Bariatric Embolization: A Procedure Dead or Alive?

Alberto Alonso-Burgos¹

Received: 14 October 2020 / Accepted: 2 December 2020 / Published online: 27 January 2021

© Springer Science+Business Media, LLC, part of Springer Nature and the Cardiovascular and Interventional Radiological Society of Europe (CIRSE) 2021

Obesity is a chronic disease resulting of excess adiposity that over time leads not only to structural and functional abnormalities but also to elevated premature mortality rates as well as an increased comorbidity risk related with the development of more than 200 chronic diseases [1]. Definitively, obesity reduces the quality of life of affected individuals and imposes substantial societal economic costs.

Bariatric arterial embolization (BAE), consisting on left gastric artery embolization, has been proposed as treatment for weight loss based on reducing the blood supply to the fundus of the stomach resulting in a decreased ghrelin release. Ghrelin is, to date, the main hormone known related with the feeling of hunger. Thus, via decreasing ghrelin levels, BAE would lead to relieve hunger and resulting, theoretically, in the patient eatingless and weightloss [2].

BAE procedure was pointed in the beginning as a feasible and relatively safe solution to an extraordinarily complex problem. After initial promising results in animal models, BAE was reported as an effective and safe approach for obesity. When following reported BAE series showed an 4.7%–17.1% total weight loss [3], BAE seems not being broadly established. Moreover, the key point is still, does it have clinical benefits? For how long?

To date, no randomized controlled trials have evaluated the efficacy of BAE and no homogeneous long-term follow-up with a relatively large sample size have been reported. Moreover, the clinical effect of BAE procedure is still controversial and more studies are needed to determine the exact effect in lowering the Lean Body Mass (LBM, body composition calculated by subtracting body fat weight from total body weight that has been described as a superior index to total body weight for prescribing proper levels for assessing metabolic disorders) and improving the lipid profile, diabetes and metabolic syndrome in those patients. Reported studies are heterogeneous in population and design, including patients with established criteria for obesity but also with over-weight. All these points are summarized in Table 1.

Ideal technical approach as well as embolic agent and BAE procedure end-point are still a work in progress [3, 4]. In the same way, assessments in follow-up protocols, gastric changes (endoscopy), pharmacotherapy, hunger and quality of life scores, laboratory values and lifestyle modifications after BAE are necessary. All these points are summarized in Table 2.

Regarding the efficiency on the reduction of hunger, even if BAE effectiveness is more related to ischaemic gastric ulcers than to lowering in ghrelin secretion, should be evaluated.

The obesity problem is, by far, one of the greatest and complex health problems to deal with. Even when weight-loss surgery does not always help people maintain a healthy weight, to consider the obesity as a hunger problem is a reductionism and an extremely simplified point of view. It is well-known that lifestyle and dietary changes are probably the best focus for obesity but most people who lose weight on a weight-loss diet gain the full amount back within a couple of

✉ Alberto Alonso-Burgos
alonsoburgosmd@gmail.com; alonso@unav.es

¹ Vascular Surgery and Interventional Radiology Unit, Clínica Universidad de Navarra, Marquesado de Santa Marta 1, 28022 Navarra, Madrid, Spain

Table 1 Summarized published data concerning to BAE study design and follow-up

Study and report	Patients	Indication	Follow-up (range), mo	Total weight loss percent
Weiss et al. Radiology 2019; 291:792–800	15	BMI 40–60	15 (N/A)	5.96%
Elens et al. Cardiovasc intervent radiol 2019; 42:513–519	11	BMI 25–30	6 (N/A)	10.0%
Pirlet et al. Catheter cardiovasc interv 2019; 93:365–370	7	BMI > 40	12 (N/A)	4.77%
Bai et al. Obes surg 2018; 28:907–915	5	BMI > 30	9 (N/A)	12.64%
Syed et al. J Vasc interv radiol 2016; 27:1502–1508	4	BMI > 40	6 (N/A)	8.52%
Kipshidze et al. JACC cardiovasc interv 2015; 8:1641–1644	5	Obesity (not specified)	20–24	

BMI Body mass index; **GI** Gastrointestinal; **LGA** Left gastric artery; **NA** Not available

Table 2 Summarized published data concerning to BAE technical approach as well as clinical follow-up

Study and report	Embolic agent	Embolization endpoint	Follow-up evaluations and treatments	Dietary consideration after BAE
Weiss et al. Radiology 2019; 291:792–800	300–500 μ m microspheres	NA	Upper GI endoscopy 2 wk and 3 mo after BAE; gastric motility study at 1 mo PPI (40 mg/12 h) and sucralfate (1 g /8 h) from 2 wk before to 6 wk after BAE	Intake assessment and dietician consultation
Elens et al. Cardiovasc intervent radiol 2019; 42:513–519	500 μ m–700 μ m microspheres in 9 patients 300 μ m–500 μ m microspheres in 2 patients	Repeated embolic/contrast agent injections followed by Gelfoam to prevent reflux	Upper GI endoscopy after 1–2 mo in 10 patients. PPI 40 mg/24 h for 1 mo before BAE	No
Pirlet et al. Catheter cardiovasc interv 2019; 93:365–370	300 μ m–500 μ m PVA particles	Absence of distal flow	PPI therapy for 24 h	No
Bai et al. Obes surg 2018; 28:907–915	500 μ m–710 μ m PVA particles	Dosed based on Flow	Upper GI endoscopy on day of BAE and day 3 and day 30 after BAE (in case of positive findings). Omeprazole prophylaxis (IV for 3 d, oral for 2 wk after BAE)	Followed by dietician
Syed et al. J Vasc interv radiol 2016; 27:1502–1508	300 μ m–500 μ m microspheres	Complete cessation of flow	Upper GI endoscopy before the procedure, and third day after. Upper endoscopy after 30 days of the procedure for participants with positive findings. PPI one week before to one month after the BAE	Followed by dietician
Kipshidze et al. JACC cardiovasc interv 2015; 8:1641–1644	300 μ m–500 μ m microspheres	Distal branches of LGA are no longer visible	Upper GI endoscopies at day 1 and 7 after BAE	No

BMI Body mass index; **GI** Gastrointestinal; **LGA** Left gastric artery; **NA** Not available; **PPI** Proton pump inhibitors

years. By definition, diets are temporary and lifestyle changes are probably the most difficult to carry on. In the other hand, BAE procedure relies in the concept of considering the obesity as a disbalance between energy intake and expenditure, mainly modulated from ghrelin hormone. However, contributors to energy storage in obesity includes environmental, biological/medical, economics, food and beverage behaviours, psychological and social inputs, both inside and outside the person [1]. All these should be taken in count for an optimal approach to obesity.

Today, BAE have moved from an standalone treatment for obesity and should be considered as an alternative treatment to those patient not suitable for bariatric surgery. However even in those patients, BAE efficacy should be always carried out in combination with other therapies, specialties, lifestyle modifications and/or pharmacotherapy.

More evidence on the BAE treatment is necessarily an event, due to the pandemic characteristic of obesity, a multi-national scale homogeneous registry that enables robust data collection on the real-life clinical application could be necessary. Bariatric embolization is currently a procedure not dead but still looking for solid scientific data to stay alive.

Compliance with Ethical Standards

Conflict of interest Author declares that he has no conflict of interest.

References

1. Jastreboff A. Obesity as a disease: The obesity society 2018 position statement. *Obesity*. 2019;27:7–9.
2. Hafezi-Nejad N, Bailey CR, Weiss CR. Bariatric embolization: a narrative review of clinical data from human trials. *Tech VascIntervRadiol*. 2020;23:100658.
3. Aldawudi I, Katwal PC, Jirjees S, et al. Future of bariatric embolization: a review of up-to-date clinical trials. *Cureus*. 2020;12:7958.
4. Hafezi-Nejad N, Bailey CR, Gunn AJ, Weiss CR. Weight loss after left gastric artery embolization: a systematic review and meta-analysis. *J VascIntervRadiol*. 2019;30:1593–603.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.