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EDITORIAL OPEN ACCESS

Laser Sclerotherapy of hemorrhoids: A novel, safe, painless and well promising approach

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Hemorrhoidal disease is one of the most common diseases affecting rectum. The worldwide prevalence varies widely among several studies and ranges from 2.9% up to 50%. Many of these patients will develop symptoms and 20-30% of them will finally seek advice form a colorectal surgeon or proctologist. The disease is more common in adult men between 45-65 years old [1, 2].

Normally there are 3 hemorrhoid plexus in humans (right anterior, right posterior and left lateral). These plexus are normal part of the anal canal and have two main functions in the area. They protect the mucosa of anal canal and prevent incontinence by closing the anal canal during rest [1, 3].

In terms of surgical anatomy, hemorrhoids are considered to be due to Treitz muscle (suspensory muscle) displacement downwards. Normally the vascular cushions are contributing not only in the circulation of the area but also in maintaining the continence by keeping the anal canal closed tightly. The symptoms of hemorrhoid disease are well known to every surgeon and include bleeding, itching, pain and the presence of a lump in anus [3].

There have been described three types of hemorrhoids, the internal, the external and the mixed. As far as it concerns the hemorrhoidal disease in general is divided in four grades [4] (Table 1).

Since the era of Hippocrates several methods and therapies for the treatment of hemorrhoidal disease have been proposed over the time. Many physicians and authors suggest conservative means and non-surgical treatments while some other support the option of a surgical intervention which seems to be more effective and permanent [1, 4, 5].

Most specialists suggest that hemorrhoid disease grade I and II should be treated initially by conservative means, and operative means should be applied only in case of recurrence or failure to control the symptoms. On the other hand, in grade III to IV the treatment should be operative. Some authors include in the indications for operative management also the presence of a significant external component, hypertrophied papillae, associated fissure and the extensive thrombosis [6].

Conservative management includes medication, crèmes, dietary modifications, changes in common day habits. Some authors consider also rubber band ligation, sclerotherapy, cryotherapy and infrared coagulation as conservative means, while some others include them at minimally invasive means [2, 6].

The surgical treatment of hemorrhoid disease can be divided into the classic surgical procedures and the minimally invasive surgical techniques. The most common procedures during the past 60 years used to be the open hemorrhoid removal (Milligan-Morgan technique) and the closed hemorrhoidal dissection (Ferguson technique), that are recognized worldwide and considered the past decades as the gold standard in the treatment of hemorrhoid disease. Although these techniques present good results there were many problems that initiate

Table 1: Hemorrhoidal Disease Grade

Hemorrhoidal disease grade	
1st Degree	The hemorrhoids bulge slightly into the anal canal beyond the dental line. This happens during straining defecation.
2nd Degree	The hemorrhoids prolap through anus but they reduce spontaneously.
3rd Degree	The hemorrhoids prolapsed through anus but manual reduction is required to insert them into anal canal.
4th Degree	The hemorrhoids prolaps, cannot be reduces, there is bleeding and increased risk for strangulation.

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experts to develop different procedures and techniques. The most common problems associated with the classic open surgical techniques applied in the treatment of hemorrhoid disease are the severity and the duration of postoperative pain, bleeding, urinary retention, anal stenosis, development of fissure or abscess, incontinence and finally the possibility of re-operation [5].

The past two decades the Longo procedure and the Hal-Rar techniques gained supporters, because the offered an alternative operative possibility with significantly decreased postoperative pain, although both of them present advantages and disadvantages. The THD procedure seems to offer less pain and better results, especially when it is combined with hemorrhoidoplasty [7, 8].

The last twenty years several attempts to establish laser in the treatment of hemorrhoidal disease have been performed. Most of the surgeons and the researches focused on the CO_2 laser that used to dissect the hemorrhoids. This laser used instead of scalpels and scissors but fail to diminish the postoperative pain which is the main problem of almost every surgical procedure in the area. In all these methods and techniques hemorrhoids are removed, thus means that we have tissue removal [8, 9, 10].

Diode laser techniques

On the contrary to all these techniques a novel approach has been developed recently and promises to treat hemorrhoids without tissue removal. The recent developments in diode laser and laser fibers technology had a crucial contribution to these modern non-excisional techniques for hemorrhoid treatment.

The most common techniques for hemorrhoid disease laser treatment are the Help technique, the LHP technique and recently the novel LSH technique or ELITE technique. In the first two an external 980nm diode laser source is used for energy production. In Help technique an ultrasound probe is used to identify the main hemorrhoidal vessel above the dental line before entering into the pile and then laser beam energy is applied to thrombose the vessel. Finally, after few days the hemorrhoid pile shrinks as a result of the blood blow stop caused by the external laser energy application. As many authors suggest this technique presents significant advantages including decreased postoperative pain, safety, immediate decrease of all other symptoms, but there may still be a concern about the recurrence rate and the possible efficacy in 4th degree hemorrhoids. A recent study suggests that the two years recurrence rate is about 5% [11–13].

For LHP (Laser HemorrhoidPlasty) a diode laser emitting light at 980nm is applied. The light energy is transferred via a special 1000nm fiber that allows radial emission of the energy in its tip. A 980nm diode laser source is used for energy production. The fiber is inserted into the hemorrhoid pile via a small hole made in the anoderma by electrodiathermy. The energy can be applied continuously or in a pulse mode. The most usual protocol includes three pulses of a power of 15W lasting for 1.2sec, with a 0.6sec interval between them. The energy is applied to submucosal tissues into the inner of the hemorrhoid pile and thus hemorrhoid vessels are destroyed by photopexy. The energy transmission should be limited only into the hemorrhoids otherwise may cause thermal problems in the normal adjacent tissues. Many studies that have been published indicate that this technique presents significant advantages including decreased postoperative pain, safety, immediate decrease of all other symptoms, early recovery, and immediate discharge from the hospital, while some others suggest that the present technique should be performed under local anesthesia [13, 14].

Elite technique (or laser sclerotherapy of hemorrhoids)

The main difference of LSH or Elite technique is that an external 1470 nm diode laser source is used instead of the 980 nm one, and the radial fiber for energy transfer is 600nm instead of 1000 nm. The operation can be performed under general, epidural, codal or local anesthesia. The type of anesthesia depends on the problem, the patient's preference, the general condition of the patients and the existing health problems, and finally on surgeon's experience and preference. We suggest general anesthesia for beginners and caudal anesthesia for more experienced surgeons [15].

A special probe (CORONA Hemorrhoid Probe, neoLaser, Caesarea Israel), containing a bare fiber within a special conical glass tip is used. The special glass tip provides wide illumination of laser light, ensuring a gentle application of energy, while having a sharp distal end for easy tissue penetration. The probe is transferred through a special 14G 6 cm marked metal cannula (Figure 1). The probe is introduced through the anal prolapse under the surface of the anoderma and inserted via submusocal space till about 2 cm above the hemorrhoid cushion (Figure 2). The probe is connected to a 1470 nm laser (neoV1470, neoLaser, Caesarea Israel), and the laser is set to a power of 6 Watts with a single pulse of 3 seconds duration. The energy was delivered in single shots of 3 seconds. During each shot, the probe was held in position while being gently rotated around its axis to ensure uniform application of light and prevention of adherence to the tissue. We move the tip for 3 mm and repeat the process until the whole hemorrhoid pile is treated. We should remember that we start form the distal part and we pull back till the entrance point. When the hemorrhoid vessel is destroyed by photopexy the surgeon should notice a change in the color of the mucosa. The procedure is repeated in the same manner until all hemorrhoids treated successfully. Skin tags can also be removed with the same fiber, although a slightly higher energy is required (10W). After completing the

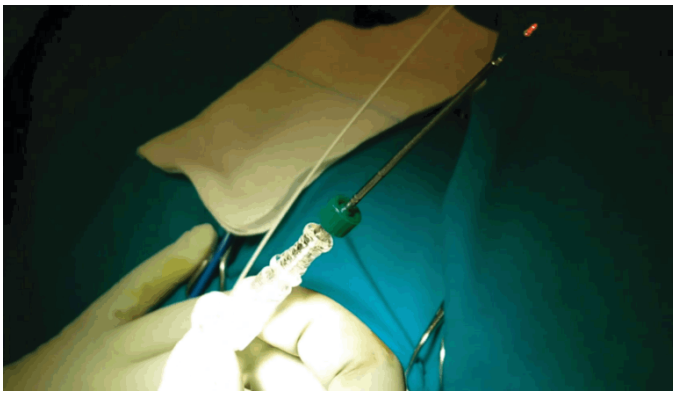

Figure 1: A special probe (CORONA Hemorrhoid Probe, neoLaser, Caesarea Israel), containing a bare fiber within a special conical glass tip is used. The special glass tip provides wide illumination of laser light, ensuring a gentle application of energy, while having a sharp distal end for easy tissue penetration. The probe is transferred through a special 14G 6cm marked metal cannula.

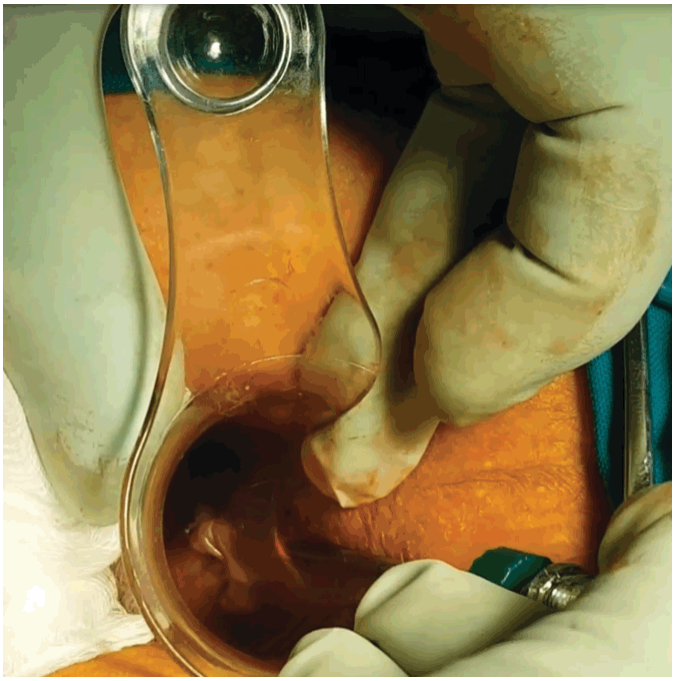

Figure 2: The probe is introduced through the anal prolapse under the surface of the anoderma and inserted via submusocal space till about 2 cm above the hemorrhoid cushion. The laser is set to a power of 6 Watts with a single pulse of 3 seconds duration. The energy was delivered in single shots of 3 seconds. During each shot, the probe was held in position while being gently rotated around its axis to ensure uniform application of light and prevention of adherence to the tissue.

therapy the patient is discharged. The time of hospital staying depends mainly on the type of anesthesia used.

Several studies compared the efficacy of the various hemorrhoid laser treatments to rubber banding and to existing common surgery procedures as Millingan-Morgan, ligature removal etc. All of these studies indicate that laser techniques present similar or even better results and may present a safe and effective alternative approach in hemorrhoidal disease treatment. LSH technique uses notably lower energy and that has a result a notably faster recovery and ability to return to normal activities while the perioperative pain seems to be significantly decreased. Although, spontaneously hematomas and edemas have been reported, their incidence remains very low. Postoperative infections haven't been reported. The perioperative bleeding is minimal, there is no urinary retention postoperatively, and the need for postoperative analgesics is significantly decreased. The main advantages of these minimally invasive treatments for hemorrhoidal disease are the significant decrease on postoperative pain intensity and duration and that they minimize the possibility of anal sphincter damage with subsequent incontinence development. A possible disadvantage is likely to be the need of single use fibers that increase the cost of the treatment [2, 16, 17].

The existing data suggest that diode laser is a safe, painless and efficient alternative for the treatment of hemorrhoids, although there are still enough to be clarified. More perspectives well organized studies with longer follow up are required to demonstrate the exact advantages of these techniques and especially to define the recurrence rate [2, 17].

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