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# Safety and efficacy of superior rectal artery embolization with particles and metallic coils for the treatment of hemorrhoids (Emborrhoid technique)

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**KEYWORDS**
Interventional imaging;
Percutaneous arterial embolization;
Hemorrhoids;
Rectal artery;
Emborrhoid

**Abstract**
*Purpose:* The purpose of this study was to comprehensively evaluate the short-term outcomes after percutaneous embolization of the superior rectal artery (SRA) with metallic coils and particles for the management of hemorrhoids.
*Materials and methods:* Forty patients (15 men, 25 women) with a mean age of 35 ± 5 years (SD) (range: 25—65 years) were prospectively enrolled. All patients had symptomatic hemorrhoids. The distribution of internal hemorrhoids was as follows: grade I ($n = 6$, 16%); grade II ($n = 28$, 69%) and grade III ($n = 6$; 15%). All patients had percutaneous embolization of the SRA with metallic coils and synthetic polyvinyl alcohol particles. Follow-up evaluation included clinical examination, rectoscopy, histopathological analysis of rectal mucosa, duplex Doppler blood flow quantification, electromyography, sphincterometry of the anal sphincter and analysis of patient satisfaction.

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*Results:* No immediate complications were observed and no patients had anal pain syndrome after embolization. Hemorrhoids showed a 43% size reduction after embolization ($P < 0.05$). Taking into account the symptom resolutions such as irritation, discomfort, bloody discharge and pain, satisfaction was observed in 5/6 (83%) patients with grade III hemorrhoids and 32/34 patients (94%) with grades I—II hemorrhoids. One month after embolization, anal sphincter contractility normalized and no changes in anal electromyography were observed. Blood flow in the hemorrhoidal plexus dropped from $109 \pm 1.2$ ml/min/100 g (SD) before treatment to $60.2 \pm 4.4$ ml/min/100 g (SD) ($P < 0.05$) the day after embolization and remained unchanged one month after embolization.

*Conclusion:* Our study demonstrates that embolization of SRA with particle and coils does not lead to ischemia in patients with symptomatic hemorrhoids. Short-term results with regard to symptom management for hemorrhoidal disease are very encouraging and should stimulate further prospective and multicenter studies.



The development of endovascular techniques offers new possibilities to treat vascular diseases that were previously managed using more aggressive treatments. Of these, internal hemorrhoids have been subjected to major changes. Elective Doppler ultrasound-guided hemorrhoidal artery ligation has expanded the potential for occluding the arterial feeders of hemorrhoidal nodes by direct ligation under Doppler ultrasound guidance [1]. After shrinking to normal size, the remaining internal hemorrhoidal nodes continue aiding anal continence. Although local complications such as infections, sphincter trauma and anal pain syndrome still remain an issue, Doppler ultrasound-guided hemorrhoidal artery ligation and other minimally invasive techniques have reduced their incidence [2].

More recently arterial embolization has been applied to patients with internal hemorrhoids [3,4]. This technique, described, as the Emborrhoid technique, is the latest treatment for symptomatic hemorrhoids and is based on endovascular coil-embolization of superior rectal artery (SRA) [3,4]. Angiography of SRA allows a complete rectal angioarchitecture assessment and if needed an occlusion of its distal branches. Because it is an emerging technique, its detailed physiologic and histologic outcomes are not yet completely evaluated.

The purpose of our study was to comprehensively evaluate the short-term outcomes after percutaneous embolization of the SRA with metallic coils and particles for the management of hemorrhoids.

## Materials and methods

### Patients

This prospective study received institutional board review and approval by the ethics committee. Informed consent was obtained from all patients prior to inclusion.

A total of 40 patients were recruited during a six-year period (2005—2010). There were 25 women and 15 men, with a mean age of $35 \pm 5$ years (SD) (range: 25—65 years). All patients predominantly complained of bleeding and discomfort due to chronic internal hemorrhoids.

Inclusion criteria consisted of having grades I—III chronic internal hemorrhoids according to Goligher's classification [5]. Patients agreed to receive this treatment after full explanation and discussion. No patients had any contraindications to conventional angiography such as allergies to iodinated contrast medium, medications or renal function impairment. The distribution of internal hemorrhoids was as follows: grade I ($n = 6$; 16%); grade II ($n = 28$; 69%) and grade III ($n = 6$; 15%).

### Embolization technique

The femoral artery was punctured using the Seldinger technique under local anesthesia. A guiding catheter (6-F or 7-F) was placed at the origin of the inferior mesenteric artery for selective angiogram. Angiography of the lower mesenteric artery (Fig. 1) was performed using 10—15 ml of non-ionic iodinated contrast agent. Embolization was performed through a 5-F catheter that was installed exactly above the point of division of the SRA into distal branches. Non-lysing synthetic polyvinyl alcohol (PVA) particles (Ivalon®, Ivalon International Therapeutics, Fremont, CA, USA) and standard metallic coils (Gianturco®, Cook Europe, Bjaeverskov, Denmark) were used with embolic agents delivered by hydraulic method. PVA particles of small diameter (0.3 mm) were used for occluding the distal branches of the SRA. Embolization was further completed with 3—5 mm metallic coils that were placed in the SRA trunk. Endovascular intervention was carried out until the ''end point'' was achieved (i.e., neither flow in the SRA distal branches nor any opacification of terminal branches in the projection of the hemorrhoids). After the procedure, a compression bandage was applied to the

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