

# The FairEmbo Concept

Improving access to quality health care for people in developing countries with arterial embolization using suture fragments.

By Vincent Vidal, MD, PhD; Gloria Salazar, MD, FSIR; and Gilles Soulez, MD, FSIR

Access to quality health care is a fundamental human right, yet it remains elusive for millions of people in developing countries. FairEmbo is a project that aims to improve health care delivery in emerging countries by providing affordable and sustainable solutions. Our project is centered around the concept of Fair Embolization, a technique that involves using suture fragments for arterial embolization.

## RATIONALE FOR THE FAIREMBO PROJECT

FairEmbo was developed to address the limited access to commercially available embolic agents, which can be a significant barrier to access to this lifesaving procedure in many parts of the world. The lack of local providers and the high cost of embolic agents impede the development of endovascular treatments in emerging countries. The use of surgical suture, which is affordable and readily available, could potentially overcome these barriers and promote the development of vascular interventional radiology in these countries.

The idea behind FairEmbo is simple. It involves using absorbable and nonabsorbable surgical suture material to create torpedoes and particles for arterial embolization. The suture material could be cut into small, nonspherical fragments of a uniform size and then sterilized for the use as embolization agents to achieve arterial occlusion. This concept has been shown to be effective in preclinical studies and clinical case series for permanent occlusion of distal vessels.

## CLINICAL EVIDENCE

In the first FairEmbo study published in 2019, the effectiveness and safety of arterial embolization using suture fragments were assessed in a swine model.<sup>1</sup> The study showed that suture embolization was feasible, safe, and effective in achieving arterial occlusion. Further preclinical studies have shown that suture-based microparticles (SBM) are an alternative material for arterial embolization. In a study conducted on four

pigs, the use of SBM resulted in kidney embolization with similar outcomes to those observed with commonly used microspheres available on the market.<sup>2</sup> The study also found that there were no postoperative complications observed on clinical and CT controls. Another study evaluated the effectiveness and safety of uterine artery embolization (UAE) using absorbable suture fragments in a swine model.<sup>3</sup> The left uterine artery was embolized with 1-cm fragments of absorbable suture and compared to the contralateral artery embolized with gelatin sponge torpedoes. The results showed that UAE with the FairEmbo method is feasible, safe, and effective in comparison with the gelatin sponge procedure. All arteries were repermeabilized at 1 month and no necrosis was macroscopically visible.

The success of these animal studies has triggered the application of this approach in human patients. The FairEmbo technique has been used for the first time in humans with clinical success by Profs. Diop and Habouchi in Senegal and Algeria, respectively.<sup>4,5</sup> They have successfully treated retroperitoneal and postpartum bleeding in emergent, life-threatening conditions. The development of future clinical trials will aim to validate the effectiveness of the FairEmbo project and will provide further evidence of its safety and efficacy for use in humans.

## CONCLUSION

The FairEmbo project is not just a technologic solution; it is also an educational mentorship that seeks to empower local skills in interventional radiology. The project's collaborative model encourages all interventional radiologists and radiology technologists to participate.

The FairEmbo concept is an innovative and cost-effective approach to arterial embolization using suture fragments. It has been shown to be safe and effective in various clinical scenarios and has the potential to help the management of various bleeding in emerging countries. ■

*(Continued on page 60)*

(Continued from page 55)

1. Vidal V, Hak JF, Brige P, et al. In vivo feasibility of arterial embolization with permanent and absorbable suture: the FAIR-Embo concept. *Cardiovasc Intervent Radiol*. 2019;42:1175-1182. doi: 10.1007/s00270-019-02211-y
2. Di Bisceglie M, Hak JF, Diop AD, et al. FairEmbo concept for arterial embolizations: in vivo feasibility and safety study with suture-based microparticles compared with microspheres. *Cardiovasc Intervent Radiol*. 2021;44:625-632. doi: 10.1007/s00270-020-02678-0

3. Banata Gang-Ny A, Panneau J, Brige P, et al. FairEmbo concept for postpartum hemorrhage: evaluation of the efficacy of suture fragment compared with gelatin sponge torpedo embolization in a post-gravid swine model. *J Pers Med*. 2023;13:124. doi: 10.3390/jpm13010124
4. Diop AD, Diop AN, Hak JF, et al. Hemostatic embolization of renal artery pseudoaneurysm using absorbable surgical suture (FairEmbo concept). *Diagn Interv Imaging*. 2020;101:757-758. doi: 10.1016/j.diii.2020.04.002
5. Habouchi A. FAIREMBO for the treatment of postpartum hemorrhage. Presented at: PAIRS 2022 Congress; February 23-26, 2022; Dubai, United Arab Emirates.

### Vincent Vidal, MD, PhD

Department of Interventional Radiology  
La Timone University Hospital  
Marseille Public University Hospital (APHM)  
Experimental Interventional Imaging Laboratory (LIIE)-  
CERIMED  
Aix-Marseille University  
Marseille, France  
vincent.vidal@ap-hm.fr  
*Disclosures: None.*

### Gloria Salazar, MD, FSIR

Clinical Associate Professor  
Vice Chair of Diversity and Health Equity  
Department of Radiology  
University of North Carolina at Chapel Hill  
Chapel Hill, North Carolina  
*Disclosures: None.*

### Gilles Soulez, MD, FSIR

Professor of Radiology  
Centre Hospitalier de l'Université de Montréal  
Montreal, Quebec, Canada  
*Disclosures: None.*