PRACTICE GUIDELINES

Japanese Practice Guidelines for Anal Disorders
I. Hemorrhoids

Tetsuo Yamana, MD

Department of Coloproctology, Tokyo Yamate Medical Center

Abstract:

The pathogenesis of hemorrhoids is a weakening of the anal cushion and spasm of the internal sphincter. Bowel habits and lifestyles can be risk factors for hemorrhoids. The prevalence of hemorrhoids can encompass 4 to 55% of the population. Symptoms include bleeding, pain, prolapsing, swelling, itching, and mucus soiling. The diagnosis of hemorrhoids requires taking a thorough history and conducting an anorectal examination. Goligher's classification, which indicates the degree of prolapsing with internal hemorrhoids, is useful for choosing treatment. Drug therapy for hemorrhoids is typically utilized for bleeding, pain, and swelling. Ligation and excision (LE) is considered for Grade III and IV internal and external hemorrhoids. Rubber band ligation is used to treat up to Grade III internal hemorrhoids. Phenol almond oil is effective for internal hemorrhoids up to Grade III, while aluminum potassium sulfate and tannic acid have shown efficacy in treating prolapsing in internal hemorrhoids at Grades II, III, and IV. Procedure for prolapse and hemorrhoids (PPH) is surgically effective for Grade III internal hemorrhoids; however, the long-term prognosis is not favorable, with high recurrence rates. Separating ligation is effective surgical treatment for internal/external hemorrhoids Grade III and Grade IV. The basic approach to thrombosed external hemorrhoids and incarcerated hemorrhoids is conservative treatment; however, in some acute or severe cases, surgical resection is considered. Comparing the different instruments used for hemorrhoid surgery, all reduce operating time, blood loss, post-operative pain, and length of time until the return to normal activity. They do, of course, increase the cost of the procedure.

Keywords:

hemorrhoids, hemorrhoidectomy, anal disorders, guidelines

J Anus Rectum Colon 2017; 1(3): 89-99

Introduction

The Japan Society of Coloproctology is dedicated to assuring high-quality patient care by advancing the science, prevention, and management of anal disorders. The Guideline Preparation Committee is composed of society members who were chosen from the proctology group (IIb) because they have demonstrated expertise in the specialty of anal surgery.

These guidelines were prepared not only for specialists who treat patients with anal disorders, but also for general surgeons and physicians. They aim to accomplish the following: 1) to understand epidemiology, etiology, pathology, diagnosis, treatment, prognosis, etc.; 2) to facilitate the safety and efficacy of treatments; 3) to reduce human and economic burden in proctology practice; and 4) to create mutual understanding between medical providers and patients.

Methodology

Initially, as scoping searches, we decided to look for domestic and foreign clinical guidelines and utilize important past documents among them. As additional databases, we searched PubMed and The Cochrane Library for relevant items published between January 2000 and September 2013, and the Japan Medical Abstracts Society (JAMAS) for articles published between January 1983 and September 2013

in each CQ category. From our collective work, we chose clinical research papers that included the Japanese word "*hito*" or "human" and excluded papers on animal testing or genetic research. When the specialist's personal opinions were stated and it was not based on patient data, we referenced the work but generally did not use it as evidence. Using the above procedures, we found about 450 documents, which were selected from nearly 9,000 documents discovered through document retrieval, and critically examined whole sentences.

Grade of Recommendation Assessment

There are many types of categorizations, but the easiest one to adapt is the "JSCCR Guidelines 2010 for the Treatment of Colorectal Cancer." Therefore, for each CQ statement, we have attached the evidence classification and grading recommendation assessments that have been created by guideline preparation committee member consensus following the JSCCR Guidelines.

Grade of recommendation, A: Based on a high level of evidence, guideline preparation committee members concur in their opinions. (There are documents indicating a high level of evidence. A multitude of documents exists.)

Grade of recommendation, B: Based on a low level of evidence, the guideline preparation committee members concur in their opinions. (A few documents have been judged as indicating a low level of evidence. Few documents exist.)

Grade of recommendation, C: Regardless of the level of evidence, the guideline preparation committee members do not agree.

Grade of recommendation D: Guideline preparation committee members have widely varying opinions.

CQ-1   What Is the Etiology of Hemorrhoids?

Statement

A weakening of the anal cushion and the supporting tissue and spasms of the internal sphincter suggest the pathogenesis of hemorrhoids.

Discussion

Many reports explain the origin of hemorrhoids as an obstruction of venous return. It has long been theorized that a standing position causes a rise in static venous pressure, and straining causes an even greater rise in static venous pressure[1], and that pressure from anal spasms and bowel movements causes an obstruction of venous return[2,3]. Another theory states that there is an unusual enlargement of the venous wall of the anal venous plexus and protrusions in the veins and the interstitium, and this is what constitutes the actual hemorrhoids[4]. However, subsequent studies have shown that the veins inside hemorrhoids are not collateral pathways of the portal system[5,6]. It has also been reported that there are few hemorrhoid patients with portal hypertension[7,8].

The notion of weakening of the anoderm and supporting tissue is currently the most supported theory. Pathological studies of hemorrhoids up until now have centered on supporting the tissue weakening theory that includes a deterioration of supporting tissue[9], fibrous tissue fragmentation of the anal cushion (consisting of blood vessels), elastic connective tissue and smooth muscle fiber (submucosal muscle)[10], genetic factors and connective tissue weakening due to aging[11], and the relaxation of submucosal connective tissue[12].

There are many studies that suggest the etiology as spasms of the internal anal sphincter. In a study that compared the resting pressure of a group of hemorrhoid patients with a control group, the resting pressure was higher in the hemorrhoid group[13,14]. Hemorrhoid patients could be further divided into two distinct groups, males with resting pressure levels higher than the control group who complained of bleeding and discomfort, and females with resting pressure lower than the control group who reported prolapsing[15]. It is believed that the manner in which anal resting pressure affects symptoms has to do with prolapsing hemorrhoids with bowel movement being strangulated by internal anal sphincter spasms, leading to congestion of the anal cushion and bleeding[3,16].

CQ-2   What Are the Risk Factors for Hemorrhoids?

Statement

Bowel habits and lifestyles can be risk factors for hemorrhoids. However, the involvement of genetic factors is unknown.

Discussion

It has been reported that people who have infrequent bowel movements and/or strain habits are more likely to suffer from hemorrhoids[17,18]. It has also been reported that people with strain[19,20], or those who spend a long time sitting on the toilet during bowel movements are likely to develop hemorrhoids[21]. Nevertheless, some hemorrhoid patients report normal bowel movements[22-24],.; hence, there lacks sufficient evidence to make a correlation between chronic constipation and hemorrhoids.

Lifestyle is also a risk factor for hemorrhoids. According to some studies that have surveyed the correlation between lifestyle and hemorrhoids, there have been reports that there are more hemorrhoid patients among people whose occupation involves heavy lifting, or those whose occupation requires sitting for long periods of time[17,25]. Studies exist that refute a correlation between hemorrhoids and habits such as smoking, heavy alcohol consumption, or coffee drinking[17,18].

There is no clear scientific evidence with regard to genetic predisposition to hemorrhoids. There are many hemorrhoid patients with family members who suffer from the same condition, but the cause is likely diet, lifestyle, or

other environmental factors.

CQ-3   How Prevalent Are Hemorrhoids?

Statement

According to differing survey methods, the prevalence of hemorrhoids can be anywhere from 4-55% of the population. With no significant difference between males and females, hemorrhoids are much more prevalent in ages 45 to 65.

Discussion

While hemorrhoids are by far the most diagnosed anal disorder, diagnosis and survey methods lack a set standardization, making the actual rate of occurrence unclear. Since no epidemiological survey has been conducted in Japan, epidemiological surveys from abroad can be used as reference when assessing domestic occurrence rates.

Looking at the prevalence of hemorrhoids based on American domestic data from a large-scale epidemiological survey, it can be assumed that the disorder affects 4.4% of the population[26]. However, a random sampling from an epidemiological survey in London puts occurrence rates at 13.3%[27]. In the case of the London survey, the reported prevalence reflects hospital diagnostic data. Diagnoses by colorectal surgeons indicated that hemorrhoids occurred in 55% of patients observed[28]. In contrast, diagnostic data from one hospital in North America reported the occurrence rate to be 21.6%[29]. A study using hospital visit databases looking at 100,000 patients a year reported 1,177 patients (1.2%) in the U.S. and 1,123 patients (1.1%) in the U.K newly diagnosed with hemorrhoids. In both cases, a tendency toward a decrease in the number of reported hemorrhoid cases could be seen year by year[30].

In terms of the differences in prevalence according to gender, an epidemiological study in the U.S. showed no significant difference in occurrences between males and females[26]. The London hospital survey concurred, reporting no discernible difference in the rates between the genders[28]. However, one study has claimed that 60% of hemorrhoid patients are male[31], and that men are more likely to develop hemorrhoids; conversely, other studies state that women are more likely to develop hemorrhoids and the symptoms tend to persist over a long period of time[28,32].

A large-scale survey in the U.S. has indicated that hemorrhoids occur most frequently between ages 45 and 65, with patient numbers tending to decrease over age 65 and patients under age 20 tending to be rare[1]. Other reports indicate that the age range of hemorrhoid diagnoses has increased on the higher end to age 70 and then decreases after that[4]. Other risk factors reported in the prevalence of hemorrhoids indicate that they occur 1.5 times more frequently in Caucasians than African Americans[1], more frequently in Jews than non-Jews[4], and that they occur more frequently in those of higher socioeconomic status than those of lower status[1].

CQ-4   What Are Hemorrhoid Symptoms?

Statement

Hemorrhoid symptoms include bleeding, pain, prolapsing, swelling, itching, and mucus soiling.

Discussion

The main symptoms of hemorrhoids are bleeding, pain, prolapsing, swelling, itching, and mucous soiling. Symptoms depend on certain conditions such as the size and type of hemorrhoid, whether they are external or internal, and whether they are chronic or acute. In some cases, there may be only one symptom, but multiple symptoms may appear together. Symptoms may be temporary or chronic and may change naturally or over the course of treatment.

Bleeding occurs most frequently during evacuation, but it sometimes also happens while exercising or walking. The color of the blood is usually bright red due to the presence of arteriovenous channels in the hemorrhoid tissue[33]. Dark red blood or blood mixed with stool may indicate that bleeding is from a rectal or colonic lesion. Hemorrhoidal bleeding may lead to a positive fecal occult blood test or anemia; in these cases, it is necessary to rule out colorectal lesions[34].

In chronic internal hemorrhoids, prolapsing sometimes causes pain symptoms. Even non-prolapsing hemorrhoids may cause persistent pain or discomfort due to congestion, but this may be indicative of other conditions; therefore, the practitioner must pay close attention. Acute thrombosed external or internal hemorrhoids cause severe pain for the first few days, but it dissipates over time. Swelling of thrombosed external hemorrhoids may last more than three weeks even when the patient is undergoing treatment[35].

Prolapsing symptoms may be the result of prolapsing internal hemorrhoids or external hemorrhoid components within the anal canal. Some patients with simple external hemorrhoids or skin tags complain of prolapsing. Prolapsing most often occurs with defecation; however, this may happen when exercising, walking, lifting heavy objects, squatting, or bending. If the chief complaint is prolapsing, then differential diagnoses of mucosal prolapse, rectal or anal polyps, or rectal prolapse must be considered.

Itching is most often concomitant with hemorrhoids. Pruritus ani is reported to occur in 20% of cases, the most reported symptom;[36] this is often due to the fact that after defecation, patients are unable to wipe well. Mucus soiling can also be the cause of the itching. Sometimes patients will clean themselves excessively, leading to skin barrier damage, which also causes itchiness.

CQ-5 What Are Useful Diagnostic Methods for Hemorrhoids?

Statement

The diagnosis of hemorrhoids requires taking a detailed history and conducting an anorectal examination. (Grade of recommendation, B)

Discussion

Hemorrhoid diagnosis involves taking a detailed history and conducting ananorectal examinations (visual inspection, manipulation, digital examination, and anoscope)[37-39]. It is impossible to confirm the diagnosis of hemorrhoids with a digital examination alone;[40] therefore, an anoscope (or proctoscope) is utilized for diagnostic purposes[41]. In one Japanese report, 6.3% of hemorrhoid diagnoses (48/757) were made through routine colonoscopy[42]. Digital anoscopy, on the other hand, is far better suited to diagnosing hemorrhoids with a higher discovery rate and a greater ability to recognize bleeding[43]. While 22.7% of internal hemorrhoid cases test positive for fecal occult blood, Goligher's classification shows no positive correlation[44]. Due to the number of false positives, the correlation of hemorrhoids to occult blood is not that high (~6.7%)[45].

In cases where complaints of prolapsing symptoms are inconsistent with the findings, straining testing in the toilet is useful[39,40]. Even when hemorrhoids are confirmed, when melena or bloody stool is discovered, a colonoscopy should be performed to rule out other diseases[46].

CQ-6 What Constitutes the Clinical Classification of Hemorrhoids?

Statement

Goligher's classification, which indicates the degree of internal hemorrhoid prolapsing, is useful for choosing a course of treatment. (Grade of recommendation, B)

Discussion

Anatomical classification of hemorrhoids includes internal and external hemorrhoids based on whether they are above or below the dentate line. As a clinical measurement, Goligher's classification[47], which is calculated in four grades based on prolapsing and reduction, is most widely utilized[48]. Goligher's classification is the clinical staging of the prolapsing degree of internal hemorrhoids. Internal hemorrhoid grade classification (including Goligher's classification) is used universally for choosing a course of treatment[49-53].

Grade I: Hemorrhoids are visualized on anoscopy and may bulge into the lumen but do not prolapse below the dentate line.

Grade II: Hemorrhoids prolapse out of the anal canal with defecation or straining but reduce spontaneously.

Grade III: Hemorrhoids prolapse out of the anal canal with defecation or straining and require manual reduction.

Grade IV: Hemorrhoids are irreducible and may strangulate.

In the PATE 2000-Sorrento study, they noted internal and external hemorrhoids by position and acute conditions (edema, thrombosis) as well as anal sphincter tone (low, medium, high)[54]. In the revised version (PATE 2006), they created a scoring system that included symptoms.

Colonoscopic classification, including circumferential degree, size, and red color sign, is well correlated with bleeding symptoms and is useful for treatment evaluation[55]. Vascular and mucosal types can be broadly categorized through anoscopic inspection alone[56]. However, this type of classification with clear definition is not standard.

CQ-7 What Are Conservative Treatment Options and How Effective Are They?

Statement

1) Conservative treatment is used in "Everyday Lifestyle Guidance." (Grade of recommendation, B)

2) Drug therapy for hemorrhoids is typically utilized for bleeding, pain, and swelling. (Grade of recommendation, B)

3) None of the oral medications is approved for use during pregnancy, but some analgesic ointments and suppositories may be utilized. (Grade of recommendation, C)

Discussion

1) Everyday Lifestyle Guidance

The guidance given for the patient's everyday lifestyle (improvement of lifestyle habits) suggests taking care when sitting for long periods of time, working at cold temperatures, straining during defecation, choosing what to eat and drink, becoming physically exhausted, and enduring emotional stress. Patients are instructed to avoid letting their bodies get too cold, and women are encouraged to be especially careful during their menstrual cycles. In terms of food and drink, patients are told to be sure to get enough water, increase the amount of fiber in their diets[57], and be careful with their alcohol consumption. As to their toilet habits, patients are insturcted to avoid excessive straining and extended time defecating (sitting on the toilet for long periods). Patients are told not to hold it and to finish defecating in as short a time as possible[58]. When localized blood flow impairment occurs together with hemorrhoids, taking warm baths (sitz baths) is effective.

2) Drug Treatment

Drug treatment has a recognized effect in relieving pain and reducing swelling; however, these medications have no efficacy with prolapsed hemorrhoids. In terms of medication, there are both oral and topical treatments, such as suppositories and ointments. Ointments are used for lesions below the dentate line, while suppositories are used for lesions above the dentate line.

Steroidal medications have a higher efficacy when pa-

tients present with swelling, pain, and heavy bleeding associated with acute inflammation. In rare cases, when steroidal dermatitis or perianal candidiasis occurs, long-term use of steroids should be avoided[58].

Tribenoside or bromelain are effective for inflammatory edema;[59] local anesthetic agents are effective for pain; and bismuth-based agents are effective for bleeding. There are some reports from abroad indicating that pain, swelling, and bleeding can be addressed with flavonoids[60,61].

3) Drug therapy and pregnancy

As drug therapy for pregnant women can have an adverse effect on the unborn child, careful consideration must be given to its administration. To prevent unnecessary risks, including premature contractions, spontaneous abortion, and birth defects, etc., excessive use of medication should be avoided[62]. There have been no reports of birth defects among hemorrhoid patients using ointments/suppositories. There have been issues with cleft palate developing in animal fetuses when the mother has undergone long-term hydrocortisone treatment. Consequently, long-term use of steroidal ointments/suppositories is contraindicated[63]. The use of flavonoids in pregnant women has not been sufficiently evaluated; however, there is one case report of a fetal death and one of a birth defect, indicating that this treatment may not be completely safe[64].

CQ-8   What Are Surgical Treatment Options and How Effective Are They?

Statement

1) Ligation and Excision (LE) is considered surgically effective for Grade III and IV internal and external hemorrhoids. (Grade of recommendation, A)

2) Rubber band ligation is used to treat up to Grade III internal hemorrhoids. (Grade of recommendation, B)

3) With sclerotherapy, injecting 5% phenol almond oil is effective for internal hemorrhoids up to Grade III, while aluminum potassium sulfate and tannic acid (ALTA) have shown efficacy in treating prolapsing in internal hemorrhoids at Grades II, III, and IV. (Grade of recommendation, B)

4) Procedure for Prolapse and Hemorrhoids (PPH) is surgically effective for Grade III internal hemorrhoids, however the long-term prognosis is not favorable, with high recurrence rates, risks of vaginal fistula, rectal perforation, and other severe complications. (Grade of recommendation, C)

5) Separating ligation is effective surgical treatment for Grades III and IV internal/external hemorrhoids, but local anesthetic agents are necessary. (Grade of recommendation, C)

Discussion

1) LE

LE involves a modified version of the Milligan-Morgan procedure. Generally, one to three piles are excised with ligation of the hemorrhoidal artery. In Japan, the semi-

closed method is preferred; while overseas, the Ferguson-type closed operation is standard. LE is the standard surgery for any shape Grade III or Grade IV internal/external hemorrhoid. It can also be used for hemorrhoids with anal polyps as well as thrombosed external hemorrhoids.

Typical complications of LE include postoperative bleeding and stricture. Instances of postoperative bleeding have been reported in 0-3.5% of patients[65-68], divided into early- and late-stage bleeding. Early bleeding may occur on the day of surgery. There is a study that states that most bleeding originates in the drainage wound;[66] however, another study states that there is no difference in the rate of bleeding between the root and the drainage wound[68]. It is also reported that the early bleeding rate depends on the surgeon's experience (fewer or greater than 300 operations). Late bleeding occurs mostly from the arteries or veins in the root[66-68]. Stricture results from excessive excision of anoderm. To avoid stricture, individual excision or separate excision of the main and accessory hemorrhoids is recommended. The width of the excision should be half or two-thirds the width of the hemorrhoid in cases of open hemorrhoidectomy[69]. However, judicious excisions are required for the semi-closed technique, as well[70]. Adding ALTA to LE has reported advantages in reducing stricture and postoperative pain[71].

When comparing the open Milligan-Morgan method to the closed Ferguson procedure, the closed method leads to faster wound healing, but some studies state that the closed method requires a longer operating time compared to the open technique[72-75]. Some studies assert that early postoperative pain is less with the open technique[72,73], but other accounts state that there is no difference[74,75]. Some studies report postoperative bleeding to be less with the closed method;[9] however, other studies claim there is no difference in postoperative bleeding between the procedures[72,74,75]. In studies citing no difference between the two methods, there is also no discernible difference with regard to recurrence rates[72].

2) Rubber band ligation technique

Rubber band ligation is a noninvasive treatment that cuts off the blood flow through ligation and creates necrosis[76]. Several different types of band ligators are available. The advantages of the technique are that it is relatively painless, easy to perform, and useful for ordinary size hemorrhoids. It also can be performed as part of a colonoscopy[77,78]. Ligated internal hemorrhoids will always change to a darker red color after the procedure. They will then spontaneously fall off within a week.

When comparing rubber band ligation to sclerotherapy for Grade II internal hemorrhoids, rubber band ligation has better results in terms of postoperative pain and recurrence rates[79]. When comparing rubber band ligation to open LE for Grade II internal hemorrhoids, there is less pain as well as less urinary disturbance[80]. With Grade III internal hemorrhoids, however, rubber band ligation is less effective than LE and sometimes requires the procedure to be repeated[81].

A meta-analysis of randomized controlled trials shows that rubber band ligation is more effective than sclerotherapy and infrared coagulation[82]. Hence, rubber band ligation is the first recommendation for Grade II internal hemorrhoids[81,83,84]. For Grade III internal hemorrhoids as well, rubber band ligation may be considered first[81].

Complications of the rubber band ligation technique include pain, bleeding, and thrombosed external hemorrhoids in 1-3%. Bleeding complications also occur more often in patients with coagulation defects or those taking anticoagulants; therefore, rubber band ligation may be contraindicated in such cases[82].

3) Sclerotherapy

Although several types of sclerosants have been utilized worldwide, 5% phenol almond oil and ALTA were approved in Japan in 2014. The use of 5% phenol almond oil can result in inflammation of hemorrhoidal tissue and lead to secondary fibrosis and decreased blood flow in hemorrhoidal tissue. This procedure is positively indicated for hemorrhoids up to Grade III.

ALTA cuts off the blood flow, which decreases the size of hemorrhoids, leading to fibrosis of the collagen fiber, preventing prolapsing symptoms[85]. There is good indication for this technique with Grades II and III internal hemorrhoids, but it may also be effective for Grade IV. There is a four-step injection technique required with ALTA, so, a syringe-type anoscope is recommended. The recurrence rate for ALTA has been reported at 4-16%[86-90], but recurrence is considered to increase over time. Typical adverse events with ALTA include fever, rectal ulcer, lower abdominal pain, low blood pressure, and bradycardia[89,90]. Lower abdominal pain, low blood pressure, and bradycardia result from vasovagal reflex, but these symptoms can be prevented using lidocaine containing ALTA[88,91]. When comparing ALTA to LE, ALTA has advantages with regard to operating time, postoperative pain, postoperative bleeding, and hospital stay. However, the recurrence rate is higher with ALTA[89,92].

4) PPH

PPH surgery employs a circular stapler. First, the rectal mucosa is removed above the hemorrhoid circumferentially. Next, the anal cushion is lifted up and affixed to its normal position. This cuts off the blood flow of the superior hemorrhoidal artery, and the internal hemorrhoid decreases in size[93]. The recurrence rate after one year varies significantly among facilities and according to patient selection from 0.2 to 11.8%[95]. Regarding complications, one report stated that 35 patients necessitated low anterior resection for rectal perforation[96], so care must be taken to utilize proper techniques such as the purse-string suture[93].

Compared to LE, PPH has advantages that include less postoperative pain, less bleeding, shorter hospital stays, and quicker return to normal activities[1,33]. Some reports state that there is no significant difference between the two techniques in terms of recurrence rates[94,98], but other studies cite higher recurrence rates with PPH after long-term follow-up[57,95,97,99].

5) Separate ligation technique

The separate ligation technique is also referred to as the traditional hemorrhoid ligation method in Japan. It entails ligating the root of the hemorrhoid, cutting off the blood flow, so that it falls off. A difference between this and rubber band ligation is that in addition to its use with internal hemorrhoids, this technique can also be utilized for external hemorrhoids and skin tags. Regarding wound healing, the scar is rather soft and elastic. Complications include postoperative bleeding 0.8%, urinary disturbance 0.2%, fecal incontinence, gas incontinence, and scar pain[100]. Local anesthesia is necessary to manage postoperative pain.

6) Other Techniques

The anal cushion lifting technique consists of dissecting the layer between the anal cushion and the internal sphincter, then, lifting up the hemorrhoid, anoderm, and the anal cushion[37]. One advantage is less postoperative pain[101], but there has been no evidence based on long-term follow-up. Doppler-guided transanal hemorrhoidal artery ligation technique consists of ligating the superior hemorrhoidal artery above the dentate line[102]. Another advantage is that this can be an outpatient procedure. Recurrence rates have been reported at 6-21% in short-term follow-up[103,104], but there is no evidence based on long-term follow-up.

CQ-9 What Are the Most Effective Treatments for Thrombosed External and Incarcerated Hemorrhoids?

Statement

1) The basic approach to thrombosed external hemorrhoids is conservative treatment; however, in cases where there are large thrombi, severe pain, or excessive bleeding, surgical resection is considered. (Grade of recommendation, C)

2) In the case of incarcerated hemorrhoids, the first line of treatment is to adapt a wait-and-see position and consider elective surgery once various symptoms have improved. Nonetheless, in acute situations, when pain worsens or bleeding continues, surgery will be considered. (Grade of recommendation, C)

Discussion

1) Thrombosed external hemorrhoids

When venous congestion increases in the area and acute blood thrombi form, in a short period of time, one to four days being the peak, rapid increases in volume and internal pressure occur[105]. When there is no pain, patients may then complain of symptoms such as rectal swelling, a mass, or prolapsing.

The first level of treatment is to wait and see. Patients are told to apply ointments, or take sitz baths, i.e., conservative measures, at this stage. These symptoms usually subside in two to four weeks, with the thrombi dissolving and conditions such as swelling and discomfort abating. The vast majority of these symptoms do not warrant a thrombectomy or

external hemorrhoidectomy, but when thrombi are large, pain is severe, or bleeding from thrombotic rupture occurs, early surgical intervention is considered.

Among overseas reports and guidelines, there are numerous opinions stating that surgery should be performed within 72 hours of complaints of severe pain[105-108]. A comparison of retrospective studies shows that recurrence rates with conservative treatment are 25.4% compared with 6.3% for surgical treatment. It is worth noting that the average time of recurrence was 7.1 months in the conservative treatment group and 25 months in the surgical group, the significant difference of which has led to reports stating that surgical intervention in these cases should be attempted earlier[109]. For this reason, it is recommended that surgical excision be considered in cases of large thrombi, strong acute pain, and thrombotic rupture.

Surgery may be performed under a local anesthetic in an outpatient situation, but when the thrombus is large or a thrombus has formed inside the anus, or the patient experiences great anxiety, it is better to perform surgery in an operating room[105,107,108]. Complications, such as skin tags, early recurrence (3.1-6.5%), and delayed wound healing [(anal fissures, anal fistulas, or abscesses) (2.1-3.0%)], are often observed with early surgical intervention[105,106,109,110].

2) Incarcerated hemorrhoids

Incarcerated hemorrhoids occur from persistent prolapse outside the anal canal. The prolapsed hemorrhoids are strangulated by the sphincter muscle; and acute necrosis, ulcers, and lymphedema may ensue due to blood flow disturbance. These hemorrhoids are difficult to reduce and cause severe pain. A differential diagnosis should be made. Internal hemorrhoids and non-incarcerated circumferential thrombosed external hemorrhoids should be ruled out[111].

Complaints of postoperative pain are greater with incarcerated hemorrhoids, 48.3%, compared with non-incarcerated hemorrhoids, 20.1%[112]. Postoperative stenosis is higher with incarcerated hemorrhoids, 17.2%, compared with 5.2% in non-incarcerated hemorrhoids[113]. Internal sphincter injury may occur more frequently after surgical treatment of incarcerated hemorrhoids[111,113-117]. For these reasons, employing conservative treatments, such as manual reduction, rest, sitz baths, and medications, and waiting for acute conditions to subside, is desirable. Once acute conditions subside, elective hemorrhoidectomy may be considered.

Some reports state that there are no differences with regard to anal function or stenosis after an incarcerated hemorrhoidectomy[111,118]. In cases where there is severe pain, necrosis, continuous bleeding, or the patient's desire for an early return to social activity, an immediate incarcerated hemorrhoidectomy in an acute setting may be considered. However, care must be taken to avoid excessive excision or sphincter injury.

CQ-10   What Are the Best Instruments for Hemorrhoid Surgery?

Statement

Comparing the different instruments used for hemorrhoid surgery, equipment such as the electrocautery device, ultrasonic scalpel, and vessel sealing system (VSS) all reduce operating time, the level of blood loss during and after surgery, the degree of postoperative pain, and the length of time until the return to normal activity. They do, of course, increase the cost of the procedure. (Grade of recommendation, C)

Discussion

1) Electrocautery device

The merits of an electrocautery device are that because the sensory nerve is cauterized, there is less wound pain[119,120], and operating time is shorter compared to a conventional scalpel. In addition, there are reports that the length of the hospital stay is shorter, and wound edema is significantly less;[119] however, some studies indicate that there is no significant difference in wound infection rates[121]. Nevertheless, wound healing does tend to take longer with a conventional scalpel[122,123].

2) Ultrasonic scalpel

The ultrasonic scalpel is a device that minimizes thermal tissue damage and protein coagulum denaturation through 80°C low frictional heat. Compared to conventional hemorrhoid surgery, there is less tissue damage, better hemostasis, less postoperative pain, shorter operating time, and early return to normal activity[124,125]. Wound healing time is longer than that of the conventional scalpel, but shorter than that of electrocautery devices[122,123]. Postoperative complications are actually comparable[124,125], but the cost is approximately ten times as great[126].

3) Vessel sealing system (VSS)

Using computer-generated, high-current, low-voltage electricity, the device causes vessel wall collagen degeneration and seals off a 5 mm vessel. It has high potential for hemostasis of the blood vessels, and the lateral thermal diffusion is only 2 mm. Compared to conventional or ultrasonic scalpels, operating time is shorter, hospital stays are shorter, and there is less blood loss and postoperative pain. However, in terms of postoperative pain, bleeding, and incontinence, no significant difference has been reported[127-131]. Nonetheless, there are issues that include the risk of postoperative anal stricture due to excessive excision and high costs.

4) Lasers

Although the devices have been employed, there is insufficient evidence regarding instruments and therapies such as IndoCyanine Green (ICG) dye-enhanced diode laser photosclerotherapy[132], bipolar semiconductor lasers, carbon dioxide gas/Yttrium Aluminum Garnet lasers[133-135]. These are all high-cost devices without studies to support their value, and there are concerns about precise modulation of laser ra-

diation; so therefore, they are not used often.

Conflicts of Interest
There are no conflicts of interest.

References

1. Morgagni JB. Sears and causes of diseases, Vol. 2, Letter 32, Article 10. 1749. (Translated by Benjamin Alexander, 1769. London, A. Miller, p. 105-6).
2. Parks AG. The surgical treatment of haemorrhoids. Br J Surg. 1956 Jan 1; 43(180): 337-51.
3. Graham-Stewart CW. What causes hemorrhoids? A new theory of etiology. Dis Colon Rectum. 1963 Sep 1; 6(5): 333-44.
4. Onituka A. [Hemorrhoids-pathogenesis]. Chiryo. 1969; 51: 2081-9. Japanese.
5. Goenka MK, Kochhar R, Nagi B, et al. Rectosigmoidvarices and other mucosal changes in patients with portal hypertension. Am J Gastroenterol. 1991 Sep 1; 86(9): 1185-9.
6. Swart B. [Uberlegungenzur Genesethpischer Kollateralkreslaufebeiportalem Hochdruck und derenrontgenologisch-klinische Symptomatologie]. Radiologe. 1968; 8: 73-83.
7. Bernstein WC. What are hemorrhoids and what is their relationship to the portal venous system? Dis Colon Rectum. 1983 Dec 1; 26(12): 829-34.
8. Jacobs DM, Bubrick MP, Onstad GR, et al. The relationship of hemorrhoids to portal hypertension. Dis Colon Rectum. 1980 Nov 1; 23(8): 567-9.
9. Gass OC, Adams J. Haemorrhoids: aetiology and pathology. Am J Surg. 1950; 79: 40-3.
10. Thomson WHF. The nature of haemorrhoids. Br J Surg. 1975 Jul 1; 62: 542-2.
11. Haas PA, Fox TA, Haas GP. The pathogenesis of hemorrhoids. Dis Colon Rectum. 1984 Jul 1; 27: 442-50.
12. Ohori A. [Pathogenesis and clinicopathological study of hemorrhoids]. Tohoigakuzasshi. 1996; 43: 139-48. Japanese.
13. Hancock BD, Smith K. The internal anal sphincter and Lords procedure for haemorrhoids. Br J Surg. 1975; 62: 833-6.
14. Read MG, Read NW, Haynes WG, et al. A prospective study of the effect of haemorrhoidectomy on sphincter function and faecal continence. Br J Surg. 1982 Jul 1; 69(7): 396-8.
15. Arabi Y, Alexander-Williams J, Keighley MRB. Anal pressures in haemorrhoids and anal fissure. Am J Surg. 1977 Nov 1; 134 (5): 609-11.
16. Burkitt DP. Varicose veins, deep vein thrombosis, and haemorrhoids: epidemiology and suggested aetiology. Br Med J. 1972 Jun 3; 2(5813): 556-61.
17. Acheson RM. Haemorrhoids in the adult male: a small epidemiological study. Guys Hosp Rep. 1960; 109: 184-195.
18. Hyams L, Philpot J. An epidemiological investigation of hemorrhoids. Am J Proctol. 1970 Jun; 21(3): 177-93.
19. Graham-Stewart CW. What causes hemorrhoids? A new theory of etiology. Dis Colon Rectum. 1963 Sep 1; 6(5): 333-44.
20. Hancock BD. Internal sphincter and the nature of haemorrhoids. Gut. 1977 Aug 1; 18(8): 651-5.
21. Thomson JPS, Leicester RJ, Smith LE. Haemorrhoids. 2nd ed. Oxford (U.K.): Butterworth-Heinemann; 1992. Coloproctology and the pelvic floor; p. 373-93.
22. Gazet JC, Redding W, Rickett JW. The prevalence of haemorrhoids: a preliminary survey. Proc R Soc Med. 1970; 63(Suppl 1): 78-80.
23. Webster DJ, Gough DC, Craven JL. The use of bulk evacuant in patients with haemorrhoids. Br J Surg. 1978 Apr 1; 65(4): 291-2.
24. Johanson JF, Sonnenberg A. The prevalence of hemorrhoids and chronic constipation: an epidemiologic study. Gastroenterology. 1990 Feb 28; 98(2): 380-6.
25. Prasad GC, Prakash V, Tandon AK, et al. Studies on etiopathogenesis of hemorrhoids. Am J Proctol. 1976 Jun; 27(3): 33-41.
26. Johanson JF, Sonnenberg A. The prevalence of hemorrhoids and chronic constipation: an epidemiologic study. Gastroenterology. 1990 Feb 28; 98(2): 380-6.
27. Acheson RM. Haemorrhoids in the adult male: a small epidemiological study. Guys Hosp Rep. 1960; 109: 184-95.
28. Gazet JC, Redding W, Rickett JW. The prevalence of haemorrhoids: a preliminary survey. Proc R Soc Med. 1970; 63(Suppl 1): 78-80.
29. Hyams L, Philpot J. An epidemiological investigation of hemorrhoids. Am J Proctol. 1970 Jun; 21(3): 177-93.
30. Johanson JF, Sonnenberg A. Temporal changes in the occurrence of hemorrhoids in the United States and England. Dis Colon Rectum. 1991 Jul 1; 34: 585-91; discussion 591-593.
31. Bleday R, Pena JP, Rothenberger DA, et al. Symptomatic hemorrhoids: current incidence and complications of operative therapy. Dis Colon Rectum. 1992 May 1; 35(5): 477-81.
32. Haas PA, Haas GP, Schmaltz S, et al. The prevalence of hemorrhoids. Dis Colon Rectum. 1983 Jul 1; 26(7): 435-9.
33. Aigner F, Gruber H, Conrad F, et al. Revised morphology and hemodynamics of the anorectal vascular plexus: impact on the course of hemorrhoidal disease. Int J Colorectal Dis. 2009 Jan 1; 24: 105-13.
34. Clinical Practice Committee, American Gastroenterological Association. American Gastroenterological Association medical position statement: diagnosis and treatment of hemorrhoids. Gastroenterology. 2004 May 31; 126(5): 1461-2.
35. Chan KK, Arthur JD. External haemorrhoidal thrombosis: evidence for current management. Tech Coloproctol. 2013 Feb; 17: 21-5.
36. Daniel GL, Longo WE, Vernava AM. Pruritus ani: causes and concerns. Dis Colon Rectum. 1994 Jul 1; 37(7): 670-4.
37. Rivadeneira DE, Steele SR, Ternent C, et al. Practice parameters for the management of hemorrhoids (Revised 2010). Dis Colon Rectum. 2011 Sep 1; 54(9): 1059-64.
38. Madoff RD, Fleshman JW. American Gastroenterological Association technical review on the diagnosis and treatment of hemorrhoids. Gastroenterology. 2004 May 31; 126(5): 1463-73.
39. Matuda Y, Asano M. [Examination methods and technical points of anal diseases]. Geka. 2011; 73(9): 913-8. Japanese.
40. Iwadare J. Basic [Outpatient examination of anorectal disorders]. Itocho. 2003; 38(9): 1225-37. Japanese.
41. Patient Care Committee of The Society for Surgery of the Alimentary Tract (SSAT). Surgical management of hemorrhoids. J Gastrointest Surg. 2005; 9(3): 455-6.
42. Adachi W, Kishimoto Y, Ota H, et al. [Anorectal lesions detected by retroflex colonoscopy in healthy adults]. J Jpn Coloproct. 2011; 64(7): 455-61. Japanese.
43. Harish K, Harikumar R, Sunilkumar K, et al. Videoanoscopy: useful technique in the evaluation of hemorrhoids. J Gastroenterol Hepatol. 2008 Aug 1; 23(8 pt 2): 312-7.
44. Kunimoto M, Sasaki K, Hirata K. [Correlation between degree of internal hemorrhoids and fecal occult blood test]. J Jpn Coloproct. 1997; 50(8): 605-9. Japanese.
45. van Turenhout ST, Oort FA, Terhaarsive Droste JS, et al. Hemorrhoids detected at colonoscopy: an infrequent cause of false-positive fecal immunochemical test results. Gastrointest Endosc.

2012 Jul 31; 76(1): 136-43.

46. Levin B, Lieberman DA, McFarland B, et al. Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: a joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. Gastroenterology. 2008 May 1; 134(5): 1570-95.

47. Goligher JC. Surgery of the anus, rectum and colon. 5th ed. London: Billiere Tindall; 1984: 101 p.

48. Kurokawa A, Kitsuki K, Shimotani S. [Classification of hemorrhoids]. Rinshogeka. 2008; 63(11): 81-7. Japanese.

49. Banov L Jr, Knoepp LF Jr, Erdman LH, et al. Management of hemorrhoidal disease. J S C Med Assoc. 1985 Jul; 81(7): 398-401.

50. Rivadeneira DE, Steele SR, Ternent C, et al. Practice parameters for the management of hemorrhoids (Revised 2010). Dis Colon Rectum. 2011 Sep 1; 54(9): 1059-64.

51. Altomare DF, Roveran A, Pecorella G, et al. The treatment of hemorrhoids: guidelines of the Italian Society of Colorectal Surgery. Tech Coloproctol. 2006 Oct 1; 10(3): 181-6.

52. Patient Care Committee of The Society for Surgery of the Alimentary Tract (SSAT). Surgical management of hemorrhoids. J Gastrointest Surg. 2005; 9(3): 455-6.

53. Madoff RD, Fleshman JW. American Gastroenterological Association technical review on the diagnosis and treatment of hemorrhoids. Gastroenterology. 2004 May 31; 126(5): 1463-73.

54. Gaj F, Trecca A, Busotti A, et al. The new classification of hemorrhoids: PATE2000-Sorrento. History of the scientific debate. Minerva Chir. 2002 Jun; 57(3): 331-9.

55. Fukuda A, Kajiyama T, Kishimoto H, et al. Colonoscopic classification of internal hemorrhoids: usefulness in endoscopic band ligation. J Gastroenterol Hepatol. 2005 Jan 1; 20(1): 46-50.

56. Graham-Stewart CW. What causes hemorrhoids? A new theory of etiology. Dis Colon Rectum. 1963 Sep 1; 6: 333-44.

57. Cataldo P, Ellis N, Gregorcyk S, et al. Practice Parameters for the Management of Hemorrhoids (Revised). Dis Colon Rectum. 2005; 48: 189-194.

58. Chikuba A. [Conservative treatment of hemorrhoids]. Gekachiryo. 2011; 105: 17-22. Japanese.

59. Kinugasa A, Ishiyama Y, Nishio A, et al. [Clinical effects of bromelain preparations for hemorrhoids: a double-blind, comparison study]. Shinyakutorinsho. 2000; 49: 1240-58. Japanese.

60. Di Pierro F, Spinelli G, Monsu G, et al. Clinical effectiveness of a highly standardized and bioavailable mixture of flavonoids and triterpenes in the management of acute hemorrhoidal crisis. Acta Biomed. 2011 Sep 1; 82(1): 35-40.

61. Jiang ZM, Cao JD. The impact of micronized purified flavonoid fraction on the treatment of acute haemorrhoudal episodes. Curr Med Res Opin. 2006 Jun 1; 22(6): 1141-47.

62. Sato T, Kano H, Hayashi M, et al. [Laxatives]. Jissen Ninpotokusuri. Yakujisinposha. 1996;518-522. Japanese.

63. Sato T, Kano H, Hayashi M, et al. [Laxatives]. Jissen Ninpotokusuri. Yakujisinposha. 1996;510-512. Japanese.

64. Quijano CE, Abalos E. Conservative management of symptomatic and/or complicated haemorrhoids in pregnancy and the puerperium. Cochrane Database Syst Rev. 2005 Jul; 20(3): CD 004077.

65. Sabanci U, Ogun I, Candemir G. Stapled haemorrhoidopexy versus Ferguson haemorrhoidectomy: a prospective study with 2-year postoperative follow-up. J Int Med Res. 2007 Nov; 35(6): 917-21.

66. Iwadare J. [Operation for internal hemorrhoids: anal disease

practice for practitioner]. Nagai Shoten. 2007;85-90. Japanese.

67. Utsunomiya T, Kikuta N. [Typical features of delayed hemorrhage after hemorrhoidectomy, and the investigation of its mechanism]. Nichiringekaishi. 2002; 63(11): 2633-7. Japanese.

68. Kunimoto M, Okita K, Sato M, et al. [Risk factors of hemorrhage after hemorrhoidectomy]. J Jpn Coloproct. 2004; 57: 165-8. Japanese.

69. Nogaki M. [Modified ligature and excision operation]. J Jpn Coloproct. 1998; 51: 1061-6. Japanese.

70. Iwadare J. [Semi-closed hemorrhoidectomy: newly devised method and postoperative outcome]. J Jpn Coloproct. 1998; 51: 1067-75. Japanese.

71. Saito T, Sasaki K, Tokunaga Y. [Hemorrhoidectomy at Osaka Kitateishin Hospital]. RInshokoumonbyougaku. 2009; 1(1): 37-40. Japanese.

72. Shoaib M, Ali AA, Naqvi N, et al. Open versus closed hemorrhoidectomy: an experience at mayo hospital. Ann King Edward Med Coll. 2016 Jun 24; 9: 65-8.

73. Malik GA, Wahab A, Ahmed I. Hemorrhoidectomy: open versus closed technique. J Surg Pak. 2009 Oct; 14(4): 170-2.

74. Ho YH, Buettner PG. Open compared with closed haemorrhoidectomy: meta-analysis of randomized controlled trials. Tech Coloproctol. 2007 Jun 1; 11(2): 135-43.

75. Johannsson HO, Pahlman L, Graf W. Randomized clinical trial of the effects on anal function of Milligan-Morgan versus Ferguson haemorrhoidectomy. Br J Surg. 2006 Oct 1; 93(10): 1208-14.

76. Kosugi M, Iwaki T. New rubber-band loader to facilitate use of hemorrhoid ligator. Dis Colon Rectum. 1998 Oct 23; 41(10): 1328-9.

77. Tomiki Y, Higashiyama A, Okada T, et al. Evaluation of endoscopic hemorrhoidal ligation in 119 patients. Dig Endosc. 2003 Jan 1; 15(1): 30-4.

78. Kondo Y. [Endoscopic hemorrhoid sclerotherapy]. Geka. 2007; 69: 1013-6. Japanese.

79. Saeed N, Khan MY, Khan NM-U-R. Comparison of rubber band ligation versus injection sclerotherapy in second-degree haemorrhoids. Medical Forum Monthly. 2009; 20: 40-44.

80. Ali U, Samad A. Rubber band ligation versus open hemorrhoidectomy: a study of 100 cases. J Postgrad Med Inst. 2005 Jul 10; 19(3): 217-22.

81. Rivadeneira DE, Steele SR, Ternent C, et al. Practice parameters for the management of hemorrhoids (Revised 2010). Dis Colon Rectum. 2011 Sep 1; 54(9): 1059-964.

82. MacRae HM, McLeod RS. Comparison of hemorrhoidal treatment modalities: a meta-analysis. Dis Colon Rectum. 1995 Jul 1; 38(7): 687-94.

83. Shanmugam V, Thaha MA, Rabindranath KS, et al. Systematic review of randomized trial comparing rubber band ligation with excisional haemorrhoidectomy. Br J Surg. 2005 Dec 1; 92(12): 1481-7.

84. Shanmugam V, Thaha MA, Rabindranath KS, et al. Rubber band ligation versus excisional haemorrhoidectomy for haemorrhoids. Cohrane Database Syst Rev. CD005034. 2005 Jan 1.

85. Kurokawa A, Kitsuki K, Ikeda I, et al. [Pathological changes of ALTA therapy]. Rinshokoumonnbyogaku. 2009; 1: 17-26. Japanese.

86. Takano M, Iwadare J, Ohba H, et al. Sclerosing therapy of internal hemorrhoids with a novel sclerosing agent comparison with ligation and excision. Int Colorectal Dis. 2006 Jan 26; 21(1): 44-51.

87. Kurokawa A, Kitsuki K. [Minimally invasive surgery]. Rinsho-

geka. 2012; 67: 655-9. Japanese.

88. Saitho T, Sasaki H, Tokunaga Y. [Sclerotherapy for internal hemorrhoids]. Rinshogeka. 2008; 63: 111-7. Japanese.

89. Tsuji Y. [Efficacy of ligation & excision and ALTA for hemorrhoids]. Gekachiryo. 2008; 99: 301-4. Japanese.

90. Hachiro H, Abe T, Kunimoto M. [ALTA for anal diseases: experience of 1000 cases]. J Jpn Coloproct. 2008; 61: 216-20. Japanese.

91. Hachiro H, Abe T, Kunimoto M. [New sclerotherapy for hemorrhoids: clinical experience of 2000 cases]. J Jpn Coloproct. 2006; 59: 317-21. Japanese.

92. Abe T, Hachiro H, Kunimoto M. [Comparisons of ALTA and ligation & excision]. J Jpn Coloproct. 2007; 60: 213-7. Japanese.

93. Tsujinaka Y, Hamahata Y, Matsuo K. [PPH using circular stapler for circular stapler and postoperative outcomes]. J Jpn Coloproct. 2001; 54: 896-900. Japanese.

94. Kam MH, Ng KH, Lim JF, et al. Results of 7302 stapled haemorrhoidectomy operation in a single centre: a seven-year review and follow-up questionnaire survey. ANZ J Surg. 2011 Apr 1; 81(4): 253-6.

95. Sakr MF, Moussa MM. LigaSure hemorrhoidectomy versus stapled Hemorrhoidopexy: a prospective, randomized clinical trial. Dis Colon Rectum. 2010 Aug 1; 53(8): 1161-7.

96. Faucheron JL, Voirin D, Abba J. Rectal perforation with life-threatening peritonitis following stapled haemorrhoidopexy. Br J Surg. 2012 Jun 1; 99(6): 746-53.

97. Khan NF, Shah SSH, Bokhari S, et al. Outcome of stapled haemorrhoidectomy versus Milligan Morgan's haemorrhoidectomy. J Coll Physicians Surg Pak. 2009 Sep 1; 19(9): 561-5.

98. Ganio E, Altomare DF, Milito G, et al. Long-term outcome of a multicenter randomized clinical trial of stapled haemorrhoidpexy versus Milligan-Morgan haemorrhoidectomy. Br J Surg. 2007 Aug 1; 94(8): 1033-7.

99. Morpurgo E, Termini B, Tosato SM, et al. Anorectalmanometric changes after standard and stapled hemorrhoidectomy. J Pelvic Surg. 2008 Jan 1; 14(1): 51-5.

100. Masuda Y, Kurokawa A, Hata Y. [Practice and postoperative outcomes of classical hemorrhoid ligation - separate ligation]. J Jpn Coloproct. 1998; 51: 1087-93. Japanese.

101. Ishiyama Y, Tarumi K, Ishiyama G, et al. [Anal cushion lifting method]. Rinshokoumonnbyogaku. 2013; 5: 29-33 Japanese.

102. Morinaga K, Hasuda K, Ikeda T. A novel therapy for internal hemorrhoids: ligation of the hemorrhoidal artery with a newly devised instrument (Moricorn) in conjunction with a Doppler flowmeter. Am J Gastroenterol. 1995 Apr 1; 90(4): 610-3.

103. Infantino A, Bellomo R, Dal Monte PP, et al. Transanal haemorrhoidal artery echodoppler ligation and anopexy (THD) is effective for II and III degree haemorrhoids: a prospective multicentric study. Colorectal Dis. 2010 Aug 1; 12(8): 804-9.

104. Szmulowicz UM, Gurland B, Garofalo T, et al. Doppler-guided hemorrhoidal artery ligation: the experience of a single institution. J Gastrointest Surg. 2011 May 1; 15(5): 803-8.

105. Beck DE. Benign rectal, anal, and perineal problems. ACS Surgery: Principles and Practice. 2004; 17: 1-12.

106. Mounsey AL, Henry SL. Which treatments work best for hemorrhoidectomy? J Fam Pract. 2009; 58: 492-3.

107. Cataldo P, Ellis CN, Gregorcyk S, et al. Practice parameters for the management of hemorrhoids (revised). Dis Colon Rectum. 2005 Feb 1; 48(2): 189-94.

108. Rivadeneira DE, Steele SR, Ternent C, et al. Practice parameters for the management of hemorrhoids (revised 2010). Dis Colon Rectum. 2011 Sep 1; 54(9): 1059-64.

109. Greenspon J, Williams SB, Young HA, et al. Thrombosed external hemorrhoids: outcome after conservative or surgical management. Dis Colon Rectum. 2004 Sep 1; 47(9): 1493-8.

110. Jongen J, Bach S, Stübinger SH, et al. Excision of thrombosed external hemorrhoid under local anesthesia: a retrospective evaluation of 340 patients. Dis Colon Rectum. 2003 Sep 1; 46(9): 1226-31.

111. Tsuji Y, Takano K, Kuromizu J. [Examination of postoperative pain of hemorrhoids]. J Jpn Coloproct. 1999; 52: 519-23. Japanese.

112. Tsuji Y, Tsuji T, Tsuji T. [Analysis and measures of postoperative stenosis after hemorrhoidectomy]. J Jpn Coloproct. 2003; 56: 132-6. Japanese.

113. Smith M. Early operation for acute haemorrhoids. Br J Surg. 1967 Feb 1; 54(2): 141-4.

114. George B, Moti K. Urgent hemorrhoidectomy for hemorrhoidal thrombosis. Dis Colon Rectum. 1979 Apr 1; 22(3): 159-61.

115. Howard PM, Pingree JH. Immediate radical surgery for hemorrhoidal disease with acute extensive thrombosis. Am J Surg. 1968 Nov 1; 116(5): 777-8.

116. Mazier WP. Emergency hemorrhoidectomy: a worthwhile procedure. Dis Colon Rectum. 1973 May 1; 16(3): 200-5.

117. Takano M, Fujiyoshi T, Takagi K, et al. [Surgical treatment for incarcerated hemorrhoids]. J Jpn Coloproct. 1991; 44: 248-53. Japanese.

118. Eu KW, Seow-Choen F, Goh HS. Comparison of emergency and elective haemorrhoidectomy. Br J Surg. 1994 Feb 1; 81(2): 308-10.

119. Hirano K, Yoshioka H. [Ligation and excision method using electorical device]. Arch Jpn Chir. 1993; 62: 249-53. Japanese.

120. Hussain SA, Hussain S. Incision with knife or diathermy and postoperative pain. Br J Surg. 1988 Dec 1; 75(12): 1179-80.

121. Johnson CD, Serpell JW. Wound infection after abdominal incision with scalpel or diathermy. Br J Surg. 1990; 77: 626-627.

122. Hambley R. Wound healing of skin incisions produced by ultrasonically vibrated knife, scalpel, electrosurgery and carbon dioxide laser. J Dermatol Surg Oncol. 1998; 14: 11.

123. Maemura K. [Ultrasonic scalpel, intestinal anastomosis, tissue injury, wound healing, microangiography]. Nishogekaishi. 2000; 33(2): 163-8. Japanese.

124. Chung CC, Ha JPY, Tai YP, et al. Double-blind, randomized trial comparing harmonic scalpel TM hemorrhoidectomy, bipolar scissors hemorrhoidectomy, and scissors excision. Dis Colon Rectum. 2002 Jun 1; 45(6): 789-94.

125. Armstrong DN, Ambroze WL, Schertzer ME, et al. Harmonic Scalpel vs. electrocautery hemorrhoidectomy: a prospective evaluation. Dis Colon Rectum. 2001 Apr 30; 44(4): 558-64.

126. Tan LJY, Seow-Choen F. A prospective, randomized trial comparing diathermy and Harmonic Scalpel hemorrhoidectomy. Dis Colon Rectum. 2001 May 31; 44(5): 677-9.

127. Nienhuijs SW, de Hingh IHJT. Conventional versus LigaSure hemorrhoidectomy for patients with symptomatic hemorrhoids (Review). Cochrane Database of Syst Rev. 2013; 4: 4799-807.

128. Kwok SY, Chung CC, Tsui KK, et al. A double-blind, randomized trial comparing Ligasure TM and Harmonic Scalpel TM hemorrhoidectomy. Dis Colon Rectum. 2005 Feb 1; 48(2): 344-8.

129. Mastakov MY, Buettner PG, Ho YH. Updated meta-analysis of randomized controlled trials comparing conventional excisional haemorrhoidectomy with LigaSure for haemorrhoids. Tech Coloprotocol. 2008 Sep 1; 12(3): 229-39.

130. Sakr MF. LigaSure versus Milligan-Morgan hemorrhoidectomy: a prospective randomized clinical trial. Tech Coloprotocol. 2010 March 1; 14(1): 13-7.

131. Peters CJ, Botterill I, Ambrose NS, et al. Ligasure™ vs conventional diathermy haemorroidectomy: long-term follow-up of a randomized clinical trial. Colorectal Dis. 2005 Jul 1; 7(4): 350-3.

132. Usui Y. [ICG dye enhanced diode laser therapy for hemorrhoids: a new procedure]. J Jpn Coloproct. 2001; 54: 921-5. Japanese.

133. Utsunomiya K, Shibata O, Kikuta S, et al. [Characteristic features of noncontact of Nd: YAG laser and diode to excised hemorrhoid tissues]. J Jpn Coloproct. 2004; 57: 435-44. Japanese.

134. Pandini LC, Nahas SC, Nahas, CSR, et al. Surgical treatment of haemorrhoidal disease with CO2 laser and Milligan-Morgan cold scalpel technique. Colorectal Dis. 2006 Sep 1; 8(7): 592-5.

135. Haga S, Matsumoto N, Kato H, et al. Usefulness of laser cautery in hemorrhoidectomy. J Jpn Coloproct. 1990; 43(7): 1415-8. Japanese.