

World Journal of *Gastroenterology*

World J Gastroenterol 2024 November 14; 30(42): 4518-4596



EDITORIAL

- 4518 Sepsis-associated liver injury: Mechanisms and potential therapeutic targets
Chen JW, Liu CY, Li S, Wu SW, Cai C, Lu MQ

ORIGINAL ARTICLE**Retrospective Study**

- 4523 Comparing gastrointestinal dysfunction score and acute gastrointestinal injury grade for predicting short-term mortality in critically ill patients
Shen C, Wang X, Xiao YY, Zhang JY, Xia GL, Jiang RL

Prospective Study

- 4532 Strategic insights into the cultivation of pancreatic cancer organoids from endoscopic ultrasonography-guided biopsy tissue
Yang JL, Zhang JF, Gu JY, Gao M, Zheng MY, Guo SX, Zhang T

Basic Study

- 4544 Transfection of 12/15-lipoxygenase effectively alleviates inflammatory responses during experimental acute pancreatitis
Sun HW, Bai YY, Qin ZL, Li RZ, Madzikatire TB, Akuetteh PDP, Li Q, Kong HR, Jin YP

CASE REPORT

- 4557 Esophageal melanosis: Two case reports and review of literature
Kazacheuskaya L, Arora K

LETTER TO THE EDITOR

- 4566 Colon cancer screening programs prevent cancer
Flynn DJ, Feuerstein JD
- 4569 Does hemorrhoidal artery embolization really benefit patients with hemorrhoids?
Lei ML, Dong LL, Zhang HP, Yu YB
- 4576 Metabolic dysfunction-associated steatotic liver disease: The question of long-term high-normal alanine aminotransferase as a screening test
Moyana TN
- 4583 Endoscopic polidocanol foam sclerobanding for treatment of internal hemorrhoids: A novel outpatient procedure
Mou AN, Wang YT

- 4587** Evaluation of the GATIS score for predicting prognosis in rectal neuroendocrine neoplasms
Feng YN, Liu LH, Zhang HW
- 4591** *Helicobacter pylori*, esophageal precancerous lesions, and proton pump inhibitor overuse
Zhang F, Zhang H, Liu YM, Tang FS

ABOUT COVER

Editorial Board Member of *World Journal of Gastroenterology*, Ce-Fan Zhou, PhD, Professor, School of Life and Health Sciences, Vice Dean of Biomedical Research Institute, National "111" Center for Cellular Regulation and Molecular Pharmaceutics, Hubei University of Technology, Wuhan 430068, Hubei Province, China.
cefan@hbut.edu.cn

AIMS AND SCOPE

The primary aim of *World Journal of Gastroenterology* (*WJG, World J Gastroenterol*) is to provide scholars and readers from various fields of gastroenterology and hepatology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online. *WJG* mainly publishes articles reporting research results and findings obtained in the field of gastroenterology and hepatology and covering a wide range of topics including gastroenterology, hepatology, gastrointestinal endoscopy, gastrointestinal surgery, gastrointestinal oncology, and pediatric gastroenterology.

INDEXING/ABSTRACTING

The *WJG* is now abstracted and indexed in Science Citation Index Expanded (SCIE), MEDLINE, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2024 edition of Journal Citation Reports® cites the 2023 journal impact factor (JIF) for *WJG* as 4.3; Quartile: Q1. The *WJG*'s CiteScore for 2023 is 7.8.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Ying-Yi Yuan*; Production Department Director: *Xiang Li*; Cover Editor: *Jia-Ru Fan*.

NAME OF JOURNAL

World Journal of Gastroenterology

ISSN

ISSN 1007-9327 (print) ISSN 2219-2840 (online)

LAUNCH DATE

October 1, 1995

FREQUENCY

Weekly

EDITORS-IN-CHIEF

Andrzej S Tarnawski

EXECUTIVE ASSOCIATE EDITORS-IN-CHIEF

Jian-Gao Fan (Chronic Liver Disease)

EDITORIAL BOARD MEMBERS

<http://www.wjgnet.com/1007-9327/editorialboard.htm>

PUBLICATION DATE

November 14, 2024

COPYRIGHT

© 2024 Baishideng Publishing Group Inc

PUBLISHING PARTNER

Shanghai Pancreatic Cancer Institute and Pancreatic Cancer Institute, Fudan University
Biliary Tract Disease Institute, Fudan University

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

POLICY OF CO-AUTHORS

<https://www.wjgnet.com/bpg/GerInfo/310>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

PUBLISHING PARTNER'S OFFICIAL WEBSITE

<https://www.shca.org.cn>
<https://www.zs-hospital.sh.cn>



Does hemorrhoidal artery embolization really benefit patients with hemorrhoids?

Miao-Lin Lei, Li-Li Dong, Hui-Peng Zhang, Yan-Bo Yu

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade C

Novelty: Grade B

Creativity or Innovation: Grade C

Scientific Significance: Grade B

P-Reviewer: Chen YZ

Received: June 4, 2024

Revised: September 29, 2024

Accepted: October 12, 2024

Published online: November 14, 2024

Processing time: 149 Days and 6.4 Hours



Miao-Lin Lei, Hui-Peng Zhang, Yan-Bo Yu, Department of Gastroenterology, Laboratory of Translational Gastroenterology, Qilu Hospital, Shandong University, Jinan 250012, Shandong Province, China

Li-Li Dong, Department of Gastroenterology, Affiliated Qingdao Third People's Hospital, Qingdao University, Qingdao 266001, Shandong Province, China

Corresponding author: Yan-Bo Yu, MD, PhD, Doctor, Professor, Department of Gastroenterology, Laboratory of Translational Gastroenterology, Qilu Hospital, Shandong University, No. 107 Wenhuxi Road, Jinan 250012, Shandong Province, China. yuyanbo2000@126.com

Abstract

This letter offers commentary on an article published in a recent issue of the *World Journal of Gastroenterology*. Hemorrhoidal artery embolization is a promising approach to severe hemorrhoidal bleeding treatment, but inappropriate patient selection and the use of different embolization procedures may affect the clinical efficacy and cause serious complications. In this article, the most appropriate candidate patients, embolization materials, embolization methods, and clinical evaluation methods are discussed to improve the safety and effectiveness of the procedure.

Key Words: Hemorrhoidal artery embolization; Indications; Contraindications; Complications; Effectiveness

©The Author(s) 2024. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Hemorrhoidal artery embolization (Emborrhoid) is a promising nonsurgical technique for treating severe hemorrhoidal bleeding. The indications, contraindications, effectiveness, and safety of hemorrhoidal artery embolization should be considered to achieve better health outcomes.

Citation: Lei ML, Dong LL, Zhang HP, Yu YB. Does hemorrhoidal artery embolization really benefit patients with hemorrhoids? *World J Gastroenterol* 2024; 30(42): 4569-4575

URL: <https://www.wjgnet.com/1007-9327/full/v30/i42/4569.htm>

DOI: <https://dx.doi.org/10.3748/wjg.v30.i42.4569>

TO THE EDITOR

Hemorrhoidal artery embolization (Emborrhoid) is an effective method of treating bleeding hemorrhoids, preserving anal function, and relieving pain. As reported in their article "Transanal eco-Doppler evaluation after hemorrhoidal artery embolization", Tutino *et al*[1] conducted an observational study on 11 patients who underwent Emborrhoid. The data from that study suggest that Emborrhoid is a minimally invasive, effective, and relatively safe treatment approach. However, embolization is not effective in all patients, and some undesirable complications and failures are not uncommon. Thus, increasing the benefits conferred by Emborrhoid remains challenging.

INDICATIONS AND CONTRAINDICATIONS

For patients with symptomatic hemorrhoidal disease (HD), the current guidelines recommend dietary adjustments and behavioral therapy as the main first-line therapies[2]. Drug treatment can alleviate the clinical symptoms of HD to varying degrees[3]. The conventional excisional methods (Milligan–Morgan, Ferguson procedures) are still an effective treatment for symptomatic 2nd- and 3rd-degree hemorrhoids[4]. However, traditional excisional methods are limited by complications such as pain, bleeding, and fecal incontinence. Emborrhoid is currently available in clinical practice[5]. In a randomized clinical trial, the patients in the superior rectal artery (SRA) embolization group had clinical outcomes similar to those in the Ferguson closed hemorrhoidectomy surgical group, and the patients in the embolization group had relatively lower pain levels[6]. Regarding the short-term outcomes, Emborrhoid is a realistic, safe, and minimally invasive treatment for refractory symptomatic internal hemorrhoids[7].

There are currently no standard indications for Emborrhoid in patients experiencing chronic hemorrhoidal bleeding. It is a safe and effective technique for treating 2nd and 3rd-degree hemorrhoids, particularly in individuals who are not suitable candidates for surgery according to the guidelines provided by the Italian Society of Colorectal Surgery (level 2 evidence, grade C recommendation)[4]. These guidelines provide evidence-based recommendations; however, more studies are needed to determine the ideal candidates for this procedure. Emborrhoid may also be considered in patients with bleeding or surgical contraindications from 1st- or 4th-degree internal hemorrhoids[8,9]. Threatening rectal bleeding is a potential indication for the embolization of hemorrhoidal arteries[10]. Moreover, embolization is prioritized for patients with hemorrhoids who cannot tolerate surgery, have no prior history of surgery, do not have severe prolapse, want treatment, have been diagnosed with vascular abnormalities, or have other correlated factors. For people with severe heart disease and bleeding hemorrhoids, Emborrhoid may be an alternative option to consider[11]. Prior surgery can significantly alter the vascular anatomy, making it not conducive to treatment with embolization. Nonetheless, hemorrhoidal artery embolization remains an acceptable alternative for patients in whom prior surgeries failed[8,10]. Notably, Komekami *et al*[12] reported that rectal arteriovenous malformation (AVM) might be a cause of severe hemorrhage from internal hemorrhoids. Under these conditions, arterial embolization can safely be used to treat both bleeding hemorrhoids and AVMs at the same time. Notably, alternative causes of rectal bleeding, such as radiation proctitis, can be successfully treated with embolization[13]. We summarized the characteristics of the participants in the included studies (Table 1).

Contraindications for endovascular treatment include severe renal impairment, contrast medium allergy, and the lack of vascular access. Other contraindications include acute hemorrhoid complications, chronic anal or perianal fissures, and colorectal cancer[5,14,15]. Emborrhoid in patients with inflammatory bowel disease remains controversial[15,16].

TECHNICAL ASPECTS

The hemorrhoid embolization technique has been previously described (Figure 1). Patients signed a consent form after they were informed of the benefits and risks of the embolization procedure. The embolization procedure was performed under local anesthesia through the right femoral or radial artery using a 5F introducer sheath. Selective angiography of the inferior mesenteric artery was subsequently performed with a Simmons catheter inserted through the vascular sheath. In most cases, the SRA branches were subsequently catheterized and superselected with a 2.4F or smaller microcatheter. Arterial embolization needs to consider choosing appropriate sites and materials. Complete embolization is defined as the absence of distal SRA branch flow and the absence of opacification of the terminal branches in the projection of the hemorrhoids. The extensive use of vascular closure devices helps achieve faster hemostasis and provides early ambulation to patients. Embolization *via* the transradial access is advantageous for outpatients because of its association with a low incidence of vascular complications, early ambulation, and short hospital stay[17].

Regarding the site of embolization, no generally accepted standards currently exist. Complete or incomplete embolization depends heavily on a comprehensive risk assessment of rebleeding or lack of bleeding[8]. Most studies did not report on the occurrence of ischemic complications[8,18]. Tradi *et al*[5] confirmed that the preservation of the upper branches feeding the anorectal wall and anastomoses can effectively prevent potential ischemic complications from occurring. However, additional studies with larger sample sizes and longer follow-up periods are needed to verify the long-term efficacy of these treatments. Vascular abnormalities increase the difficulty and risk of Emborrhoid. In a single-center retrospective study, Sun *et al*[19] concluded that embolization based on the connection between the SRA and the inferior rectal artery was an effective and safe method. Moussa *et al*[20] recommend embolization of the middle rectal artery as the first choice when the main blood supply appears to be from the middle rectal artery with a thin SRA. The need for internal iliac arteriography and embolization in patients whose branches of the internal iliac artery involve the

Table 1 Indications or inclusion criteria of hemorrhoidal artery embolization

Indications	Specific situations
Disabling rectal bleeding[10]	
Surgical contraindications[16]	Abnormal coagulation function anticoagulants, various acquired or genetic coagulation disorders (cirrhosis, protein S deficiency, haemophilia, <i>etc.</i>)[8,11,23] Previous unsuccessful surgery[8,16] Poor cardiopulmonary function[34]
No history of surgery[8,10]	
Vascular abnormalities	Rectal arteriovenous malformation[12] Both hemorrhoidal disease and portal hypertension with rectal varices[35]
No severe prolapse[8]	
Wishes of younger active patients[8], immunosuppressed patients[36]	
Pathological condition[15]	Morbid obesity, paraplegia

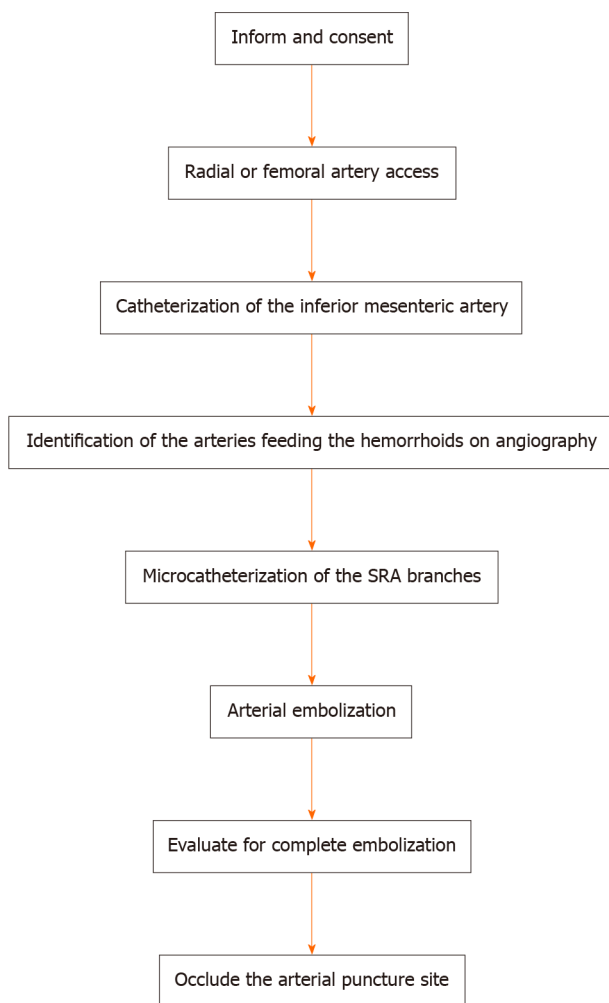


Figure 1 Embolization technique. SRA: Superior rectal artery.

blood supply to the hemorrhoidal area requires further exploration[21].

Currently, there are several types of embolic agents, each with its own advantages and disadvantages (Table 2). Zakharchenko *et al*[22] reported that embolization with particles is more effective at controlling hemorrhoid symptoms than embolization with coils. Theoretically, embolization with particles has a greater likelihood of clinical success and clinical benefit but is linked to a higher risk of ischemic complications than coil embolization[23]. However, there was no discernible difference in the clinical success rate between coil embolization and coil embolization combined with particle

Table 2 Advantages and disadvantages of different embolic materials

Embolic materials	Advantages	Disadvantages
Microcoils	Easy to identify under fluoroscopy[37] Mild adverse reactions[29]	Dependent on a normal coagulation status[38] A non-distal embolization[8] Slow symptom relief[22]
Particles	Occluding the distal branches[22] Higher clinical success rates[23]	Particulate reflux[38] An increased risk of local ischemic complications[23]
Liquid embolic materials	A high hemostasis effect with a low recurrent bleeding rate[38]	Vascular glue penetration can be difficult to control[38] Unwanted retrograde flow or reflux[39] Possibility of ischemic complications[26]

embolization in some studies[20]. Moreover, the radiation dose significantly increased as the procedure time for combined embolization with particles and coils increased[15]. Recent clinical studies have shown that gelfoam particles have similar short-term efficacy compared to polyvinyl alcohol (PVA) microparticles[24]. Importantly, PVA particles are permanent embolic materials that can occlude the distal branch of the SRA. Although PVA embolization can prevent the collateral circulation from causing secondary bleeding, it theoretically increases the risk of intestinal ischemic necrosis [21]. The clinical outcomes are better when larger particles (900–1200 µm) are used than when smaller particles are used [25]. In addition, the safety of using liquid embolic materials requires further study[26].

Through advances in technology and materials, embolization devices and new embolic materials have been developed and improved to overcome these limitations. At the 3-month follow-up, most patients with cirrhotic portal hypertension (4 out of 5) showed clinically relevant improvement due to the release of oversized coils in a stretched fashion (“spaghetti technique”)[23]. A new electric detachable microcoil has been shown to be effective[27].

COMPLICATIONS

The incidence of complications is low, and these complications have no significant effect on prognosis. In one case report, only 1 of 3 patients experienced self-limiting perianal pain and edema after a third embolization (all the branches of the SRAs had been embolized)[10]. This may be a benign manifestation of temporary blood flow redistribution that can be alleviated by the administration of nonsteroidal anti-inflammatory drugs[8,15,21,28]. After confirming the number and shape of the SRA, patients were intervened with different embolization materials and experienced transient complications, including tenesmus (14/15), pain (5/15) and low-grade fever (11/15)[29]. After embolization, 34.4% of patients developed low-grade fever, which is related to the absorption of a gelatin sponge[21]. The incidence of ischemic complications is low. In one case report, ischemic damage and subsequent rectal stenosis occurred in patients who underwent particle embolization[30]. Finally, the patient was successfully treated with 3 endoscopic balloon dilations[30]. Lupattelli *et al*[31] suggested that particle migration toward a nontarget area may be caused by a large SRA-sigmoid artery anastomosis. Embolization with ethylene vinyl alcohol, a liquid agent, caused focal rectal necrosis, and microparticle embolism resulted in cellulitis in porcine animal models[26].

CLINICAL EFFICACY

The reported technical success rates ranged from 90% to 100%, and the clinical success rates ranged from 64% to 93%. However, the definition of clinical success is often vague and thus requires further exploration[32]. Clinical success was defined by Moussa *et al*[16] as an increase of at least 2 points in the French bleeding score after embolization, with no complications. Afterwards, measures of clinical success included the time limit and visual analogue scale score[5]. Vidal *et al*[8] defined clinical success as an improvement in symptoms that could not be quantified intuitively. Clinical evaluations included a quality of life assessment, endoscopic findings, histopathological analysis, ultrasound findings, sphincterometry, and anal electromyography[10,16,17,22,29]. However, these self-evaluations are mainly based on hemorrhoidal symptom evaluation, which is not closely related to any clinical findings and presents challenges. Embolization can moderately improve the prolapse score, which can be explained by the decrease in arterial flow after embolization. In addition, surgery is still needed for Grade IV hemorrhoid prolapse[5].

Rectal bleeding can occur immediately after embolization (after a few weeks) or after a certain period of time (after months)[10]. Recurrent rectal bleeding may be associated with incomplete embolization of the superior rectal network[10] caused by unrecognized anatomical variations[8], vascular spasm[16], vascular distortion[33], prior surgery[33], coil recanalization[8], and coagulation disorders[8]. A combination of nitroglycerine, verapamil, and unfractionated heparin was prophylactically administered intraluminal to prevent vasospasm[28]. Tradi *et al*[5] performed univariate analysis of

the influence of various factors on the incidence of recurrence. They reported an association between the appearance of collateral branches of the SRA and recurrence by reperfusion of the corpus cavernosum recti downstream of the coil packing. Re-embolization or even surgery should be considered to achieve hemostasis.

CONCLUSION

In summary, Emborrhoid is a promising technique for the treatment of bleeding hemorrhoids. Physicians need to carefully evaluate the patient's condition to choose the appropriate embolization materials and suitable embolization methods. Future randomized controlled trials with greater sample sizes and longer follow-up periods are needed to determine the most appropriate candidate patients, embolization sites, and embolic materials to avoid adverse effects, and a standardized scoring system for hemorrhoidal artery embolization treatment is needed.

FOOTNOTES

Author contributions: Lei ML performed the bibliographic search; Lei ML and Dong LL designed the overall concept and outline of the manuscript; Yu YB and Zhang HP revised the article critically for important intellectual content; and all authors approved the final version of the manuscript.

Supported by National Natural Science Foundation of China (General Program), No. 82070540; The Taishan Scholars Program of Shandong Province, No. tsqn202211309; and Program of Medical and Health Research Guidance in Qingdao City, No. 2022-WJZD108.

Conflict-of-interest statement: The authors declare no conflicts of interest for this article.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country of origin: China

ORCID number: Yan-Bo Yu 0000-0003-2995-3270.

S-Editor: Liu H

L-Editor: A

P-Editor: Cai YX

REFERENCES

- 1 **Tutino R**, Stecca T, Farneti F, Massani M, Santoro GA. Transanal eco-Doppler evaluation after hemorrhoidal artery embolization. *World J Gastroenterol* 2024; **30**: 2332-2342 [PMID: 38813050 DOI: 10.3748/wjg.v30.i17.2332]
- 2 **Hawkins AT**, Davis BR, Bhama AR, Fang SH, Dawes AJ, Feingold DL, Lightner AL, Paquette IM; Clinical Practice Guidelines Committee of the American Society of Colon and Rectal Surgeons. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Hemorrhoids. *Dis Colon Rectum* 2024; **67**: 614-623 [PMID: 38294832 DOI: 10.1097/DCR.0000000000003276]
- 3 **Perera N**, Liolitsa D, Iype S, Croxford A, Yassin M, Lang P, Ukaegbu O, van Issum C. Phlebotonics for haemorrhoids. *Cochrane Database Syst Rev* 2012; CD004322 [PMID: 22895941 DOI: 10.1002/14651858.CD004322.pub3]
- 4 **Gallo G**, Martellucci J, Sturiale A, Clerico G, Milito G, Marino F, Cocorullo G, Giordano P, Mistrangelo M, Trompetto M. Consensus statement of the Italian society of colorectal surgery (SICCR): management and treatment of hemorrhoidal disease. *Tech Coloproctol* 2020; **24**: 145-164 [PMID: 31993837 DOI: 10.1007/s10151-020-02149-1]
- 5 **Tradi F**, Louis G, Giorgi R, Mege D, Bartoli JM, Sielezneff I, Vidal V. Embolization of the Superior Rectal Arteries for Hemorrhoidal Disease: Prospective Results in 25 Patients. *J Vasc Interv Radiol* 2018; **29**: 884-892.e1 [PMID: 29724519 DOI: 10.1016/j.jvir.2018.01.778]
- 6 **Falsarella PM**, Nasser F, Affonso BB, Galastri FL, Motta-Leal-Filho JMD, Valle LGM, Cunha MJS, Araújo SEA, Garcia RG, Katz M. Embolization of the Superior Rectal Arteries versus Closed Hemorrhoidectomy (Ferguson Technique) in the Treatment of Hemorrhoidal Disease: A Randomized Clinical Trial. *J Vasc Interv Radiol* 2023; **34**: 736-744.e1 [PMID: 36736690 DOI: 10.1016/j.jvir.2023.01.022]
- 7 **Bagla S**, Pavidapha A, Lerner J, Kasimcan MO, Piechowiak R, Josovitz K, Marathe A, Isaacson A, Sajan A. Outcomes of Hemorrhoidal Artery Embolization from a Multidisciplinary Outpatient Interventional Center. *J Vasc Interv Radiol* 2023; **34**: 745-749 [PMID: 36736822 DOI: 10.1016/j.jvir.2023.01.023]
- 8 **Vidal V**, Sapoval M, Sielezneff Y, De Parades V, Tradi F, Louis G, Bartoli JM, Pellerin O. Emborrhoid: a new concept for the treatment of hemorrhoids with arterial embolization: the first 14 cases. *Cardiovasc Intervent Radiol* 2015; **38**: 72-78 [PMID: 25366092 DOI: 10.1007/s00270-014-1017-8]
- 9 **Zhou H**, Li L, Wang WJ, Li YL. [Clinical analysis of percutaneous superselective superior rectal artery embolization for grades II-III internal hemorrhoids]. *Zhonghua Nei Ke Za Zhi* 2024; **63**: 861-865 [PMID: 39183158 DOI: 10.3760/cma.j.cn112138-20231123-00337]
- 10 **Vidal V**, Louis G, Bartoli JM, Sielezneff I. Embolization of the hemorrhoidal arteries (the emborrhoid technique): a new concept and challenge for interventional radiology. *Diagn Interv Imaging* 2014; **95**: 307-315 [PMID: 24589187 DOI: 10.1016/j.diii.2014.01.016]

- 11 **Venturini M**, De Nardi P, Marra P, Panzeri M, Brembilla G, Morelli F, Melchiorre F, De Cobelli F, Del Maschio A. Embolization of superior rectal arteries for transfusion dependent haemorrhoidal bleeding in severely cardiopathic patients: a new field of application of the "emborrhoid" technique. *Tech Coloproctol* 2018; **22**: 453-455 [PMID: 29797246 DOI: 10.1007/s10151-018-1802-5]
- 12 **Komekami Y**, Konishi F, Makita K, Mijin T, Onogawa A, Chochi T, Lee C, Yoshida T, Maeda T, Mitsusada M, Hasegawa S. Rectal arteriovenous malformation (AVM) with bleeding of an internal hemorrhoid. *Clin J Gastroenterol* 2016; **9**: 22-26 [PMID: 26879656 DOI: 10.1007/s12328-016-0629-8]
- 13 **Ma X**, Niu T, Peng Y, Xu S. The first case report of rectal artery embolization in the treatment of radiation proctitis. *Asian J Surg* 2024; **47**: 1003-1004 [PMID: 37945401 DOI: 10.1016/j.asjsur.2023.10.104]
- 14 **Campenni P**, Iezzi R, Marra AA, Posa A, Parello A, Litta F, De Simone V, Ratto C. The Emborrhoid Technique for Treatment of Bleeding Hemorrhoids in Patients with High Surgical Risk. *J Clin Med* 2022; **11** [PMID: 36233395 DOI: 10.3390/jcm11195533]
- 15 **Ferrer Puchol MD**, Esteban Hernández E, Blanco González FJ, Ramiro Gandia R, Solaz Solaz J, Pacheco Usmayo A. Selective intra-arterial embolization to treat hemorrhoids. *Radiologia (Engl Ed)* 2020; **62**: 313-319 [PMID: 32029240 DOI: 10.1016/j.rx.2019.12.004]
- 16 **Moussa N**, Sielezneck I, Sapoval M, Tradi F, Del Giudice C, Fathallah N, Pellerin O, Amouyal G, Pereira H, de Parades V, Vidal V. Embolization of the superior rectal arteries for chronic bleeding due to haemorrhoidal disease. *Colorectal Dis* 2017; **19**: 194-199 [PMID: 27338153 DOI: 10.1111/codi.13430]
- 17 **Iezzi R**, Campenni P, Posa A, Parello A, Rodolfo E, Marra AA, Ratto C, Manfredi R. Outpatient Transradial Emborrhoid Technique: A Pilot Study. *Cardiovasc Intervent Radiol* 2021; **44**: 1300-1306 [PMID: 33977328 DOI: 10.1007/s00270-021-02856-8]
- 18 **Sun X**, Bai X, Cheng L, Gu X, Yuan Q, Jing J, Zhang J, Jin Y, Zhou Y, Chen Q. Embolization of the Superior and Inferior Rectal Artery for Chronic Bleeding Caused by Hemorrhoidal Disease: A Case Report. *J Vasc Interv Radiol* 2017; **28**: 1753-1756 [PMID: 29157482 DOI: 10.1016/j.jvir.2017.07.031]
- 19 **Sun X**, Xu J, Zhang J, Jin Y, Chen Q. Management of rectal bleeding due to internal haemorrhoids with arterial embolisation: a single-centre experience and protocol. *Clin Radiol* 2018; **73**: 985.e1-985.e6 [PMID: 30149946 DOI: 10.1016/j.crad.2018.07.105]
- 20 **Moussa N**, Bonnet B, Pereira H, Pechmajou L, Pellerin O, Abed A, Del Giudice C, Dean C, Bouda D, de Parades V, Fathallah N, Sapoval M. Mid-Term Results of Superior Rectal Artery and Coils for Hemorrhoidal Embolization with Particles Bleeding. *Cardiovasc Intervent Radiol* 2020; **43**: 1062-1069 [PMID: 32342155 DOI: 10.1007/s00270-020-02441-5]
- 21 **Han X**, Xia F, Chen G, Sheng Y, Wang W, Wang Z, Zhao M, Wang X. Superior rectal artery embolization for bleeding internal hemorrhoids. *Tech Coloproctol* 2021; **25**: 75-80 [PMID: 32712932 DOI: 10.1007/s10151-020-02312-8]
- 22 **Zakharchenko A**, Kaitoukov Y, Vinnik Y, Tradi F, Sapoval M, Sielezneck I, Galkin E, Vidal V. Safety and efficacy of superior rectal artery embolization with particles and metallic coils for the treatment of hemorrhoids (Emborrhoid technique). *Diagn Interv Imaging* 2016; **97**: 1079-1084 [PMID: 27597728 DOI: 10.1016/j.diii.2016.08.002]
- 23 **Giurazza F**, Corvino F, Cavaglià E, Silvestre M, Cangiano G, Amodio F, De Magistris G, Niola R. Emborrhoid in patients with portal hypertension and chronic hemorrhoidal bleeding: preliminary results in five cases with a new coiling release fashion "Spaghetti technique". *Radiol Med* 2020; **125**: 1008-1011 [PMID: 32306200 DOI: 10.1007/s11547-020-01194-y]
- 24 **Wang X**, Sheng Y, Wang Z, Wang W, Xia F, Zhao M, Han X. Comparison of different embolic particles for superior rectal arterial embolization of chronic hemorrhoidal bleeding: gelfoam versus microparticle. *BMC Gastroenterol* 2021; **21**: 465 [PMID: 34906095 DOI: 10.1186/s12876-021-02046-3]
- 25 **Küçükay MB**, Küçükay F. Superior Rectal Artery Embolization with Tris-Acryl Gelatin Microspheres: A Randomized Comparison of Particle Size. *J Vasc Interv Radiol* 2021; **32**: 819-825 [PMID: 33640516 DOI: 10.1016/j.jvir.2021.02.011]
- 26 **Tradi F**, Panneau J, Brige P, Mege D, Habert P, Hak JF, Di Bisceglie M, Vidal V. Evaluation of Multiple Embolic Agents for Embolization of the Superior Rectal Artery in an Animal Model. *Cardiovasc Intervent Radiol* 2022; **45**: 510-519 [PMID: 34988702 DOI: 10.1007/s00270-021-03041-7]
- 27 **De Gregorio MA**, Bernal R, Ciampi-Dopazo JJ, Urbano J, Millera A, Guirola JA. Safety and Effectiveness of a New Electrical Detachable Microcoil for Embolization of Hemorrhoidal Disease, November 2020-December 2021: Results of a Prospective Study. *J Clin Med* 2022; **11** [PMID: 35683436 DOI: 10.3390/jcm11113049]
- 28 **De Gregorio MA**, Guirola JA, Serrano-Casorran C, Urbano J, Gutiérrez C, Gregorio A, Sierre S, Ciampi-Dopazo JJ, Bernal R, Gil I, De Blas I, Sánchez-Ballestín M, Millera A. Catheter-directed hemorrhoidal embolization for rectal bleeding due to hemorrhoids (Goligher grade I-III): prospective outcomes from a Spanish emborrhoid registry. *Eur Radiol* 2023; **33**: 8754-8763 [PMID: 37458757 DOI: 10.1007/s00330-023-09923-3]
- 29 **Luo CS**, Jia YP, Mao AW, Yang W. [Preliminary clinical study of the treatment of hemorrhoids by superselective embolization of superior rectal artery]. *Zhonghua Yi Xue Za Zhi* 2017; **97**: 1960-1963 [PMID: 28693075 DOI: 10.3760/cma.j.issn.0376-2491.2017.25.009]
- 30 **Eberspacher C**, Ficuccilli F, Tessieri L, D'Andrea V, Lauro A, Fralleone L, Mascagni D. Annoyed with Haemorrhoids? Risks of the Emborrhoid Technique. *Dig Dis Sci* 2021; **66**: 3725-3729 [PMID: 34398325 DOI: 10.1007/s10620-021-07208-7]
- 31 **Lupattelli T**. Regarding "Annoyed with Hemorrhoids? Risks of the Emborrhoid Technique". *Dig Dis Sci* 2022; **67**: 1423-1425 [PMID: 35147817 DOI: 10.1007/s10620-021-07374-8]
- 32 **Morsi S**, Linares Bolseguí M, Kobeissi H, Ghozy S, Kallmes DF, Kelley SR, Mathis KL, Dozois EJ, Loftus CG, Bendel EC, Vidal V, Thompson SM. Common design and data elements on rectal artery embolization for treatment of symptomatic internal hemorrhoidal disease: an interactive systematic review of clinical trials. *CVIR Endovasc* 2024; **7**: 45 [PMID: 38733497 DOI: 10.1186/s42155-024-00458-2]
- 33 **Ahmed TM**, Cowley JB, Robinson G, Hartley JE, Nicholson AA, Lim M, Ettles DF, Monson JR. Long term follow-up of transcatheter coil embolotherapy for major colonic haemorrhage. *Colorectal Dis* 2010; **12**: 1013-1017 [PMID: 19508518 DOI: 10.1111/j.1463-1318.2009.01906.x]
- 34 **De Nardi P**, Maggi G. Embolization of the superior rectal artery: another management option for hemorrhoids. *Tech Coloproctol* 2021; **25**: 1-2 [PMID: 33156412 DOI: 10.1007/s10151-020-02371-x]
- 35 **Alves E Sousa F**, Lopes PM, Mónica IB, Carvalho AC, Sousa P. Emborrhoid technique performed on a patient with portal hypertension and chronic hemorrhoidal bleeding as a salvage therapy. *CVIR Endovasc* 2022; **5**: 1 [PMID: 34978653 DOI: 10.1186/s42155-021-00278-8]
- 36 **Thompson SM**, Kelley SR. Invited Commentary: Rectal Artery Embolization for Treatment of Symptomatic Hemorrhoidal Disease-Opportunity for Multidisciplinary Collaboration. *Radiographics* 2022; **42**: E176-E178 [PMID: 36190871 DOI: 10.1148/rg.220167]
- 37 **Weldon DT**, Burke SJ, Sun S, Mimura H, Golzarian J. Interventional management of lower gastrointestinal bleeding. *Eur Radiol* 2008; **18**: 857-867 [PMID: 18185932 DOI: 10.1007/s00330-007-0844-2]
- 38 **Urbano J**, Manuel Cabrera J, Franco A, Alonso-Burgos A. Selective arterial embolization with ethylene-vinyl alcohol copolymer for control of

massive lower gastrointestinal bleeding: feasibility and initial experience. *J Vasc Interv Radiol* 2014; **25**: 839-846 [PMID: 24755085 DOI: 10.1016/j.jvir.2014.02.024]

- 39 **Jagadeesan BD**, Grigoryan M, Hassan AE, Grande AW, Tummala RP. Endovascular balloon-assisted embolization of intracranial and cervical arteriovenous malformations using dual-lumen coaxial balloon microcatheters and Onyx: initial experience. *Neurosurgery* 2013; **73**: ons238-43; discussion ons243 [PMID: 24077579 DOI: 10.1227/NEU.000000000000186]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: office@baishideng.com
Help Desk: <https://www.f6publishing.com/helpdesk>
<https://www.wjgnet.com>

