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Hemorrhoid: Pathophysiology and Surgical Management A Literature reviews

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Introduction

Hemorrhoids remains the major problem in adult, though the incidence is difficult to be found accurately as mostly those with this kind of a disease were not expressed properly. The other reason is there are so many non-medical services in Indonesia involved in the treatment, particularly the alternative medicine. In gastro-intestinal clinic of dr. Cipto Mangunkusumo hospital there were 150 patients treated annually during period of 2005–2010. The majority of chief complain found was the bloody defecation, particularly in second and third degree internal hemorrhoids. Male and female were found equal in the second to fifth decade of life.

Anatomical consideration of anal canal and the shifted paradigm of hemorrhoids is somehow brought the impacts to the management which is changed to the comprehensive one. The role of anal cushion during defecation, continence, and tight anal closure let hemorrhoidectomy as a former operative treatment of choice is left behind and replaced by hemorrhoidopexy, a procedure of which the anal cushion is preserved. Recent knowledge of the involvement of vascular plexus and smooth muscle let these remedies works on the vessels as well as muscular system and fibrous tissue takes place rationally in the management of hemorrhoids.

However, anatomical consideration, physiology of anal canal and the risk factors that induced hemorrhoids despite degree of hemorrhoids were noted as the factor should be considered to the success of treatment. Patients' expectation, compliance and social environment were also influence factors to be considered in setting the combination of appropriate treatment. High fiber containing diet, enough water consumption and defecation habit are essential to a treatment that might be combined with invasive surgery to treat internal hemorrhoids of 3rd and 4th degree.

Hemorrhoids

Hemorrhoids is an abnormal protrusion of anal cushion representing pathologic condition characterized by anal bleeding and prolapse of anal lumps; consist of anatomical-, physiological changes, and clinical manifestations of such changes. Anal cushion is a kind of meshwork in sub epithelial space surrounding anal canal consist of mucosa,

submucosa, fibro-elastic tissue, vascular plexus and smooth muscle which is fixed to anal sphincter by Treitz and Park ligaments.

The terminology of hemorrhoid is Greek origin *haem* (blood) and *rhoos* means flow, in accordance to former definition was dilated anal vein/varices. In American and English literature known as piles comes from Latin *pila* means lump. Thus, as there any manifestation of anal bleeding during defecation then such a condition diagnosed as hemorrhoids, while there's only manifested as a lump then the diagnosis refereed to piles.

Another attribute to hemorrhoids in different language were always contribute to vascular existence and its flow; in Italy (Galen) called *profluvio disangue*, in French called *flux d'or* (flow of gold), in Germany called *goldene ader* = golden vein, in Deutch called *ambeijen*, and Hindi called *wasir*.

Anatomy of anal canal

Investigation of fetal anal canal shows mucosal and submucosal protrusion above the dentate line folds constructing anal cushion. This indicates that such a structure developed in embryo. Anal cushion lies in left lateral, right posterior and right anterior, for clinical purposed known as 3, 7 and 11 o'clock position. It covered by rectal mucosa with afferent nerve supply. The submucosa between epithelia and internal sphincter consists of vascular network, muscular and supporting tissue. Contraction of longitudinal muscle during defecation let the anal cushion or proximal anal canal retracted cranially while distal everted.

The theory of hemorrhoids

There are theories describing hemorrhoid. 1) Varicose vein and portal hypertension. John Hunter (1848) in accordance to Hunterian Museum Descriptive Catalogue found that hemorrhoids found secondary to dilated veins as the impact of increased the pressure of local veins in addition to local defect of veins wall. Increased pressure of the local vein found as impairment or absence of valves in portal vein and its branches which related to vein system in anal canal. Any defect of portal vein lead to stagnation of flow in hemorrhoid plexus.

2) Vascular hyperplasia. This explain that the anal protrusion as the results of tissue metaplasia. According to Virchow and Allingham, hemorrhoids indeed is a hemangioma as there is a similarity to

cavernous hemangioma. 3) Prolapse of anal cushion. Anal cushion protruded due to degenerated supporting tissue of anal canal. Study showed fragmentation of supporting tissue let the anal cushion prolapsed permanently or temporarily which is might be reduced manually. The submucosal smooth muscle which is supporting tissue prevents the anal cushion prolapse. Such a theory described is held nowadays as the rationale for the current treatment

The pathophysiology of hemorrhoids

There are factors plays an important role in the development of hemorrhoids. First, the mechanical property. Any weakness of supporting tissue and the fixing ligament of anal cushion let the anal cushion prolapsed during straining a defecation with hard stool. A habit in defecation in sitting position plays an important role in the development of hemorrhoids, as the rectal axis positioned with the load focused on anus. Subsequently, such a prolapsed anal cushion could not be reduced spontaneously, but manually. The second one is hemodynamic property. Venous back flow due to occluded anastomosis of arteriovenous lead to the swelling and thickening as well as enlarging anal cushion let it prolapse which could not be reduced as there's tight anal sphincter pinching. These factors found in conformity with one dominant. Internal hemorrhoid found as the combination of defecation of hard stool and damage of anal cushion which is a kind of supporting tissue degeneration. Such a damage let the blood flow in hemorrhoid plexus stagnated and further edema lead to enlarged anal cushion. A condition let the cushion prolapsed permanently or manifest as anal bleeding as the area found to be irritable. The stasis of vascular flow lead to marginalization of leucocytes which is then adhered to the endothelium and followed by releases of inflammatory mediator such as prostaglandin and free radicals, increasing capillary permeability, endothelial fragility, and the last, necrosis of vascular wall.^{1,3}

Pathogenesis of hemorrhoids

Pathogenesis of hemorrhoids referred to be multifactorial. Many factors influencing are diet and dietary habits, tonicity of anal sphincter, hard feces mass, straining, gestation and toileting in sitting position. These factors lead to disruption of back flow followed by edema and protrusion of anal cushion, decreased of sphincter tone that aggravate the prolapsed cushion manifested in lump and or anal bleeding.

Diagnosis

Internal hemorrhoids in many occasions were easily diagnosed based on clinical findings, either lumps or protrusion, and anal bleeding. This was found to be inaccurate since anal bleeding might reflect many other entities in colorectal region. There should be steps to be followed to build the diagnosis and excluding the differential diagnosis in the same time. Thus, internal hemorrhoids should be diagnosed based on a clear visualization of the examiner, but not through palpation or digital rectal exam. History taking is addressed to find other clinical finding that might be found coincided. Valuable information should be found in detail including the characteristic of blood (fresh blood, drips following a defecation) in addition to painful sensation (source, duration, prior to- or, following defecation). Patient's expectation should also be resumed as the judgement for selection of a treatment. External hemorrhoids usually represent mild to severe pain in varies, as the skin distended due to thrombosis and related to excessive physical activity, straining, diarrhea, or changes in diet. Reduced pain in 5–7 days found to be correlated with the resolution of thrombosis. External thrombosis might

be followed with skin erosion resulted in bleeding. The recurrence found in the same location is found as much 40–50%.⁸

The most important thing to be noted as the majority complain was bleeding following defecation. Dripping fresh blood solely from stool referred to the characteristic of hemorrhoids. One should remember that in 4th degree the fresh blood characterized hemorrhoids is absent in most cases. This was found to be correlated to the thickening and fibrotic mucosa. Any blood found beyond defecation usually has no relationship to hemorrhoids. Another common complain following hemorrhoids was anal prolapse, which experienced as lumps moving out anal canal during defecation that might or might not be reduced. Other companions found with hemorrhoids were, perianal mucus, pruritus, soiling surround anus, and anemia.

In physical examination, it found the patient remain in a good condition or anemic in chronic type. Visual inspection of anal region showing dermatitis which is usually due to application of antiseptic and any other anesthetic remedies, surface transudation, mucus and blood might be the clue for inflammatory bowel disease (such as Crohn's and colitis), venereal disease, or fistula. Any abnormal findings might be found is abnormal skin, skin tags, sinus and fistula or fissure.

Digital rectal exam is an important procedure to be provided in hemorrhoids, is not addressed to confirm hemorrhoids but to the way find out another entity. Such a procedure found were very helpful to find any complication of hemorrhoids such as thrombosis or any other abnormality in perianal area. Patient is instructed to strain prior to the procedure, let the prolapsed anal cushion clearly represented. With this kind of maneuver, internal hemorrhoids of second grade will be clearly visualized. Further step is assessing anal sphincter tone, rectal mucosa, ampulla, and prostate in male or cervix in female. Hypertonic anal sphincter indicates spasm that might be found in existence of anal fissure. One should note that digital rectal exam should not be carried out where there is pain as found to be the issue in 3rd and 4th degree. In clinical practice, the procedure is done in left lateral decubitus or Sim's position, which is comfortable to the patient, in addition, the examiner requires no special bed such as for lithotomy position. The knee chest position seems to be the best position to exam anal canal as well as rectum, although such a position unlikely the suitable position for the patient particularly in female, and for the examiner. The procedure in those positions described is carried out using anal scope.

Anoscopy and proctoscopy. The procedures are addressed to explore the mucosa starts from anal canal to rectum, including the structure of mucosa and dentate line. Through the procedure, diagnosis is to be made particularly in those with no prolapse as this procedure provide a good visualization of anal cushion in the anal canal.

Sigmoidoscopy. There are two types of sigmoidoscopy available, i.e. rigid- and flexible type. The procedure is carried out by inserting the instrument through anus, right to the rectum and sigmoid (more less about 25 cm from anocutaneous line run to the sigmoid). With the use of such device, differential diagnosis is easily excluded, for instance, source of bleeding.

The management

The management of hemorrhoids referred to its classification, one should note that this referral is not absolute. Some considerations should

be kept in mind in selection of therapy in addition to its grading, i.e. the natural of disease (acute or chronic), facility, and certainly the capability of the surgeon. An important issue is patients' expectation that should always be obtained prior to the management. First, systemic treatment (high water consumption and high fiber diet) commencing the management of 1st to 4th degree hemorrhoids which is addressed to softening the feces let no strain during defecation. Second, evading the risk factors, including toilet sitting retraining. Third, local treatment in accordance to grades using local and systemic medical treatment to provide vasoconstriction, control of inflammation, treatment of vascular permeability/fragility and to improve contraction of muscular system of anal cushion property. In chronic type, invasive or surgical treatment might be required. Some considerations in selection of surgical treatment. In fertile women, gestation referred to main causative of hemorrhoids. The use of oral contraception is somehow showing correlation to the incidence of hemorrhoids. Thus, hemorrhoidectomy absolutely is contra indicated in gestation and post delivery period. The anal sphincter in elderly is weakening. Hemorrhoidectomy in these ages leading to high incidence of incontinence. Hemorrhoidectomy in patient with Crohn and colitis particularly in anorectal is followed by the high incidence of post-operative complication. Those with immune deficiency leading to delayed healing and perianal fistula. However, surgical treatment should be reconsidered in those with mental disorder.

1) Non-operative treatment.

Nowadays there's a shift of paradigm in the management of hemorrhoids to minimal intervention which is less severe than surgery. Patient with acute internal hemorrhoids can be managed properly in day

clinic with rubber-band ligation, sclerotherapy injection, infrared photocoagulation, cryosurgery, laser surgery and trans anal hemorrhoidal dearterialization.

2) Surgical management of hemorrhoids is described as follows.

a) Minimal intervention

Rubber-band ligation is a most clinical intervention used in management of internal hemorrhoids for its simplicity and efficacy. Such a technique is carried out with no sedation in clinic using simple instruments such as ligature and anoscope. As hemorrhoids identified, through anoscope a bander is inserted and directed to apex of hemorrhoids (fig 1). The hemorrhoid is then ligated using rubber band (fig 2). Adequate ligation leading to ischemia and necrosis and the lump which is then detached in 5-7 days after ligation. There's remain a controversial regarding the number of ligations. Evaluation following a ligation should be provided in 2-3 weeks, should there the manifestation remains, then additional ligation is needed.¹⁹ Such a method is effective in 2nd and 3rd degree.

Some consideration should be noted is ligation should be placed in area covered by mucosa. Should the placement of ligation be too distal, incriminated skin that consist of somatic nerve will be found. This induces a painful sensation. For this reason, a ligation should be placed in the apical or slightly cranial. This procedure is contraindicated in those who consume anti-platelet drugs, prophylactic SBE, and those with immunodeficiency. Severe perineal sepsis has been reported as the complication.

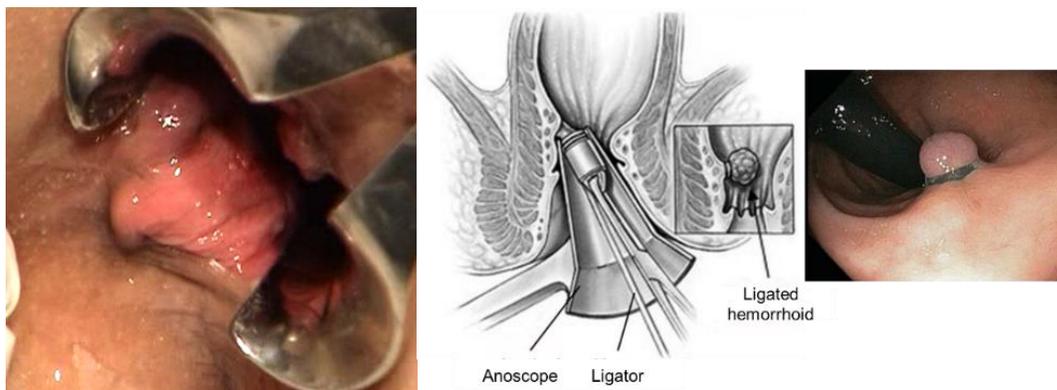


Fig. 1. Rubber-band ligation procedure. Left: prior to ligation procedure. Right: immediately following ligation.

b) Surgical treatment

The management of external hemorrhoids is depending on the nature of disease. Edematous tissue surrounding due to blood clots in inferior hemorrhoid plexus that induces moderate–severe pain. Should the clot be left in place unremoved, spontaneous extrusion through a thin skin will be noted; or seldom gradual resorption will be followed with by subsiding pain. This may leave the skin deformed and known as skin tag. Should the manifestation have solved, non–operative care including fecal softener and potent analgesic is the option. The manifestation usually disappeared in 5–7 days. Unsuccessful pain management using analgesics indicate the necessity a surgical excision to remove the clot, and the wound is left opened. Such a procedure is carried out under local anesthesia.¹⁹

In 3rd and 4th degree hemorrhoid, should conservative treatment be not effective, and recurrence is quite high, a surgical procedure is the best choice. Conventional hemorrhoidectomy is effective to reduce the symptoms and remove the component of hemorrhoids. The problems encountered following this conventional procedure is frequently found, such as pain, bleeding, anal stenosis, incontinence and soiling.¹¹ This is the reason why conventional hemorrhoidectomy is left behind and replaced by hemorrhoidopexy. There are number of surgical management of hemorrhoids. a) Open surgery, i.e. technique of Milligan–Morgan, technique of Parks, technique of Ferguson, and technique of Fansler Arnold. b) Hemorrhoidopexy with stapler (Longo PPH)(PPH: procedure for prolapse and hemorrhoids). Contra indication: surgical manipulation is not a choice of treatment in gestation and post delivery period. Indication for surgery of hemorrhoids consists of 1. Hemorrhoids of 3rd and 4th degree, either internal or external or combination. 2. Prolapsed and thrombosis in hemorrhoids. 3. Failed in clinical procedure. And 4. Hemorrhoids with comorbid.

The gold standard in hemorrhoidectomy is 1. Technique of Milligan–Morgan (open method). 2. Technique of hemorrhoidectomy Ferguson (closed method). 3. Other technique such as Fansler, Parks, Whitehead, electrocautery, ligature, and harmonic scalpel.

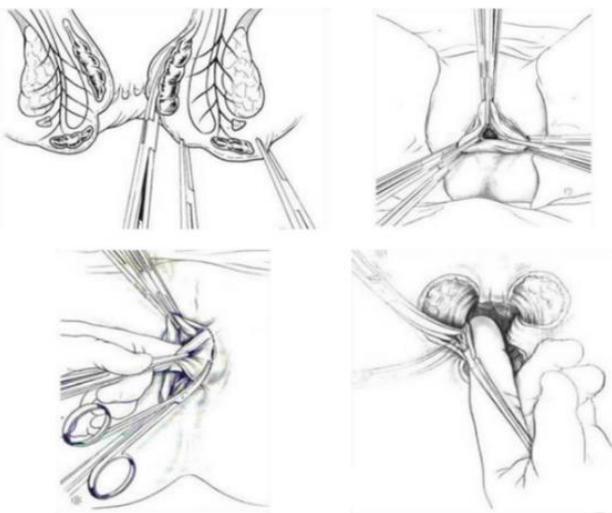


Fig. 2. Hemorrhoidectomy proposed by Milligan–Morgan

Hemorrhoidectomy is a surgical procedure realized to be followed by complications following surgery. Surgical treatment of hemorrhoids is carried out in those with prolapsed hemorrhoids, consists of excision and ligation. The most popular technique is one proposed by Milligan–Morgan. Modification to this procedure is diathermia excision with no ligation, additional lateral and internal sphincterotomy.^{6,7}

Trans anal circular stapling. This procedure is addressed to remove redundant rectal mucosa (prolapsed hemorrhoids). Such a procedure reduces prolapsed mucosa and preserved normal anatomical structure between anal mucosa of hemorrhoids and anal sphincter. The merit of stapler compared to conventional hemorrhoidectomy is significant pain management postoperatively lead the patient back to normal daily activity shortly.^{6,7}

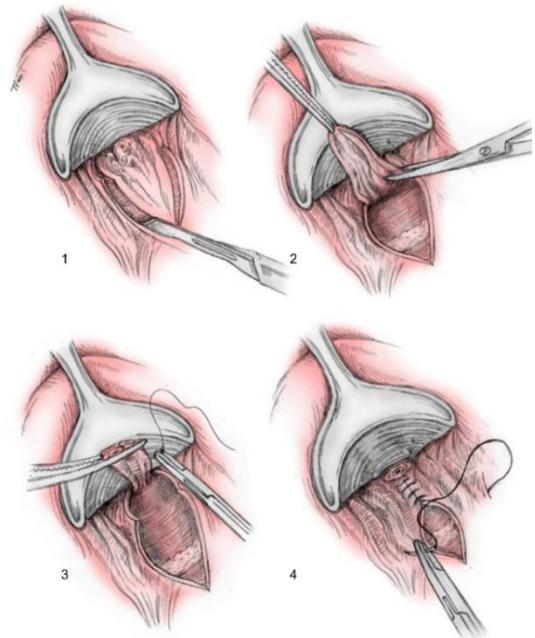


Fig. 3. Hemorrhoidectomy proposed by Ferguson

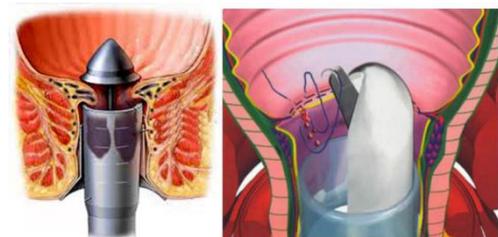


Fig. 4. Hemorrhoidectomy with stapler

Hemorrhoidopexy of Longo. Such a procedure using stapler is proposed by Antonio Longo from University of Palermo, Italy in 1998. The procedure is addressed to reduce the symptoms by strategy

to reconstruct anatomical and physiologically without radical removal of hemorrhoid plexus.^{12,20} The technique reduces the extended of prolapse by mucosal removal circumferentially from proximal anus. This will affect in retracted anal cushion back to its anatomical position.^{11,20}

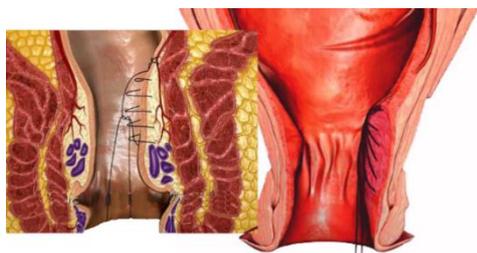


Fig. 5. Hemorrhoidopexy (i.e. the procedure for prolapsed and hemorrhoids, PPH)

The procedure attributed to procedure for prolapse and hemorrhoids (PPH). Other attributes to this procedure are, mechanical hemorrhoidectomy with circular stapler, hemorrhoidopexy with circular stapler, circular mucosectomy with stapler, and anopexy with stapler.¹³ This technique quite different to any other surgical techniques since a technique merely remove the prolapsed mucosa and the hemorrhoids is fixed at the level of anorectal ring.^{13,20} The indication of hemorrhoidopexy is those with 3rd degree and mucosal prolapse. The contra indication is those with solely one prolapsed, severe case with fibrosis of anal cushion let it unable to be repositioned.¹¹ The advantage of a technique is less pain and complication with shorter length of stay, short recovery, and also provide a better compliance.^{17,14,16,12,20} Studies showed that hemorrhoidopexy is followed by lower risk of recurrence, less pain, shorter length of stay. This might be applied in reduction of prolapsed hemorrhoids.^{14,12,16,17,15,20}

The postoperative complications have been reported are urine retention, postoperative bleeding, and PPH syndrome (inflammation of internal sphincter).¹¹ Several complications of hemorrhoidectomy are reported, i.e. 1) Post-operative pain. Conventional excision induces severe pain in many cases. This was found to have correlation with the excessive use of diathermy in excision of hemorrhoids. Diathermy followed by damaged nerve ends as those found in burn injured of the 3rd degree. The advantage of a technique is a good hemostasis let a clear visualization and anal sphincter preservation may be preceded during surgery. Delayed pain might be found in the earlier week postoperatively. Analgesics, laxative, and sit bathing usually effective to control the pain. Studies showed that hemorrhoidectomy with stapler is followed by lower incidence of post-operative pain. 2) Incontinence. Distended rectal due to accumulated fecal mass as the patient evading painful defecation. To this incontinence, fleet enema and analgesic were very helpful. 3) Post-operative bleeding. It found in first 24 hours following surgery and usually caused by inadequate hemostasis procedure. Secondary bleeding in 7–14 postoperative days, usually caused by wound dehiscence during hard defecation. MPFF effective as it increases venous return and improves vascular fragility that stabilizes mucosa, thus administration of MPFF effectively prevents postoperative bleeding. Other option is administration of adrenalin of 1/10.000 submucosa through proctoscopy. 4) Anal stricture. This is a seldom manifestation following hemorrhoidectomy. Anal stricture found as there's excessive perianal skin removed intraoperatively. 5) Skin tag. Such a manifestation is seldom requiring surgical excision. 6) Sepsis. The risk of portal pyemia following hemorrhoidectomy is quite minimal and infrequently lead to clinical problem. 7) Recurrence.

The recurrence of hemorrhoids following conventional hemorrhoidectomy has been reported as much as 5%. Studies are focused now on hemorrhoidectomy with staples.⁹

Hemorrhoid and gestation

During gestation, veins of internal—and external hemorrhoids loaded to extra pressure thus induces the symptoms varies from anal inconvenient to anal bleeding this frequently found during 3rd trimester of gestation. A total of 20–35% female in gestation have hemorrhoids (mother risk), and merely found during gestation which is healed spontaneously post-delivery period. Many factors responsible to these veins extra load during gestation, i.e. fetal growth and uterus depressing veins of lower pelvic, hormonal changes dilating hemorrhoids veins, repetitive constipation during gestation, and high pressure of veins during laboring.¹⁸

The treatment is focused to reduce the symptoms, reduce the pressure of hemorrhoids veins with high fiber diet. There's a simple and practice treatment with ice pack applied to external hemorrhoids 3–4 times daily for 15 minutes, bathing with warmed water 4–5 times daily for 20–30 minutes. And others are remedies to soften the feces, topical cream to treat itching and pain. However, should surgical intervention be required, rubber-band ligation is the acceptable choice of surgical treatment that recommended for 2nd and 3rd degree hemorrhoids.¹⁸

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