HEMORRHOIDS: PATHOPHYSIOLOGY PREVENTION AND TREATMENT

Abstract

The term "hemorrhoid" comes from the Greek terms "hema" and "rhoos," both of which refer to blood flow. The most frequent reason for lower gastrointestinal bleeding is hemorrhoids. Both internal and external hemorrhoids can occur. Internal hemorrhoids are situated inside the rectum are painless and usually unnoticeable. Hemorrhoids are an orectal ailment that affects More frequently found in individuals between the ages of 45 and 65, it affects 4.4% of the world's population. The venous plexuses in the anal canal swell up in hemorrhoids. It may result in discomfort, prolapse, thrombosis, and bleeding. The term "piles" is another term for hemorrhoids. The rectum is generally insensate because it stretches using the Columnar epithelial mucosa lines the distal sigmoid colon, which leads to the anus, and is sympathetic and parasympathetic nervous systems that innervate. The hypogastric system serves as its vascular and lymphatic supply. Hemorrhoids Anal cushions in patients exhibit significant pathological changes. These modifications include rupture, anal subepithelial muscle deformation, fibroelastic tissue degeneration, abnormal venous dilatation, and vascular thrombosis. In addition to the abovementioned observations, Hemorrhoidal samples have demonstrated a significant an inflammatory response including the vascular wall and connective tissue around it, concomitant thrombosis, ischemia, and mucosal ulcers. The haemorrhoids can be managed by dietary and lifestyle management, medical treatment, non-operative treatments, operative treatments and Herbal remedies.

Keywords- Hemorrhoid, Anatomy, Pathophysiology, Diagnosis, Prevention, Treatment

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I. INTRODUCTION

The typical anal cushions are symptomatically enlarged and displaced distally in hemorrhoids. Hemorrhoid (1) are the most typical indication of rectal bleeding during bowel movements. Hemorrhoids, commonly known as hemorrhoids disease or just hemorrhoids, are a common rectal condition brought on by swell and repositioning of the anal cushions downward. The physiopathology of hemorrhoids comprises overdistribution of the hemorrhoid complex, anal cushion degeneration, and vascular hyperplasia(2). The term "hemorrhoid" comes from the Greek terms "hema" and "rhoos," both of which refer to blood flow(3). The most frequent reason for lower gastrointestinal bleeding is hemorrhoids. Both internal and external hemorrhoids can occur. Internal hemorrhoids are situated inside the rectum are painless and usually unnoticeable. It hurts and tends to bleed if the external hemorrhoid is situated in the anus, which is home to numerous pain-sensing nerves(4). They are a serious medical and financial problem that millions of individuals throughout the world must deal with. Numerous disorders, Constipation and extended straining have both been linked to hemorrhoidal development. Abnormal vascular channel dilatation and distortion along with deteriorating changes within the connective tissue supporting the anal cushion are significant the symptoms of hemorrhoidal illness (5). Vascular hyperplasia in addition to an inflammatory response (6). Hemorrhoids are anorectal ailment that affects More frequently found in individuals between the ages of 45 and 65, it affects 4.4% of the world's population. Research reveals that 5–10% of people with hemorrhoids are hesitant to receive traditional treatment. Constipation, diarrhoea, alcohol use, ageing, low-fiber diets, spicy diets, and constant straining are risk factors linked to changes in the pathophysiological status of anal hemorrhoids. Swelling, irritation, bleeding, and itching are some of the more noticeable symptoms of hemorrhoids (7).

The venous plexuses in the anal canal swell up in hemorrhoids. It may result in discomfort, prolapse, thrombosis, and bleeding. The term "piles" is another term for hemorrhoids. Since ancient times, mankind has been aware of them. Hemorrhoids develop as a result of the blood vessels close to the rectum and anus expanding. Hemorrhoids can be caused by veins that are frequently affected, and these veins are typically found in the lower anus and rectum. Hemorrhoids develop whenever these walls veins become thin and strained as a result of swelling and frequent passage of hard faeces. Hemorrhoids are said to have the potential to harm practically everybody. It is very typical(8). Many patients with hemorrhoids or piles delay seeking medical attention after the onset of their symptoms. This inclination can result from the sickness that affects the anal area, where They are embarrassed to seek medical attention. Others could decide from visiting the hospital for financial reasons(1).

II. ANATOMY

The rectum is generally insensate because it stretches using the Columnar epithelial mucosa lines the distal sigmoid colon, which leads to the anus, and is sympathetic and parasympathetic nervous systems that innervate. The hypogastric system serves as its vascular and lymphatic supply. Near the proximal side of the levator-sphincteric complex, which is the anal canal about 4 cm long, reaches beyond the anall margin to confluence through the rectum. The anus, unlike the Anoderm lines the rectum, a sensitive and modified an squamous epithelium that is fed by the inferior hemorrhoidal system and is densely innervated with somatic sensory nerves(9).

The dentate line, which normally sits 3 cm above the anal margin, is where the squamous anoderm meets the columnar mucosa (10). When thinking about hemorrhoids' treatment, the dentate line serves as the primary anatomic reference point. Hemorrhoidal cushions on the exterior are positioned from the distal dentate line, while internal Immediately adjacent to it, hemorrhoids are cushions of fibrovascular tissue. When used in this context, the term "external" does not refer to something that is rather than inside the anal canal something that is external hemorrhoids may exist inside the anal edge distal to the dentate line. (Figure 1).

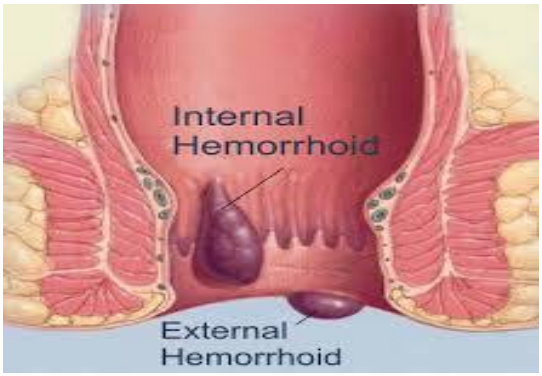

Figure 1: Representation of Normal Anorectum

Even though there frequently anatomic variants of this set-up, "cushions" are commonly present between the right anterior and right posterior on the left side. places where the mucous membrane in the vicinity within the anal canal developed a thicker tissue that is present in patches. Although There is a little connectivity additionally with the inferior hemorrhoidal arteries, superior hemorrhoidal artery, intermediate hemorrhoidal arteries, and their branches provide the majority of the blood supply for these cushions. The superior, middle, and inferior hemorrhoidal veins facilitate venous drainage, making it possible for systemic circulations and the portal to communicate. For these reasons, these veins develop direct arteriovenous connections within the cushions, blood loss from hemorrhoids is arterial, not venous. (11).

These cushions' submucosal layer is rich in muscular fibres that come from both the conjoined longitudinal muscle and the internal sphincter in addition to the aforementioned veins. The muscularis submucosae, a type of muscle fibre, aid in keeping these tissues adhered to the internal sphincter beneath. (9),(12). Using this supporting tissue degrade or deteriorate over time, ageing, beginning early in life, perhaps in the second or third decade, causing venous distention, erosion, and distal cushion displacement, thrombosis and haemorrhage, as well as allowing for prolapse of tissue (11). With a 15%–20% contribution to the anal verge's resting pressure, hemorrhoidal cushions are thought to be crucial for maintaining rectal continence. In addition to completely closing anal entrance, they help preserve the defecation's sphincter mechanism, especially while performing a Valsalva manoeuvre(5).

III. PATHOPHYSIOLOGY

Uncertainty surrounds the precise pathophysiology of hemorrhoidal development. The popular varicose vein theory, which claimed that hemorrhoids were brought on resulting from varicose veins in the anal canal, is no longer valid because it has been established that anorectal varices and hemorrhoids are two different conditions. In actuality, people with varices and portal hypertension do not experience a higher incidence of hemorrhoids(1). The theory of the sliding anal canal lining is now widely accepted (Thomson, 1975). This suggests that hemorrhoids form as soon as the anal cushions supporting tissues deteriorate or degrade. Therefore, the medical term for the aberrant the venous dilatation caused by the anal cushions being moved downward hemorrhoids. There are typically three principal anal cushions in the anal canal: right anterior, right posterior, and left lateral, with varying numbers of lesser cushions positioned in between(11). Hemorrhoids Anal cushions in patients exhibit significant pathological changes. These modifications include rupture, anal subepithelial muscle deformation, fibroelastic tissue degeneration, abnormal venous dilatation, and vascular thrombosis. In addition to the abovementioned observations, Hemorrhoidal samples have demonstrated a significant an inflammatory response including the vascular wall and connective tissue around it, concomitant thrombosis, ischemia, and mucosal ulcers (6).

The Goligher classification scheme for hemorrhoids is the most popular one. Internal hemorrhoids are further categorised according to the prolapse degree in Goligher's classification: Hemorrhoids are divided into four grades 1st grade, which are bleeding but nonprolapsing hemorrhoids; Grade II, which decensus upon strained but spontaneously abbreviate; Grade III, which prolapse, but manual reduction is necessary; and Grade IV, which are irreducibly prolapsing hemorrhoids.7 Among the problems with Goligher's categorization is that simple irreducible hemorrhoids and acutely thrombosed, imprisoned internal hemorrhoids, as well as thrombosed and in prison hemorrhoids circumferential rectal mucosal prolapse is among them. also labelled as fourth-degree hemorrhoids(14).

IV. PATHOGENESIS OF HAEMORRHOIDS

Hemorrhoids are said to have a complex pathogenesis. Diet and eating habits, the tone of the anal sphincter, the amount of hard faeces, straining, gestation, and using the restroom while seated are among the many factors that might affect this. These causes cause the anal cushion to protrude and edematize, and they decrease sphincter tone, aggravating the prolapsed cushion and causing lumps and/or anal haemorrhage(15).

V. DIAGNOSIS OF HAEMORRHOID

Patients who experience hemorrhoids typically describe painless rectal bleeding along with bowel movements as blood dripping into the toilet bowl. due to the direct arteriovenous nature of hemorrhoidal tissue connection, the blood is often bright crimson. If bleeding is present unusual for hemorrhoids, there is having no bleeding source visible when the patient has substantial risk factors for colorectal neoplasia, on anorectal examination, or both, it is important to wait to diagnose hemorrhoids when there is positive faecal occult blood or anaemia(16). Due to mucous production or faecal soiling, prolapsing hemorrhoids can produce perineal irritation or anal itching. In patients with big hemorrhoids, a sense of inadequate evacuation or rectal fullness is also noted. Hemorrhoids rarely produce pain

unless thrombosis has developed, especially in an external hemorrhoid or if a fourth-degree internal hemorrhoid strangulates. In patients with hemorrhoids, anal fissure and perianal abscess are the more frequent causes of anal pain. (1). A complete clinical assessment and a clear patient background are the foundation for the diagnosis of hemorrhoidal illness. The evaluation should include a digital examination and a left lateral anoscopy. Anal skin tags, external hemorrhoids, perianal dermatitis brought on by anal discharge or faeces, and anorectal fistulas, and anal fissure should all be checked for in the perianal area. Some doctors advise patients to sit and squat while straining to look due to the prolapse. Digital examination can detect abnormal anorectal masses, anal stenosis and scars, assess anal sphincter tone, and determine the status of prostatic hypertrophy, which may be the cause of straining as this worsens descent of the anal cushions during micturition even though internal hemorrhoids cannot be palpated. During anoscopy, the size, position, degree of bleeding, and hemorrhoidal irritation should all be documented. Additionally, transparent anoscopes with flexible endoscopes placed intrarectally provide for great visualisation of the anal canal and hemorrhoids and allow for the taking of photos.(17).

VI. MANAGEMENT OF HEMORRHOID

According to the level and intensity for signs, therapeutic therapy for hemorrhoids can include dietary and lifestyle changes change to extreme surgery.

1. **Dietary and Lifestyle Modification:** Increasing fibre intake or including more bulk during a diet may assist prevent since passing firm stool on the anal mucosa, straining throughout bowel movements might damage the anal cushions and result in symptomatic hemorrhoids. Fibre supplementation didn't relieve on clinical testing, prolapse, discomfort, or itching symptoms of hemorrhoids, although they did lessen the possibility of bleeding and lingering indications of about 50%. Therefore, fibre supplements are thought to work well as a non-prolapsing therapy. hemorrhoids; but it can take up to 6 weeks before there is a discernible change. become apparent. Fibre supplements continue to be an essential component of a regimen and both the initial therapy after various therapeutic methods for hemorrhoids since they are affordable and safe(18). Patient with hemorrhoids should be of any severity counselled to alter their way of life as part of their treatment and as a defensive tactic. These modifications include increasing dietary fibre and oral fluid consumption, reducing fat intake, and engaging in regular exercise., enhancing maintaining good oral hygiene, refraining from reading or straining while using the restroom, and avoiding medicines that promote constipation or diarrhoea.

2. **Medical Treatment:** Oral flavonoids: These venotonic substances were initially discussed as a means of treating edoema and a persistent vein problem. They seemed to have anti-inflammatory properties as well as the ability to improve lymphatic drainage, raise vascular tone, lower venous capacity, and reduce capillary permeability. They are used as an oral drug, primarily in Europe and Asia, to cure hemorrhoids even though he clinical therapy precise mode of action is still a mystery. The most prevalent flavonoid utilised in clinical therapy is 90% of the micronized purified flavonoid fraction (MPFF) is diosmin, and 10% is hesperidin. Drugs that have been micronized to particles smaller than 2 m have better solubility and absorption as well as a quicker action starts. In an updated meta-analysis of 14 randomised studies involving 1514 patients, flavonoids were found to reduce the chance of a 67% blood loss chronic irritation by 35% and pain by 65% as well as the recurrence rate by 47%. According to some researchers, MPFF can

lessen rectal pain, uncomfortableness, and subsequent bleeding after hemorrhoidectomy (19).

3. **Oral Calcium Dobesilate:** Another venotonic medication, this one is frequently used the management of acute hemorrhoid symptoms along with persistent venous insufficiency and diabetic retinopathy. Calcium dobesilate was shown to reduce capillary permeability, prevent platelet aggregation, and increase blood viscosity, all of which reduced tissue edoema. In a clinical trial for hemorrhoid treatment, calcium dobesilate combined with a fibre supplement effectively reduced acute bleeding symptoms and was linked to a significant reduction in hemorrhoid inflammation (20).

4. **Topical Treatment:** There are numerous topical treatments available, such as creams and suppositories, and the majority of them can be purchased without using a prescription. However, there isn't enough convincing evidence to back up these medications' actual efficacy. Different chemicals, including local anaesthetic, may be present in these topical treatments., cortisone, and steroid hormones (21) revealed a successful outcome when Low-grade hemorrhoids and high resting anal canal pressures in people received 0.2% glyceryl trinitrate topical ointment to treat their symptoms of hemorrhoids. However, 43% of the patients complained of headaches while receiving care. reported that nifedipine ointment applied locally to treat acutely thrombosed external hemorrhoids had good effectiveness. It is important to keep in mind that the calcium channel blockers and nitrite applied topically may have a more relaxing effect on the internal anal sphincter than on the hemorrhoid tissue itself, which would be expected to have a more vasodilator effect.

   Some topical treatments, like Preparation-H® (Pfizer, USA), which has 0.25% phenylephrine, petrolatum, light mineral oil, and shark liver oil, target vascular channels within experience vasoconstriction hemorrhoids in addition to topical medications that affect the internal anal sphincter's tone. While the other chemicals are thought of as protectants, phenylephrine is a vasoconstrictor with a selective vasopressor impact the location of arterial circulation. Numerous types of Preparation-H are offered, including suppositories, medicated and travel-size wipes, ointments, creams, gels, and wipes. It temporarily relieves acute hemorrhoid symptoms including bleeding and pain when urinating (22).

5. **Non-Operative Treatment**

   - **Sclerotherapy:** Right now, it is recommended to use this therapeutic approach for first- and second-degree haemorrhoids. Chemical agents are injected with the intention of causing fibrosis, which will Mucosa must be fixed to the underlying muscle. Quinine, urea hydrochloride, vegetable oil, 5% phenol in oil, and hypertonic salt solution are the solutions that are employed. Injection must not be injected directly into the hemorrhoidal tissue itself but rather into the submucosa at its base. in order to avoid causing upper abdominal and precordial pain right away. In addition to mucosal ulceration or necrosis, misplacing the injection can lead to unusual septic consequences such as retroperitoneal sepsis and prostatic abscess. Antibiotic prophylaxis is indicated for people with predisposed valvular heart disease or immunodeficiency due to the possibility of bacteremia during sclerotherapy. (23).

- **Rubber band ligation:** Hemorrhoids in the first and second degrees, as well as certain patients with third-degree haemorrhoids, can be effectively treated by ligating rubber bands (RBL). Rubber band Scarring and ischemic necrosis are the outcomes of ligating the hemorrhoidal tissue, which fixates the connective tissue to the rectal wall. Because somatic nerve afferents, are present, placing a rubber band too close to the dentate line may result in significant pain and needs to be removed right once. The many commercially available tools, such as the haemorrhoid ligator rectoscope and endoscopic To make the treatment a one-person job, the ligator uses suction to suck the extra tissue into the applicator., RBL can be safely accomplished in one or more locations within one sitting (24). Most frequent RBL the result is pain or discomfort in the lower abdomen, which is typically treated with warm sitz baths, mild analgesics, and avoiding firm stools with the use of gentle laxatives or bulk-forming medications. Urinary retention, thrombosed external hemorrhoids, mild bleeding from mucosal ulceration, and pelvic sepsis are a few other concerns. Anticoagulants should be stopped by the patients two weeks prior to and one week after RBL.

- **Infrared Coagulation:** The hemorrhoid mass contracts as a result of the infrared coagulator's production of Infrared radiation causes tissue to clot and evaporates liquid in cells. Depending on strength and wavelength of coagulator, probe is inserted into hemorrhoid base using the anoscope. Between 1.0 and 1.5 seconds is the suggested contact time. After the operation, the dead tissue appears such as a white dot and subsequently is healed by fibrosis. Less procedure is required for infrared coagulation (IRC). than sclerotherapy and does not have the same risks associated with improper sclerosing injection. IRC is a quick and safe operation, although it may not be appropriate for huge hemorrhoids that are prolapsing(25).

- **Radiofrequency Ablation:** A recent method of treating hemorrhoids is radiofrequency ablation (RFA). On the hemorrhoidal tissue, a round electrode attached to radiofrequency generator induces contacting tissue to clot and evaporate. By using this technique, hemorrhoidal vascular components are decreased, and subsequent fibrosis will fix the hemorrhoidal mass to the supporting tissue. A RFA may carried out as outpatient procedure using an anoscope, just like sclerotherapy. Acute urine thrombosis in the perianal vein, wound infection, and retention are some of its side effects. RFA is relatively easy technique, however it linked to higher likelihood prolapse and continually bleeding (26).

- **Cryotherapy:** The hemorrhoidal tissue is removed using cryotherapy and a freezing cryoprobe. due to the destruction of sensory nerve terminals at extremely less temperatures, it is said to reduce pain. But numerous clinical studies showed that it was linked to lingering discomfort, a discharge that smells bad, and significant incidence of chronic hmorrhoidal mass. Therefore, it is infrequently employed. Two meta-analyses are available that compare results of the three inoperative hemorrhoid treatments most frequently used (sclerotherapy, RBL, and IRC). These are two investigations showed RBL had lowest rate of retreatment and the fewest recurrent hemorrhoids symptoms, but it had a significantly greater frequency of postoperative discomfort. RBL could therefore be suggested as the initial inoperative option for treating grade I to III hemorrhoids. RBL was the most often performed procedure in a

more than 900 general and colorectal surgeons were surveyed in Britain, with sclerotherapy and hemorrhoidectomy coming in second and third (1).

6. Operative Treatment

- **Hemorrhoidectomy:** When compared to alternative treatment options, excisional hemorrhoidectomy has the lowest recurrence rate for haemorrhoids. Ligasure (Covidien, United States) and Harmonic scalpel (Ethicon Endosurgery, United States) are two examples of vascular-sealing instruments that can be used for the procedure. Excisional hemorrhoidectomy can be carried out successfully as an outpatient procedure with perioral anaesthesia infusion. Acute difficult hemorrhoids that are strangulated or thrombosed, patient choice, and concurrent surgically treatable anorectal diseases such anal fissure or fistula-in-ano are some of the indications for hemorrhoidectomy. Hemorrhoidectomy is typically recommended third or fourth-degree internal bleeding in the patients of hemorrhoids (27).

  Postoperative discomfort from hemorrhoidectomy is a significant disadvantage. Evidence suggests that Ligasure hemorrhoidectomy is superior to scissors or diathermy hemorrhoidectomy reduced postoperative complications discomfort, minimum hospital stays, quicker wound healing, and quicker recovery. Acute urinary retention (2%–36%), postoperative bleeding (0.03%–6%), bacteremia and septic complications (0.5%–5.5%), wound breakdown, unhealed wound, loss of anal sensation, mucosa prolapse, anal stricture (0%–6%), and even faecal incontinence (2%–12%), are all examples of complications that can occur after surgery are additional postoperative consequences. According to recent data, if there is no suspicion of cancer, hemorrhoidal specimens can skip pathological investigation.

- **Plication:** Without excision, plication can put anal cushions back in their proper place. The hemorrhoidal mass is oversewed during this technique, and the topmost vascular pedicle is tied with a knot. However, there are still a few possible side effects include bleeding and pelvic pain after this treatment.

7. Doppler-Guided Hemorrhoidal Artery Ligation: Hemorrhoidectomy Was Replaced In 1995 A Novel Procedure Based On Doppler-Guided closure of the superior hemorrhoidal artery's terminal branches. In Europe, Doppler-guided hemorrhoidal artery ligation (DGHAL) is a procedure that grown popularity. Later, the results of the vascular studies showed individuals with haemorrhoids having grown calibre The arterial blood flow of the superior rectal arteries' terminal branch, corroborated logic for this treatment. As a result, suture ligated vascular providing for hemorrhoidal tissue reduce hemorrhoidal symptoms. In the second- or third-degree hemorrhoids, DGHAL works well. It should be noted that DGHAL might not help prolapsing symptoms in severe hemorrhoids. DGHAL had similar short-term results and recurrence rates after a year to traditional hemorrhoidectomy. Further research on the long-term effects of DGHAL is needed due to the risk of revascularization and the recurrence of bothersome hemorrhoids (28).

8. Stapled Hemorrhoidopexy: Since 1998, stapled hemorrhoidopexy (SH) has been available. Hemorrhoids are resuspended back inside the anal canal after a ring of excess rectal mucosa is removed close by and secured using a circular stapling tool. Blood

supply is cut off to hemorrhoidal tissue in addition to lifting the prolapsing haemorrhoids. A new meta-analysis that included 27 patients compared the surgical outcomes of SH and hemorrhoidectomy. randomised, randomised tests and 2279 techniques, revealed it was SH linked to lower levels of previously, pain restoration bowel movement, minimum stay in hospital, quicker return to regular activities and quicker healing of wounds, and increasing the levels of patient satisfaction. However, over a more period of time, SH linked to a more prolapse rate. Those who have circumferential prolapsing hemorrhoids and having no more than three internal hemorrhoids lesions., SH is typically postponed due to the high recurrence risk, high stapling machine's price, and possibly severe side effects such constipation and rectovaginal fistula.

These two most recent surgical techniques, SH and DGHAL, work to realign anorectal mucosal prolapse and reduce blood circulation in the anal canal in order to treat hemorrhoids' pathogenesis. Both methods were found to be secure and efficient in a recent retrospective assessment of the Results of the DGHAL (n = 51) and SH (n = 63) studies at 18 months for grade III hemorrhoids. DGHAL had a lower a higher likelihood of recurrence and lower patient satisfaction, but it also had a shorter stay in the hospital and an earlier return to function. Recent research found comparable short-term and long-term effects for the two techniques in a limited prospective study contrasting DGHAL and SH for grade II–III hemorrhoids. However, those receiving DGHAL had a quicker return to work and experienced fewer complications than those taking SH (1).

9. **Medicinal Plants Used In Treatment On Hemorrhoid:** The following plants are being used traditionally for the treatment of hemorrhoids. Namely *Dolichandrone falcata*(7), *Aloe vera, Arum maculatum*(2), *Myrtus communis*(3), *Collinsonia canadensis, Ruscus aculeatus, Aesculus hippocastanum, , Arnica spp, Quercus spp. Hammamelis virginiana Matricaria recutita, Centella asiatica, Calendula officinalis, Plantago ovata, Terminalia chebula,* (29), *Aesculus hippocastanum* L., *Hamamelis virginiana* L., *Ruscus aculeatus* L. hemorrhoid treatment are discussed.

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