's perspective. A variety of analgesic regimens have been recommended, usually consisting of a combination of oral and parenteral narcotics[93-97]. The use of local infiltration of bupivacaine into the wounds and perianal skin has been variably successful in long-term pain reduction[98,99]. Conversely, ketorolac has demonstrated considerable efficacy in managing posthemorrhoidectomy pain[100]. The use of alternative administration routes for narcotics either by patch or subcutaneous pump have been successful in controlling pain; however, the management of these routes of administration can be risky in the outpatient setting because of the risk of narcotic-induced respiratory depression. The most appropriate regimen following outpatient hemorrhoidectomy appears to be intraoperative use of ketorolac, sufficient doses of oral narcotic analgesics for home administration, and supplementation of the narcotics by an oral nonsteroidal antiinflammatory drug (NSAID). Two recent publications have supported the use of nifedipine with lidocaine ointment and glyceryl trinitrate (GTN) ointment for posthemorrhoidectomy pain. Reducing the internal sphincter spasm may contribute to the effectiveness of this therapy. Of 69 patients randomized to receive 0.2% GTN or placebo, the patients in the GTN group experienced significantly less postoperative pain on days 1, 3, and 7 ($P < 0.05$), used less analgesics, and had improved wound healing compared to placebo at 3 weeks from a diathermy Ferguson hemorrhoidectomy[101,102]. Joshi et al looked at evidence-based management of pain after hemorrhoidectomy surgery in a systemic review in 2010. The findings revealed that local anesthetic infiltration as a sole technique or with general or regional anesthetic should be recommended in addition to a combination of NSAID, paracetamol, and opiates. Other medications that are recommended as analgesic adjuncts may include laxatives and oral metronidazole started before surgery[103].

Urinary retention is a frequent postoperative problem following hemorrhoidectomy, ranging in incidence from 1% to 52%[104-107].A variety of strategies have been used to treat the problem, including parasympathomimetics, α-adrenergic blocking agents, and sitz baths[104,108]. The best approach, however, seems to be a strategy of prevention that includes limiting perioperative fluid administration to 250 mL, an anesthetic approach that avoids use of spinal anesthesia, avoidance of anal packing, and an aggressive oral analgesic regimen[109].

Early postoperative bleeding (<24 hours) occurs in approximately 1% of cases and represents a technical error requiring return to the operating theater for resuturing of the offending wound[110]. Delayed hemorrhage occurs in 0.5% to 4% of cases of excisional hemorrhoidectomy at 5 to 10 days postoperatively[111-113]. The etiology has been held to be early separation of the ligated pedicle before adequate thrombosis in the feeding artery can occur[114]. The bleeding in this scenario is usually significant and requires some method for control of ongoing hemorrhage. Options include return to the operating theater for suture ligation or tamponade at the bedside by Foley catheter or anal packing[114-116]. The subsequent outcome after control of secondary hemorrhage is generally good, with virtually no risk of recurrent bleeding. It may be helpful to irrigate out the distal colorectum with posthemorrhage enemas or at the time of intraoperative control of bleeding to avoid confusion when the residual clots pass per anum.

Watson AJ et al[117] in a large multicenter trial eTHoS(either Traditional Haemorrhoidectomy or Stapled Haemorrhoidopexy for Haemorrhoidal Disease) a pragmatic, multicentre, randomised controlled trial over 29 secondary care centres. Patients, aged 18 year or older, with circumferential haemorrhoids grade II to IV, were eligible to take part. This study showed almost equal postoperative complication rate in conventional hemorrhoidectomy and stapler hemorrhoidopexy.

Varela Gutiérrez G, Castañeda Ortiz EM[112] did initial one year experience in patients selected for haemorrhoidopexy with stapler, evaluating post-operatory pain, early and delayed complications, day-in hospital stay and reintegration to daily activities. Patients operated with haemorrhoidopexy with circular Ethicon Endo Surgery Inc. PPH 03 33 mm (Cincinnati, OH) were included prospectively in the period between November 1st 2004 and October 30th 2005 in Mexico's ABC Medical Center. Thirtynine patients were included in this study, of which 17 (44%) presented a III degree haemorrhoidal disease and 22 (56%) with IV degree. Post-operatory bleeding was observed in 3 patients (8%); post-operatory pain was evaluated with Mankoski scale. After day five, every patient reintegrated to its daily activities, and none required re-intervention.

Picchio M, Greco E, Di Filippo A, Marino G, Stipa F, Spaziani E[113] presented and discussed the results of the most diffuse surgical techniques for hemorrhoids. Traditional surgery for hemorrhoids aims to remove the hemorrhoids, with closure (Fergusson's technique) or without closure (Milligan-Morgan procedure) of the ensuing defect. This traditional approach is effective, but causes a significant postoperative pain because of wide external wounds in the innervated perianal skin. Stapled hemorrhoidopexy, proposed by Longo, has gained a vast acceptance because of less postoperative pain and faster return to normal activities. In the recent literature, a significant incidence of recurrence after stapled hemorrhoidopexy was reported, when compared with conventional hemorrhoidectomy. Double stapler hemorrhoidopexy may be an alternative to simple stapled hemorrhoidopexy to reduce the recurrence in advanced hemorrhoidal prolapse. Transanal hemorrhoidal deartertialization was showed to be as effective as stapled hemorrhoidopexy in terms of treatment success, complications, and incidence recurrence.

Mongardini M, Custureri F, Schillaci F, Leone G, Cola A, Fanello G, Benedetti F, Maturo A, Pappalardo G[114] reported a rare case of rectal stenosis following stapler hemorrhoidopexy.

Gravié JF, Lehur PA, Huten N, Papillon M, Fantoli M, Descottes B, Pessaux P, Arnaud JP[115] a multicenter Randomnized Controlled Trial showed Stapled hemorrhoidopexy causes significantly less postoperative pain. The technique is reproducible and can achieve comparable outcomes as those of the MM technique as long as the well-described steps of the technique are followed. Like with conventional surgery, anorectal dysfunction can occur after stapled hemorrhoidopexy in some patients. Its effectiveness in relieving symptoms is equivalent to conventional surgery, and the number of hemorrhoidal prolapse recurrences at 2 years is not significantly different. Hemorroidopexy is applicable for treating reducible hemorrhoidal prolapse.

Ebert KH, Meyer HJ[116] reported the stapler devices caused less pain, fewer complications and shorter hospitalisation. Stapler hemorrhoidectomy is an effective treatment for IIIrd degree hemorrhoids. In comparison to the Milligan-Morgan procedure, it has advantages in the early post-operative period. Defecation problems can occur with an unknown prognosis.

V. Materials And Methods

Study design:

Prospective Randomized Study

Source of data:

After obtaining approval from College Ethical Committee, this study entitled **"Comparative Study Between Conventional Hemorrhoidectomy Versus Stapled Hemorrhoidopexy At Ja Group Of Hospitals Gwalior"** was conducted on 60 patients of hemorrhoids undergoing either conventional hemorrhoidectomy by Milligan-Morgan technique or stapler hemorrhoidopexy randomized on the basis of chit system in the Department of Surgery, J A Group of Hospitals and G R Medical College, Gwalior (MP) during February 2015 to March 2016.

Inclusion criteria :

1) Age equal or more than 18 years or less than 60 years.

Exclusion criteria:

1) Age less than 18 years or more than 60 years.
2) Patients admitted in general surgery ward for emergency procedure.
3) Patients admitted in general surgery ward who are sick/uncooperative & therefore cannot take part in study.

Method of collection of data:

Before commencement of the study, available relevant literature was reviewed. Patients were thoroughly explained the nature of their disease, types of procedures available and the available information regarding side effects, cost effectiveness of conventional hemorrhoidectomy and stapler hemorrhoidopexy were explained. After taking well informed and written consent, they were assigned to a particular intervention group by lucky draw method. They were provided questionnaire about demographic details, preoperative symptoms, immediate, early and late postoperative complications experienced and resumption of normal functions and discharge.

The parameters studied were:

Baseline Parameters

A. Age Distribution- Mean of which was compared in both the groups, to ascertain if there is difference in the 2 study groups based on this criterion.
B. Gender Distribution- Mean of which was compared in both the groups, to ascertain if there is difference in the 2 study groups based on this criterion.

C. Presenting Complaints- Patients reported either bleeding alone or bleeding with prolapse. Mean of which was compared in both the groups, to ascertain if there is difference in the 2 study groups based on this criterion.

Testing Parameters

A. Operative Duration- Whether patients had <30 min or >30 min. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

B. First defecation after Surgery- Whether patients defecated on Day 0 or later. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

C. Immediate postoperative complication- 2 variables were studied:

1) Postoperative pain- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

2) Pain during defecation- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

D. Early postoperative complications- 7 variables were studied:

1) Postoperative bleeding- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

2) Urine Incontinence- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

3) Urine Retention- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

4) Sphinter Spasm- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

5) Fever- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

6) Anal Stricture- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

7) Discharge per anum- Whether present or not. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

E. Condition at Discharge- 2 variables were studied:

1) Anus size- Whether normal or stenosed. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

2) Wound condition- Whether healthy or infected. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

F. Duration of Hospital Stay- Whether <2 days or >2 days. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

G. Delayed Postoperative Complications-

1) Recurrence- Whether present or absent. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

2) Fecal Incontinence- Whether present or absent. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

3) Rectal Perforation- Whether present or absent. Mean was calculated and analytically compared between the 2 study groups using chi-square analysis.

Pre-operative clinical examination was done in detail including calculation of body mass index. Pre-operative lab investigations necessary for anesthesia fitness were done.

Stapler devices were Ethicon® PPH03 available at Deen Dayal stores and in the JAHOT Indents, which had a single use stapler device, polyprolene 1 no. double needle, anal dilator, and proctoscope available with the kit.

VI. Statistical Analysis

Observations between the two study groups were categorized and accordingly Chi-Square test or Paired-t tests were used for statistical analysis for comparison. P-value<0.05 was considered to be significant (CI = 95%). Results were tabulated and represented by suitable graphs and compared with other similar studies.

VII. Observations And Results

A total of 60 patients who underwent either conventional hemorrhoidectomy or stapler hemorrhoidopexy in Department of Surgery, G R Medical College and J A Group of Hospitals, Gwalior were included in this study from February 2015 to March 2016 and following results were obtained:

1. Baseline Variables-

a) Age

Age of the patients involved in the 2 study groups was tabulated and their mean analyzed using independent variable t test.

Table1- Following crosstable present Mean age in the 2 study groups

	Surgery	N	Mean Age	Std. Deviation	Std. Error Mean
Age	Conventional Hemorrhoidectomy	30	40.6667	4.92939	.89998
	Stapler Hemorrhoidectomy	30	42.5667	5.37993	.98224

P value in this analysis came out 0.615 which showed no statistically significant difference between the mean ages of the 2 groups.

b) Gender Distribution

Gender distribution of the 2 groups were studied and analyzed using chi-square test.

Table 2- This crosstable shows comparison of gender distribution in the 2 study groups

Gender distribution				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
sex	Male	17	18	35
	Female	13	12	25
Total		30	30	60

P value for this analysis is 0.793 shows statistically no significant difference between the gender distribution of the 2 groups.

c) Presenting Complaint

Presenting complaints of the 2 groups were compared and analyzed statistically using chi-square test.

Table 3- This crosstable shows comparison between presenting complaints of the 2 groups

		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
Pc	Bleeding only	19	18	37
	bleeding with prolapse	11	12	23
Total		30	30	60

P value came to be 0.791 which showed statistically no significant difference between the two groups' presenting complaints.

2. Testing variables-

a) Operative Duration

Operative Duration of the 2 groups were statistically analyzed using chi-square test. 73% of stapler procedures took <30 min in comparison to 40% in performing conventional procedures. These results were compared statistically using chi-square test which showed p-value of 0.009 stating significant difference between the two groups based on operative duration.

Table 4- This crosstable shows comparison between operative duration of the procedure in the 2 groups

Operative duration				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
opdur	<30 min	12	22	34
	>30 min	18	8	26
Total		30	30	60

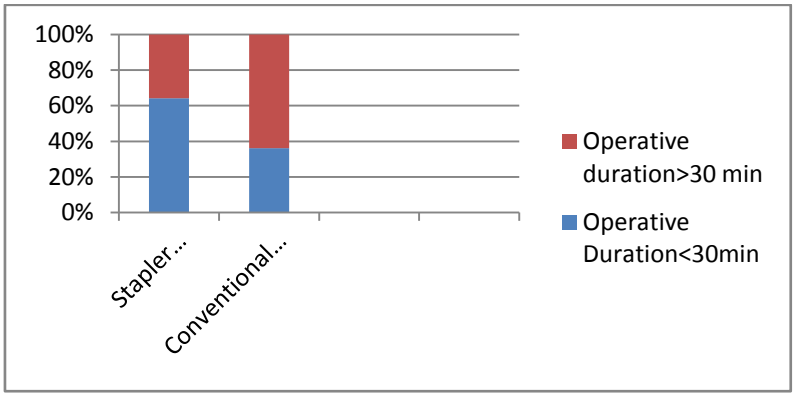


Figure 8-Bar chart showing distribution of operative duration according to the type of procedure

b) First defecation after Surgery

First defecation after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 53.33% incidence of first defecation on Day 0 in conventional hemorrhoidectomy group and 56.66% in stapler group. P value came out 0.795 which showed that there is statistically no significant difference in the 2 groups based on first defecation after surgery.

Table5: This table shows difference in the First day of defecation after procedure between the 2 study groups

First defecation after surgery

		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
First def	Day0	16	17	33
	After Day0	14	13	27
Total		30	30	60

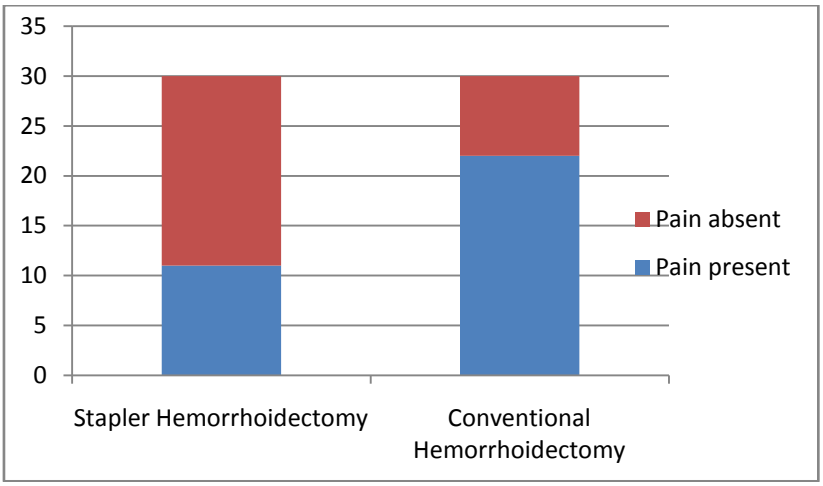
c) Postoperative Pain

Postoperative pain was studied and compared in both the groups. Statistical analysis by chi-square test revealed 73.33% incidence of postoperative pain in conventional hemorrhoidectomy group and 36.66% in stapler group. P value came out 0.004 which showed that statistically there is significant difference in the 2 groups based on postoperative pain.

Table 6: This table shows difference in the Postoperative pain after procedure between the 2 study groups

Postoperative pain				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
postoppain	Present	22	11	33
	Absent	8	19	27
Total		30	30	60

Figure 9- This graph represents presence and absence of postoperative pain in the 2 groups



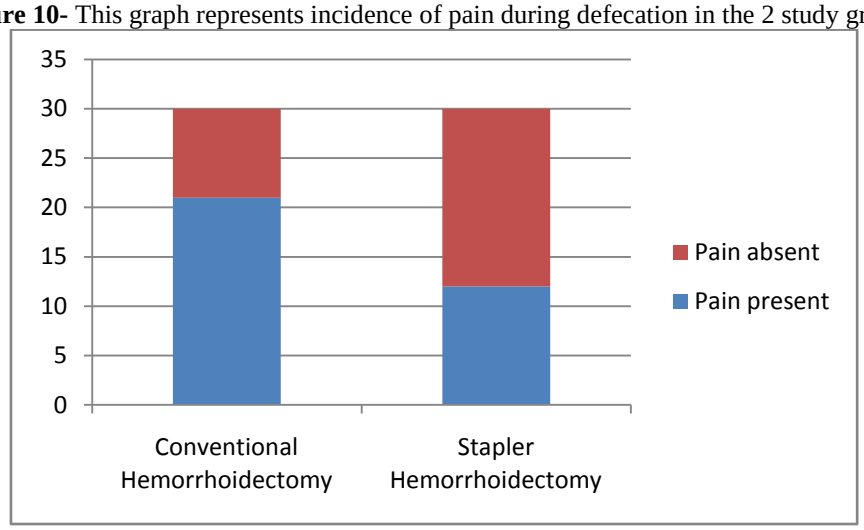
d) Postoperative pain during Defecation

Pain during defecation after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 70.00% incidence of postoperative pain in conventional hemorrhoidectomy group and 30.00% in stapler group. P value came out 0.020 which showed that statistically there is significant difference in the 2 groups based on postoperative pain.

Table 7- This crosstable represents incidence of Pain during defecation in the 2 groups

Pain during defecation				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
paindef	Present	21	12	33
	Absent	9	18	27
Total		30	30	60

Figure 10- This graph represents incidence of pain during defecation in the 2 study groups



e) Postoperative bleeding

Pain during defecation after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 26.66% incidence of postoperative pain in conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.542 which showed that statistically there is no significant difference in the 2 groups based on postoperative bleed.

Table 8- This crosstable represents incidence of Postoperative bleeding during defecation in the 2 groups

Postoperative bleeding				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
postopbleed	Present	8	6	14
	Absent	22	24	46

Total	30	30	60

f) Postoperative Urinary Incontinence

Urinary incontinence after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 30.00% incidence of urinary incontinence in conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.371 which showed that statistically there is no significant difference in the 2 groups based on urinary incontinence.

Table 9- This crosstable represents incidence of urinary incontinence during defecation in the 2 groups

Urine incontinence				
		Surgery		Total
		Conventional orrhoidectomy	Stapler orrhoidectomy	
urinincont	Present	9	6	15
	Absent	21	24	45
Total		30	30	60

g) Postoperative Urinary retention

Urinary retention after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 26.66% incidence of urinary retention in conventional hemorrhoidectomy group and 16.67% in stapler group. P value came out 0.347 which showed that statistically there is no significant difference in the 2 groups based on urinary retention.

Table 10- This crosstable represents incidence of Urinary retention in the 2 groups

Urinary retention				
Count				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
urinreten	1.00	8	5	13
	2.00	22	25	47
Total		30	30	60

h) Postoperative Sphincter Spasm

Anal sphincter spasm after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 36.67% incidence of urinary retention in conventional hemorrhoidectomy group and 26.67% in stapler group. P value came out 0.405 which showed that statistically there is no significant difference in the 2 groups based on sphincter spasm.

Table 11- This crosstable represents incidence of Postoperative sphinter spasm in the 2 groups

Sphincter Spasm				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
sphincspasm	1.00	11	8	19
	2.00	19	22	41
Total		30	30	60

i) Postoperative fever

Postoperative fever after surgery was studied and compared in both the groups. Statistical analysis by chi-square test revealed 36.67% incidence of urinary retention in both conventional hemorrhoidectomy as well as stapler group.

Table 12- This crosstable represents incidence of Postoperative fever in the 2 groups

Fever				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
fever	1.00	8	8	16
	2.00	22	22	44
Total		30	30	60

j) Postoperative Anal Stricture

Postoperative anal stricture was studied and compared in both the groups. Statistical analysis by chi-square test revealed 33.67% incidence of urinary retention in conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.243 which showed that statistically there is no significant difference in the 2 groups based on postoperative anal stricture.

Table 13- This crosstable represents incidence of Postoperative anal stricture in the 2 groups

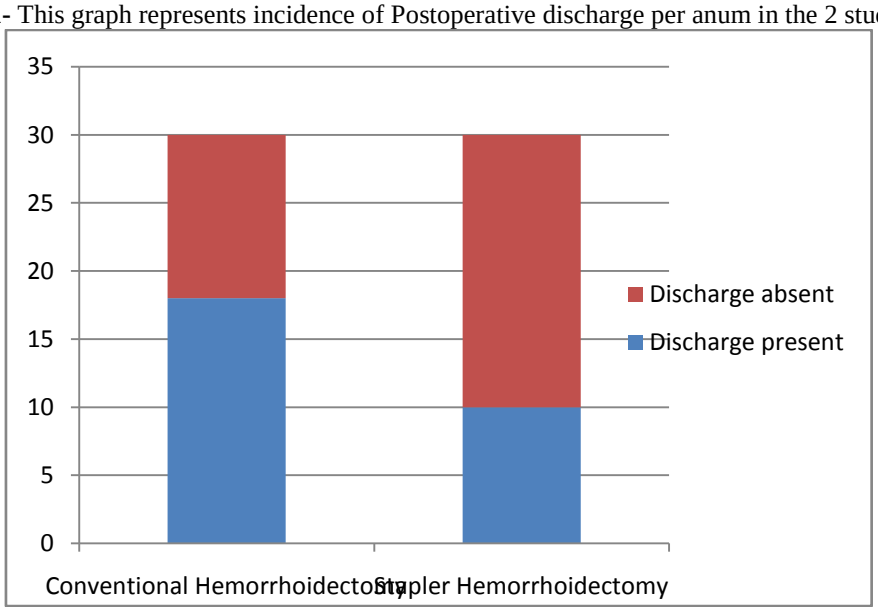
Anal stricture				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
stricture	Present	10	6	16
	Not present	20	24	44
Total		30	30	60

k) Postoperative discharge per anum

Postoperative discharge per anum was studied and compared in both the groups. Statistical analysis by chi-square test revealed 60.00% incidence of postoperative discharge per anum in conventional hemorrhoidectomy group and 30.00% in stapler group. P value came out 0.038 which showed that statistically there is significant difference in the 2 groups based on postoperative discharge per anum.

Table 14- This crosstable represents incidence of Postoperative discharge per anum in the 2 groups

Figure 11- This graph represents incidence of Postoperative discharge per anum in the 2 study groups



l) Anal aperture at the time of discharge

Anal aperture at the time of discharge was studied and compared in both the groups. Statistical analysis by chi-square test revealed 26.66% incidence of stenosis of anus in conventional hemorrhoidectomy group and 30.00% in stapler group. P value came out 0.774 which showed that statistically there is no significant difference in the 2 groups based on anal aperture at the time of discharge.

Table 15- This crosstable represents condition of anal aperture in the 2 groups at the time of discharge

Anus size				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
anussize	normal	22	21	43
	stenosed	8	9	17
Total		30	30	60

m) Wound condition at the time of discharge

Wound condition at the time of discharge was studied and compared in both the groups. Statistical analysis by chi-square test revealed 30.00% incidence of infection of wound in conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.371 which showed that statistically there is no significant difference in the 2 groups based on wound condition at the time of discharge.

Table 16- This crosstable represents incidence of Postoperative wound infection in the 2 groups

Operative wound				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
wound	Healthy	21	24	45
	Infected	9	6	15
Total		30	30	60

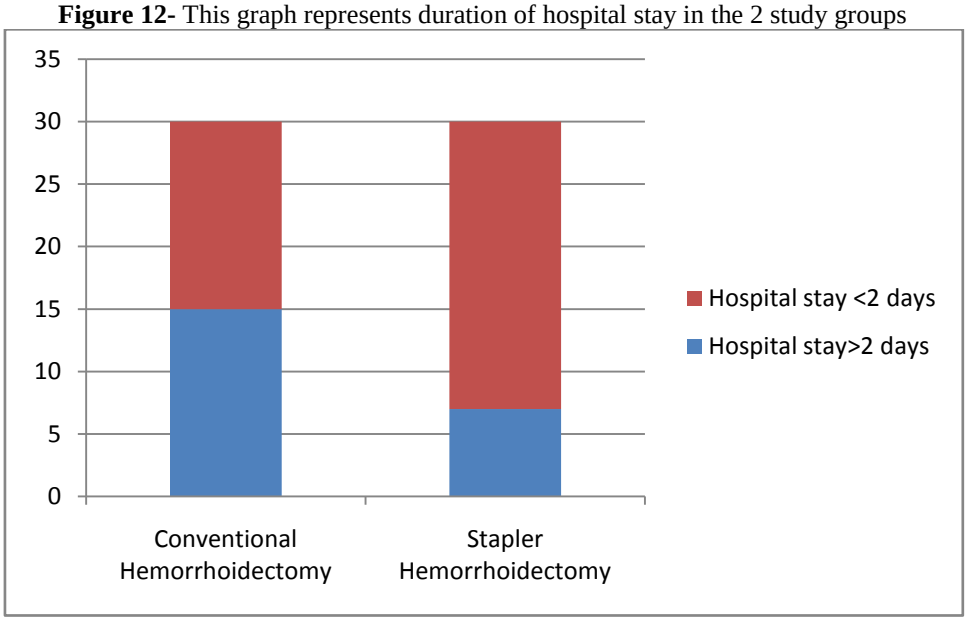
n) Duration of hospital stay

Duration of hospital stay was studied and compared in both the groups. Statistical analysis by chi-square test revealed 50.00% incidence of discharge <2 days and resumption of daily activities in conventional hemorrhoidectomy group and 76.67% in stapler group. P value came out 0.032 which showed that statistically there is significant difference in the 2 groups based on duration of hospital stay.

Table 17- This crosstable represents Duration of hospital stay in the 2 groups

Duration of Hospital Stay				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
hospitalstay	<2 days	15	23	38
	>2 days	15	7	22
Total		30	30	60

Figure 12- This graph represents duration of hospital stay in the 2 study groups



o) Reccurence after long time follow up

Reccurence after long time follow up was studied and compared in both the groups. Statistical analysis by chi-square test revealed 50.00% incidence of recurrence in conventional hemorrhoidectomy group and 56.67% in stapler group. P value came out 0.605 which showed that statistically there is no significant difference in the 2 groups based on recurrence on long term follow-up.

Table 18- This crosstable represents Duration of hospital stay in the 2 groups

recurrence after follow up

		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
recurrence	present	15	17	32
	absent	15	13	28
Total		30	30	60

p) Fecal incontinence after long term follow up

Fecal incontinence after long term follow up was studied and compared in both the groups. Statistical analysis by chi-square test revealed 26.67% incidence of fecal incontinence after conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.347 which showed that statistically there is no significant difference in the 2 groups based on recurrence on long term follow-up.

Table 19- This crosstable represents incidence of fecal incontinence in the 2 groups

Fecal incontinence				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
fecalinc	present	8	5	13
	not present	22	25	47
Total		30	30	60

q) Anal stricture after long term follow up

Anal stricture after long term follow up was studied and compared in both the groups. Statistical analysis by chi-square test revealed 33.33% incidence of anal stricture after conventional hemorrhoidectomy group and 20.00% in stapler group. P value came out 0.243 which showed that statistically there is no significant difference in the 2 groups based on recurrence on long term follow-up.

Table 19- This crosstable represents incidence of fecal incontinence in the 2 groups

Anal stricture				
		Surgery		Total
		Conventional Hemorrhoidectomy	Stapler Hemorrhoidectomy	
stricture	1.00	10	6	16
	2.00	20	24	44
Total		30	30	60

VIII. Discussion

Hemorrhoids is the most common anorectal disease. Its management is primarily based on conservative lines. Its treatment modalities have ranged from red hot poker to latest Doppler guided dearterialization techniques. Surgical methods are indicated only for those who do not respond to conservative treatment, having complications due to hemorrhoids, or having high grade, prolapsing ones. Surgical hemorrhoidectomy procedures were defined in mid nineteenth century and have remained the standard procedures till the advent of Stapler devices. Our study is to compare the outcomes of the two procedures based on early, delayed and long term complications and resumption of daily activities.

Research regarding this topic has been done mainly in western countries which have focused more on newer technologies like infra red coagulation and transanal Doppler guided dearterialization procedures are being evaluated more in their setting. These technologies are far from practical application in Indian subcontinent in government funded institutes.

In this study we've extensively studied and analysed the two surgical procedures : Conventional Milligan Morgan technique and Stapler Hemorrhoidopexy.

Our observations were as follows:

Total 60 patients who fulfilled our inclusion criteria were divided randomly in 2 intervention groups which had been compared by

Baseline variables- Age, sex and presenting complaints. All 3 variables were analyzed statistically and they showed no significant difference the 2 study groups based on these variables.

Testing Variables- Operative duration, first defecation after surgery, early, long term complications, duration of hospital stay were analysed and they showed

1. **Operative Duration** 73% of stapler procedures took <30 min in comparison to 40% in performing conventional Milligan-Morgan procedure.
   Amosi D et al[123] showed an average operative duration of 22 min which is in accordance with our study.
2. **First day of defecation after surgery** were compared for both the groups and had statistically no significant relation in the 2 groups.
3. **Postoperative pain** was compared which showed 73.33% incidence of postoperative pain in conventional hemorrhoidectomy group and 36.66% in stapler group. **Ebert KH et al[122]** showed 70% patients not having pain after Stapler procedure which again goes in accordance to our study.
4. **Pain during defecation** was compared and statistically analyzed which showed no significant difference in the 2 study groups based on this criteria.
5. **Postoperative bleeding** was compared and statistically analyzed which showed no significant difference in the 2 study groups based on this criteria.
6. **Postoperative urinary incontinence** was compared and statistically analyzed which showed no significant difference in the 2 study groups based on this criteria.
7. **Postoperative Urinary retention** was compared and statistically analyzed which showed no significant difference in the 2 study groups based on this criteria.
8. **Postoperative Sphincter Spasm** was compared and statistically analyzed which showed no significant difference in the 2 study groups based on this criteria.
9. **Postoperative discharge per anum** was compared and statistically analyzed which showed 60.00% incidence of postoperative discharge per anum in conventional hemorrhoidectomy group and 30.00% in stapler group.
10. **Pain during Defecation** was compared and statistically analyzed which showed 70.00% incidence of postoperative pain in conventional hemorrhoidectomy group and 30.00% in stapler group.
11. **Duration of hospital stay** was compared and statistically analyzed which showed 50.00% incidence of discharge <2 days and resumption of daily activities in conventional hemorrhoidectomy group and 76.67% in stapler group.

IX. Summary And Conclusion

Hemorrhoids are fibrovascular cushions containing arteriovenous communications that are located in the subepithelial space of anal canal and are a normal part of human anatomy[1]. Their management is primarily based on conservative lines. Surgical methods are indicated only for those who do not respond to conservative treatment, having complications due to hemorrhoids, or having high grade, prolapsing ones. With the introduction of new technologies more and more attempts are being made to bring these to the mainstream government funded centres. But until then, surgical procedures remain the best curative modality. Stapler procedures which started about 2 decades back have improved and now provide better outcome in relation to conventional hemorrhoidectomy procedures. We strongly advocate the use of stapler devices for hemorrhoidectomy when and where possible, especially for high grade and prolapsing ones, as these have less operative time, less postoperative pain, and early discharge period.

Limitations Of Our Study

The present study was done on a sample size of 60 patients . But we recommend a higher sample size for more accurate and unbiased analysis.

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