

Surgical management of hemorrhoids. State of the art



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Surgical management of hemorrhoids: state of the art

Most patients with hemorrhoidal disease may be treated conservatively. Along the years several surgical options have been proposed, including closed, open and semiclosed hemorrhoidectomy (HC), radiofrequency HC (LigaSure), piles' suture or Farag operation, manual and stapled haemorrhoidopexy (PPH) with or without excision of anal tags, doppler hemorrhoidal artery ligation with or without recto-anal mucopexy, ano-mucosal flap circumferential HC or Whitehead-Rand procedure. Randomized prospective trials and metanalyses have been carried out with the aim of finding the gold standard operation. When carried out for advanced disease, HC appears to be more effective than PPH, which achieves good results in third degree, but carries high reintervention rate in fourth degree piles. Almost all trials comparing open and closed HC show similar outcomes.

None of the costly innovations appears to be superior when compared with conventional procedures in terms of cure of the disease in the long term. PPH carries less postoperative pain and a shorter convalescence than HC. On the other hand, while carrying a higher rate of complications, it may be responsible of the so-called "PPH syndrome", consisting of proctalgia, tenesmus and urgency. Occasional recto-vaginal fistulas have been described after PPH, if not even of rectal perforation and other life-threatening complications. Postoperative pain is very rare after Doppler hemorrhoidal arteries ligation and may be reduced following HC using nitrate ointments and botulin toxin injection, aimed at releasing anal spasm after surgery, more safely than by an internal sphincterotomy. LigaSure HC decreases the risk of severe postoperative bleeding, which may be effectively treated by rectal balloon tamponade. Permanent and gross anal incontinence are unlikely to follow both HC and PPH. Most cases of anal stricture following HC may be treated by anal dilation. Societies' guidelines recommend a tailored surgery, i.e. the use of different procedures according to the grade of haemorrhoids, which suggests that patients should be operated by a specialist colorectal surgeon, able to perform different surgeries and to deal with complications and failures.

KEY WORDS: Hemorrhoids, Hemorrhoidectomy, Hemorrhoidopexy, Postoperative complications and recurrences.

Introduction

Hemorrhoidal disease, with an incidence of 4% of global population, is a common problem in the western world ¹. It can be successfully managed by means of

conservative measures, including fibres, sclerosing injection, rubber band ligation and infrared coagulation, in almost 90% of the cases ²⁻⁷. Hemorrhoidectomy (HC) is still considered the gold standard ⁸ and is the most used operation by Italian coloproctologists ⁹. Among manual open and closed hemorrhoidectomy (HC), the Milligan-Morgan and Ferguson procedures have been the most widely used operations carried out for decades ¹⁰⁻¹⁴, but, as postoperative pain is feared by the patient, novel procedures advertised as "painless" had been proposed, usually based on costly devices. Among them, stapled hemorrhoidopexy or Procedure for Prolapse and Hemorrhoids (PPH), based on stapled mucosectomy ^{15,16} and doppler-guided hemorrhoidal artery ligation,

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also known as HAL and THD¹⁷⁻¹⁹ associated or not to recto-ano-plexy²⁰ became rather popular in the last decade and are carried by the members of the Italian Society of Colo-Rectal Surgery (SICCR) in about 30% of the cases⁹. Radiofrequency LigaSure HC carries less recurrences than PPH²¹ and, according to the above quoted Annual report, is widely used by Italian colorectal surgeons^{9,22}. When dealing with circumferential fourth degree piles with concomitant rectal internal mucosal prolapse, the Rand modification of the Whitehead HC may achieve satisfactory results²³. Similarly to the closed HC according to Parks^{12,24,25}, however, it is not widely used as it is technically demanding. Other similar radical HC have been reported to achieve good results^{26,27}. Semiclosed HC has been also described, either with a combination of excision of the external and suture of the internal piles or with a marsupialization of the post-HC wound, carried out to decrease the risk of postoperative hemorrhage and to shorten convalescence by decreasing the healing time^{28,29}.

Other manual surgeries, i.e. the Farag and the Hussein operations, are based on the concept that internal piles may be either sutured or pexed, instead of being excised^{30, 31}.

Postoperative pain may be released by topical nitroglycerine ointment, by Botulin Toxin A injection or by local opioids at the end of the operation, with the aim to decrease the spasm of the internal sphincter³²⁻³⁵, whereas internal sphincterotomy, advocated by some authors as a helpful manoeuvre³⁶, has been found to be risky for anal continence³⁷.

Rectal bleeding, anorectal stricture and sepsis, fecal incontinence and chronic proctalgia have been reported after surgery for hemorrhoids³⁸⁻⁴³, which is occasionally followed by life-threatening complications, such as pelvic sepsis requiring diverting colostomy, usually reported after PPH⁴⁴⁻⁵⁹.

The present review is aimed at focussing the state of the art of surgery for hemorrhoids, and reporting both complications and outcome of the various procedures.

Open haemorrhoidectomy

The classical Milligan Morgan HC is still widely used, being the most common operation among Italian coloproctologists^{9,22} but two modifications have become popular among the surgical community: the diathermy HC, proposed by Lentini and Phillips^{60,61} and the LigaSure HC, based on the use of a radiofrequency device⁶²⁻⁶⁸. The former does not imply the ligation of the vascular pedicle and advocates less pain due to the total absence of sutures⁶⁹⁻⁷², the latter is aimed at avoiding painful diathermy burns in the richly innervated anal canal. Moreover radiofrequency is thought to allow a better tissue adhesion at the wound sites, thus minimizing the risk of postoperative bleeding, as demonstrated by

some prospective randomized trials^{68,73-76}. LigaSure HC allows a quick return to work⁶³. Postoperative pain may be reduced applying TNT ointment at the wound site, injecting botulin toxin A into the internal sphincter or applying loascl opioids at the end of the operation^{33,35,77-79}. Alternatively, an internal sphincterotomy may be carried out aimed at decreasing sphincter spasm, which is thought to be the main cause of postoperative pain, but it may cause fecal soiling after surgery^{34,80}. Diosmine and metronidazole have been reported to decrease postoperative bleeding and pain following open HC^{81,82}. Open HC achieves a high rate of cure, the long term recurrence rate being less than 10%⁸³⁻⁵ and, together with the closed Ferguson HC, was considered the gold standard in various metanalysis^{8,84}.

Closed hemorrhoidectomy

A type of closed HC is the Park's submucosa hemorrhoids excision¹². Nowadays it is much less used, even at the inventor's hospital, as it takes time and may cause a significant blood loss⁸⁵. However, it is the only HC which fully reconstructs the anal canal with a submucosal excision of the piles and seems more physiological in term of anatomy and function preservation. It is safe and is unlikely to cause postoperative incontinence and pain²⁴.

The original Ferguson procedure is much more used, especially in the USA⁸⁶. There are many prospective randomized trials comparing Milligan Morgan and Ferguson HC. Most of them do not demonstrate any superiority of the one vs. the other^{79,87-90} in term of postoperative pain and complications. A recent trial⁸⁸ shows that closed HC preserve a better anal function, probably because it restores the continuity of anal canal epithelium. It should be noted, however, that a partial breakdown of the anal sutures is likely to occur after Ferguson HC, being around 25% as reported by Johansson and Pahlman⁸⁸ and around 10% at the Mayo Clinic. Other authors report low postoperative pain if fine slowly absorbable sutures are used (4/0).

Another type of close HC is the Whitehead-Rand operation, indicated for circumferential hemorrhoids²³ which is radical in the sense that it fully excises the piles and the associated rectal internal mucosal prolapse, if any, and reconstructs the anal canal suturing skin flaps to the rectal mucosa. It is a relatively complex procedure, prone to suture dehiscence and therefore requiring tags excision. In fact one of the authors reported five cases out of 35 procedures carried out, without significant anal incontinence and stricture (unpublished data). A modification of this technique has been recently reported⁹¹.

Closed HC allow a high rate of cure in the long term, the recurrence rate being less than 10%^{93,94}.

Semi-closed hemorrhoidectomy

Different semiclosed HC have been described, aimed at combining the advantages of both open and closed HC, mainly a smaller wound in the anal canal with a faster healing. Among them the one first proposed by Reis Neto in the late seventies ^{28,94,95} consisting in a simple suture-ligation of the internal component above the dentate line and an excision of the external component, with a small wound left open to avoid a painful suture in the more innervated and sensitive epithelium. Another type of semiclosed HC has been reported by Pescatori ²⁹ consisting of an excision of both internal and external piles with a marsupialization of the wound, aimed at reducing it, to decrease both the healing time and the risk of bleeding. However postoperative pain is still a problem following this operation, which did not gain popularity.

Suture of hemorrhoids

An Egyptian surgeon, Farag, described this simple operation about three decades ago ³⁰ and the procedure is still used when dealing with 2nd and 3rd degree hemorrhoids, often, as is the case of one of our Units, in combination with other techniques aimed at excising concomitant external piles. The ligated internal nodules become ischemic and retracts after a while. Despite it is a mini-invasive approach, it should be noted that one of the three patients who needed an urgent reoperation for severe postoperative bleeding by one of the authors in 30 years, had had a Farag procedure. Provided that the suture is placed above the dentate line, the Farag procedure is relatively painless.

Manual and stapled hemorrhoidopexy (PPH)

It is based on the principle that hemorrhoidal cushions represent a factor of anal continence ⁹⁶⁻⁸ and therefore might be better to preserve them when treating hemorrhoidal disease. Nevertheless, it has been demonstrated by Greco and Haboubi ⁹⁹ that the diseased piles are no more soft and elastic due to the degeneration of the connective tissue, and therefore are unlikely to serve as active cushions to modulate the resting pressure in the anal canal. The role of piles in anal continence may be investigated by vaginal US ¹⁰⁰. Hemorrhoidopexy does not imply any suture below the dentate line to minimise the risk of postoperative pain, therefore is mainly addressed towards the internal piles and is unlikely to work in case of external hemorrhoids ^{101,102}.

Manual hemorrhoidopexy has been described by Hussein ³¹. A U stitch with overrunning suture repositions the prolapsed pile upward in the upper part of the anal canal. A modification of the technique, aimed at decreasing

the risk of descent of the pexied piles, has been published by one of the authors ²⁹. The Hussein procedure has not become popular like the stapled hemorrhoidopexy, based on the above mentioned concept (hemorrhoids' preservation) plus the not evidence based concept that most piles are related to a rectal internal mucosal prolapse. Instead, there is evidence that only one third of the patients with symptomatic hemorrhoids have an associated internal prolapse ¹⁰³. Another advantage claimed by the inventor of the PPH is that the procedure interrupts the vascular supply to the hemorrhoids. Again, this is not supported by any scientific evidence. Instead, it is opposed by some recent studies ^{58,104}.

Stapled hemorrhoidopexy ¹⁵ is based on the previously described stapled mucosectomy ¹⁶ and consist of an excision of a ring of lower rectal mucosa with the consequent pexy of the piles. As no suture is placed and no wound is left in the sensitive anal canal, the operation gives less pain and shorter convalescence when compared with manual HC ^{8,83,94}, but the persistence of hemorrhoids causes recurrence of symptoms in the long term, up to five times more than after manual HC ^{83,94,105}. Moreover, the fact that the operation takes place in the lower rectum may cause life threatening complications due to an injury to the surrounding structures. Rectal perforation and subsequent pelvic sepsis requiring a stoma may occur ^{43,51,56,106,107}. A PPH syndrome, consisting of tenesmus and fecal urgency has also been hypothesized ⁵³. Due to these drawbacks, the use of PPH decreased during the last ten years, from 70 to 30% among German colorectal surgeons ⁵³ and from 27% to 18% among Italian coloproctologists ⁹.

Fecal urgency, severe proctalgia and relatively high reintervention rate, up to 11% at one year, have also been reported ^{108,109}, anal pain being the most common indication for reoperating. Most authors agree that the procedure may be effective in patients with 3rd degree piles, achieving good results at 5 years ¹¹⁰⁻¹¹². Recently, the *neu@anoscope* used for stapled hemorrhoidopexy improved the technique allowing good visibility and handling ¹¹³. Some surgeons suggested to associate PPH to the excision of tags to achieve better outcome ¹¹⁴, as residual anal tags represent a problem for a number of patients ^{115,116}.

Doppler guided hemorrhoidal artery ligation and recto-ano-pexy

The aim of this procedure, also known as HAL (hemorrhoidal arteries ligation) or THD (transanal hemorrhoid dearterialization), invented by the Japanese Morinaga in 1995 ¹⁷, is to interrupt the blood supply to the hemorrhoids by means of multiple ligations of the branches of the inferior hemorrhoidal arteries identified by a doppler device mounted on an operating proctoscope. A recent variation has been described consist-

ing in the transanal obliteration of internal piles and the associated rectal internal mucosal prolapse by means of a running suture aimed at pulling up the diseased tissue. The consequent pexy causes an ischemia of the redundant tissues^{18,19,20}.

Initially the operation had been suggested for the treatment of 2nd and 3rd degree piles not responding to rubber band ligation, more recently selected patients with 4th degree hemorrhoids have been found to be good candidates¹⁸.

The main advantages of the procedure are as follows: i) it is mini-invasive and may be carried out in an outpatient setting, ii) it is rarely followed by a significant postoperative pain, anal discomfort having been reported in only 6% of the cases¹¹⁶. The operation is used in less than 10% of the patients with hemorrhoids treated in the coloproctology units of the Italian Society of Colo-Rectal Surgery (SICCR), but its use is progressively increasing^{9,22}. Patients satisfaction is high at a median follow-up of 30 months, as 86% of the cases were cured¹¹⁷.

One concern may be the rivascularization of the hemorrhoids from below, through intact vicariant blood supply, therefore results on larger series with longer follow-up are needed to confirm the initial encouraging results. Prospective randomized trials comparing HAL-THD with PPH have been recently published^{118,119} and showed a superiority of the Doppler ligation in terms of postoperative bleeding and pain.

Postoperative complications and reinterventions after the various procedures

Early complications

URINARY RETENTION is more related to the type of anesthesia than to the surgical technique, being more frequent, after spinal anesthesia¹²⁰⁻¹²². For this reason always more authors propose the use of different types of anaesthesia, such as the pudendal nerve block or local anaesthesia¹²³. There are no significant differences comparing open with closed HC and manual HC with PPH, despite a single report from Chik et al¹²⁴. Urinary retention occurs in 2-3% of the patients after HC and stapled hemorrhoidopexy requiring catheterization in most cases.

SEVERE PAIN is the problem most feared by the patients and may delay surgical treatment. Both open and closed manual HC carries more pain than PPH and HAL-THD^{105,125} but using analgesics, avoiding the insertion of hemostatic gauzes in the anal canal and applying glycerol nitrate ointment or injecting botulin toxin in the internal sphincter may help to decrease pain after manual HC^{32-34,75-77}. Some report of exacerbating pain after PPH has been published in the literature¹²⁶ and a postdefecation pain syndrome affecting 2.5% of the patients who undergo PPH has also been described,

possibly associated with an internal sphincter hypertone and responding to oral nifedipine¹⁰⁸. Pain is the most frequent cause for reintervention after PPH¹⁰⁹. In some cases the possibility of a neuropathic pain after stapled hemorrhoidopexy has been advocated¹²⁷. No difference in terms of postoperative pain has been found following open and closed hemorrhoidectomy, the VAS being around 3.5 in a scale ranging between 1 and 10⁷⁹.

SEVERE POSTOPERATIVE BLEEDING may occur after any operation for hemorrhoids with a frequency ranging between 1 and 5%^{73,101,105,128}. The risk of bleeding after PPH may be reduced using the more recent PPH03 device¹²⁹. One of the authors had 22 cases of severe postoperative bleeding in 35 years after 850 HC. In all cases but three, who needed a suture at the site of the bleeding area, it was successfully treated inflating the balloon of a Foley catheter in the lower rectum-upper anal canal; blood transfusion was needed in four cases (unpublished data). Alternative measures are cold water irrigation, packing and local injection of adrenaline³⁵. Bleeding usually occurs within the first 48 hours after PPH, whereas it may be delayed after manual HC¹³⁰.

RETROPNEUMOPERITONEUM, PNEUMOMEDIASTINUM, EMPHYSEMA OF THE NECK, usually treated conservatively with i.v fluids, more rarely requiring a diverting stoma, have been reported after PPH, due to the infiltration of gas through a rectal perforation^{49,131,132}.

LIFE-THREATENING COMPLICATIONS have been more often reported after PPH, the frequency being 1:1300 cases⁵¹. Pelvic sepsis due to rectal perforation and perineal Fournier gangrene have been occasionally reported, requiring stoma more often after PPH than after manual HC^{56,132,133}. Some life threatening and even fatal cases have been reported following PPH^{43,107,134}. Rectal perforation is more often at the level of the anastomosis, related to a dehiscence, but may occur above it, due to a rectal injury caused by the conic head of the gun or, intraperitoneally, to a perineal descent with a prolapse of the pouch of Douglas or to the presence of ascites, and may occasionally be fatal¹⁰⁷. Rectal hematoma requiring reintervention is one of the most frequent severe complications after PPH¹⁰⁶.

RECTAL OBLITERATION has been described after PPH^{46,57,135,136} and may require a transanal release of the staples or a diverting stoma or a Delorme mucosectomy. It is favoured by the use of a double purse string and is usually due to a fold of redundant rectal mucosa mimicking a rectal lumen with a malposition of the stapler anvil. Placing purse string sutures 3-4 cm proximal to the dentate line, with intervals of 1-1.5 cm, and verifying the existence of a lumen prior to introducing the stapler minimizes the risk of rectal obliteration¹³⁶.

PENILE TRAUMA AFTER ACTIVE ANAL INTERCOURSE caused by retained staples has been reported following PPH ¹³⁷⁻¹³⁹.

RECTOVAGINAL FISTULAS have been reported to be an occasional complication following PPH, more likely to be due to local ischemia than to a direct trauma ^{56,140}.

Late complications

SEVERE CHRONIC PROCTALGIA may follow PPH, possibly due to the peristapled fibrosis triggering the nerve spindles above the puborectalis muscle. It can be alleviated by transanal agraphectomy, i.e. the removal of a ring of rectal mucosa with retained staples, followed by an end-to-end sleeve manual anastomosis ¹⁴¹. Seven per cent of the patients observed with chronic proctalgia in a recent study had had a hemorrhoidectomy ¹⁴². Post-PPH proctalgia is usually exacerbated by defecation, as also reported in 20% of the patients one year after Stapled Trans Anal Rectal Resection (STARR) ¹⁴³.

RECTAL POCKET SYNDROME OR RECTAL DIVERTICULUM may be due to the entrapment of fecalith in a pocket, possibly caused by the slipping of a purse string suture after PPH ^{51,52}. The suggested treatment is the lay open of the pocket ⁴⁴. The same complication has been described after STARR ¹⁴⁴.

ANAL FISSURE is unlikely to occur after PPH, possibly due to an inadvertent injury of the anal canal due to the insertion of the gun ¹⁴⁵, whereas is more frequent following HC, mainly after Milligan Morgan HC, and is due to the either delayed or failed healing of the wound in the anal canal, favoured by an internal sphincter's hypertone ^{6,72,105,146,147}.

ANORECTAL STRICTURE may occur after any operation for hemorrhoids, being more frequently following open HC ¹⁴⁸⁻¹⁵⁰, due to a wide dysepithelization of the anal canal if the skin-mucosa bridges left behind are insufficient, and rectal after PPH, for instance in case a double firing of the gun has been performed to remove more prolapsed mucosa, as it happened in two out of 35 cases to one of the authors (unpublished data). It occurs in 3-3.6% of the cases after PPH ⁵⁶. Most cases of anal stricture are successfully treated by anal dilation, but anoplasty (Y-V or house flap) may be required in more severe cases ¹⁵¹⁻¹⁵⁴. Dilation may be rendered more effective by local injection of steroids.

ANAL INCONTINENCE also may occur after any type of procedure for hemorrhoids. Its frequency is not high, <0.1% both for HC and hemorrhoidopexy ^{51,155,156} and it is unlikely to be gross or permanent. It is usually due to a fragmentation of the internal sphincter, detectable at anal US following PPH ^{155,156}. Considering that, according to

Sultan ¹⁵⁷ 40% of the multiparous females and 10% of the primiparous females have an occult sphincter deficiency, an operation for hemorrhoids with weak sphincters may render the defect clinically evident and caution is needed in avoiding a sphincters' stretch when operating elderly women. A too generous excision of the pile close to internal sphincter during an HC or a forced insertion of the stapler during a PPH in the tight anus of a young male may cause a damage to anal continence. It is usually cured with pelvic floor rehabilitation, but it may sometimes require the injection of bulking agents in case of localized defect of the internal sphincter ^{158,159}. Migration of injected bulking agents, detected by anal US, has been recently reported ¹⁶⁰.

The combination of anal incontinence, fecal urgency, tenesmus and anal pain has occurred in a proportion of patients who had PPH performed by members of the ASCRS and been described as "PPH syndrome" ⁵⁴.

ANORECTAL SEPSIS may develop after any operation for hemorrhoids, mostly due to a dehiscence of the wound leading to a chronic abscess ¹⁴⁴ causing late discomfort or proctalgia and detected at anal US as an hypoechoic spot, usually in the intersphincteric plane. It may require a surgical exploration and excision in case of clinical disturbances. Closed HC may be more prone to local sepsis to the sutured wounds in the anal canal ¹⁶¹. Perirectal abscess cured by means of VAC sponge and Redivac system has been reported after PPH ¹⁶².

Conclusions

Many different types of surgeries have been advocated for the management of hemorrhoids and a broad spectrum of adverse events may occur, including life-threatening complications, possibly requiring a reintervention. Most Societies' guidelines suggest to tailor the type of operation to the degree of the disease. This means that a single surgeon has to be ready to perform different procedures, therefore surgery of hemorrhoids should be carried out by specialists colorectal surgeons, able to minimize the risk of complications and to treat them adequately. Manual HC is still the gold standard as it allows to cure most patients in the long term, but novel promising techniques have been proposed, which need to be carried out with the proper technique and after a careful selection of the patients. Abuses due to over-enthusiasm and to commercial advertizing should be avoided.

Riassunto

La maggioranza dei pazienti affetti da patologia è trattato conservativamente con successo. Nel corso degli anni, sono state proposte diverse opzioni chirurgiche, inclusa la tecnica chiusa, la semichiusa e la aperta (HC), la radiofrequenza HC (LigaSure), la sutura delle emorroidi o inter-

vento di Farag, la emorroidopessi manuale o con suturatrice (PPH) con o senza escissione di marische, la legatura arteriosa emorroidaria doppler con o senza mucopessi retto- anale, il flap ano-mucoso circonfenziale HC o intervento di Whitehead-Rand.

Trials prospettici randomizzati e metanalisi sono stati condotti allo scopo di definire la tecnica gold standard. Quando eseguita per malattia avanzata, la HC sembra avere migliori risultati della PPH, che invece ottiene migliori risultati nel terzo grado, ma che comporta un alto rischio di reintervento nelle emorroidi di IV grado. Quasi tutti i trials che hanno messo a confronto le tecniche aperte e chiuse (HC) hanno dimostrato risultati simili.

Nessuna delle innovazioni costose sembra essere superiore alle tecniche tradizionali per ciò che riguarda la cura della malattia nel lungo periodo. La PPH comporta minor dolore postoperatorio e una più breve convalescenza rispetto alla HC. D'altra parte, oltre ad avere un' aumentata incidenza di recidive, può essere responsabile della cosiddetta "Sindrome PPH", che consiste in proctalgia, tenesmo e urgency. Sono inoltre già state descritte occasionali fistole retto-vaginali dopo PPH, se non addirittura perforazioni del retto e altre complicanze a rischio di vita. Il dolore postoperatorio è molto raro dopo legatura delle arterie emorroidarie e può essere ridotto utilizzando nitroglicerina pomata e tossina botulinica, nel tentativo di rilasciare lo spasmo sfinteriale dopo chirurgia, in maniera più sicura che mediante una sfinterotomia interna. L'HC mediante LigaSure diminuisce il rischio di sanguinamento postoperatorio severo, che può essere effettivamente trattato con tamponamento mediante pallone rettale. È difficile osservare incontinenza anale grossolana e permanente sia dopo HC sia dopo PPH. La maggior parte dei casi di stenosi anale a seguito di HC può essere trattata con dilatatori anali. Le linee guida delle società raccomandano una chirurgia "su misura", ossia l'utilizzo di procedure differenti a seconda del grado di emorroidi, il che suggerisce che i pazienti debbano essere operati da chirurghi specialisti di coloproctologia, in grado di eseguire interventi differenti a gestire le complicanze e i fallimenti.

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