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## **Doppler-guided laser photocoagulation of haemorrhoidal arteries**

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Read at:

Laser and haemorrhoidal kits were provided by biolitec AG

### **Summary**

Doppler-guided ligation of the distal branches of the haemorrhoidal arteries is a recently developed technique for treating haemorrhoids with good results. Although local, general or epidural anaesthesia is necessary and ambulatory treatment is difficult. A new technique is described for treating haemorrhoids using a 980 biolitec diode laser uncoupled with Doppler for photocoagulation of the distal branches of hemorrhoidal arteries. 167 Patients were treated in the last two years. Ambulatory treatment was done in all patients; anaesthesia or analgesia were unnecessary. Mild intraoperative and post-operative complications were seen. 95 per cent of Patients have an improvement of their hemorrhoidal symptoms one to twelve months after treatment. Doppler-guided laser treatment of hemorrhoidal arteries is, then, a good and safe method for ambulatory treatment of haemorrhoids.

### **Introduction**

In 1995 Morinaga (1) proposed a new method for treating hemorrhoids, based on new principles on hemorrhoidal aetiopathogenesis, doppler-guided ligation of the haemorrhoidal arteries using a specially adapted proctoscope with an incorporated Doppler probe. This is inserted into the anus and the doppler locates the branches of the haemorrhoidal arteries by an audible alteration in signal. Once located, a needle holder is inserted into the lumen of the proctoscope and the artery ligated with an absorbable suture into the submucosa. The procedure is repeated until no more Doppler signals are identified.

We propose a new technique for treatment of haemorrhoids, based on the anatomical and aetiopathogenetic principles used for doppler-guided ligation of hemorrhoidal arteries, consisting of a mired photocoagulation, with a 980 diode laser, of the branches of the superior hemorrhoidal arteries.

### **Materials and method:**

The system consisted of a 980 diode laser manufactured by biolitec and a set of Doppler, anoscope and light source accessory (by

biolitec AG) to identify and close the branches of superior hemorrhoidal artery; an aspiration is also provided to eliminate the fumes produced by laser coagulation of tissues.

An anoscope is inserted into the anal canal above the hemorrhoidal cushions and mixed laser submucosal branches of hemorrhoidal arteries photocoagulation, guided by ultrasound doppler (20MHz probe of 3 mm. diameter), is done, verifying with the same doppler the arteries closure caused by laser photocoagulation.

Photocoagulation is done with a 1000 micron laser fibre positioned up to the rectal mucosa; coagulation is done four times with pulsed laser ( each of 18 joules for a total of about 72 joules, at a potence of 14 watts) for any artery's closure.

The procedure is repeated rotating the anoscope for each of the submucosal branches of the superior hemorrhoidal arteries.

No anaesthetic or analgesic procedure is necessary.

The procedure's duration is about fifteen minutes; the treatment is ambulatorial and the patient is demitted early after operation.

More than one system was examined to facilitate the procedure and the best demonstrable was a system using a 20 MHz laser probe encoupled with 980 laser diode and 1000 micron laser fibre, all provided by biolitec.

167 patients with symptomatic second degree hemorrhoids who had episodes of anal pain, bleeding, and prolapse were treated at the surgical operative unit of surgery of the Sicily's hospital.

All patients received preoperative rectosigmoidoscopy.

7, 14, 30 and 90 days (up to 12 months) after treatment the patients were examined with proctoscope.

## Results

Intraoperative complications consisted of mild pain in 10 patients (anaesthetic treatment was unnecessary), mild tenesmus in 20 patients, hemorrhagic complications that required surgical treatment (ligation) in 2 patients, bleeding requiring only laser treatment.

For 2-5 days tenesmus in 60 patients and emission of mucus or bleed in 40 patients were present ; these symptoms disappeared within 30 days in all patients without significative discomfort. .

A patient had an hemorrhagic complication at home, 7 days after treatment; he was reamitted to the hospital, but no evident hemorrhagic lesion was demonstrable endoscopically.

95% of patients had an improvement of their hemorrhoidal sintomatology 30 days after operation

Intraoperative data was available in 167 patients (table 1) whereas post-operative data were available in 98 patients (table 2)

Table 1: Intraoperative complications

Intraoperative complication	n° patients
Mild pain	10/167 (6%)
Tenesmus	20/167 (12%)
Mild hemorragey (laser treatment)	45/167 (27%)
Hemorragey (surgical treatment)	2/167 (1%)

Table 2: Post-operative complications

Complication	n° patients
Tenesmus	60/98 (61%)
Mucus or bleeding	40/98 (41%)
Hemorragey	1/98 (1%)

Photocoagulation causes a necrosis of mucosal and submucosal tissues and closure of arteries at doppler examination; this endoscopic necrotic aspect persists for 7-14 days after operation. Retraction of hemorrhoidal cushioning are also evident after 7-14 days after operation and increase up to 90 days, determining complete or partial reduction of prolapse.

#### DISCUSSION:

Despite their vascular appearance and tendency to bleed, the development of haemorrhoids may be due to a connective tissue disorder and an absolute or relative increased blood flow from superior hemorrhoidal arteries. (2)

Arteriovenous anastomoses within the submucosa are thought to contribute to

the increase in volume of the anal cushions (3). This arterial component explains why haemorrhoidal bleeding has the appearance and pH of arterial blood. (4)

Superior hemorrhoidal artery ligation, the new technique proposed in 1995 by Morinaga, was considered safe and effective for hemorrhoidal cure.

Doppler-guided ligation of the haemorrhoidal arteries was first described in 1995, and has become increasingly popular in Europe. From 1995 many surgeons reported good results from superior hemorrhoidal artery ligation. (5) (6) (7) (8)

Studies of the haemorrhoidal branches of the superior rectal arteries showed an average of 3-6 branches reaching the anal cushions. (9) (10) (11)

Doppler-guided ligation of the haemorrhoidal arteries both disrupts the arterial inflow and tethers the mucosa, causing the haemorrhoidal mass to shrink and retract.

Unfortunately the procedure tends to be carried out under general anaesthesia, but some patients are able to tolerate it under sedation.

The photocoagulation with laser of the branches of the superior hemorrhoidal arteries both close the arteries and fix the rectal mucosa and submucosa to the muscular layer, causing a retraction of the hemorrhoids and an impediment to their prolapse through the anal canal, other than closure of the arteries.

The technique is safe and causes minimal pain or discomfort to the patient. The post operative recovery is faster than alternative approaches, with very few complications. Anaesthesia or analgesia are no longer required as it is in most other successful methods, greatly reducing complications, simplifying and making the treatment safer and faster..

In conclusion:

The photocoagulation of terminal branches of hemorrhoidal arteries with laser system of present invention has many advantages when compared to other treatment methods. Use of small sized newly designed anoscope is relatively painless and causes less discomfort to the patient when inserted into anal opening. Since anaesthesia is not used, the patient can be discharged immediately as it is a quick and easy procedure performed in few minutes with minimal or no post-operative pain. Further with no anaesthesia required, there are no related complications.

During the procedure the position of laser fiber near to the hemorrhoidal cushion can be monitored using Doppler. This also prevents damaging of other normal vessels in the rectal and anal regions. Complete closure of each damaged artery is checked after the procedure. The sclerosis of the submucosa with fixation of the planes of the rectal wall prevents prolapse. Patient can return to normal activity after the procedure with no or minimal post operative pain. Late and immediate results are excellent.

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