

CASE REPORT

Esophageal ulcers secondary to cryoenergy after pulmonary vein ablation using the second-generation balloon

İkinci kuşak balon kullanılarak gerçekleştirilen pulmoner ven ablasyonundan sonra kriyoenerjiye sekonder özofagus ülserleri

Luis Álvarez-Acosta, M.D., Alejandro Quijada-Fumero, M.D.,
Raquel Pimienta-González, M.D., Julio S. Hernández-Afonso, M.D.

Department of Arrhythmology, Hospital Universitario Nuestra Señora de la Candelaria, Santa Cruz de Tenerife, Spain

Summary– Pulmonary vein isolation is an effective treatment for patients with symptomatic paroxysmal atrial fibrillation. Cryoablation balloon therapy has been developed as an alternative. Cryoablation complications have primarily been related to phrenic nerve palsy, vascular complications, stroke, and others of lesser incidence. Esophageal lesions are rare and they are not yet completely understood.

Özet– Semptomlu paroksizmal atriyal fibrilasyonu olan hastalarda pulmoner ven izolasyonu etkili bir tedavidir. Bir alternatif olarak kriyoablasyon balon tedavisi geliştirilmiştir. Kriyoablasyon komplikasyonları esasen frenik sinir felci, vasküler komplikasyonlar, inme ve daha düşük insidansla başka etkenlerle ilişkilidir. Özofagus lezyonları nadir olduğu gibi tamamiyle anlaşılamamıştır.

Cryoablation (CA) complications have largely been related to phrenic nerve palsy (13.5%), vascular complications (hemorrhage, pseudoaneurysm, arteriovenous fistula) (4.6%), stroke+transient ischemic attack (4.3%), new atrial flutter (3.7%), pulmonary vein (PV) stenosis (3.1%), cardiac tamponade (0.6%), myocardial infarction (1.2%), and death (0.6%). The role of esophageal lesions is not yet completely understood, primarily as a result of rareness.^[1,2]

CASE REPORT

A 42-year-old female without structural heart disease (36 mm left atrium) but with a history of paroxysmal atrial fibrillation (AF) developed 2 large esophageal ulcers following CA with a second-generation cryoballoon (CB). In 2010, radiofrequency (RF) ablation had been performed which resulted in early and late AF recurrence. After management with multiple anti-arrhythmic drugs, which failed to achieve rhythm control, a second ablation attempt with cryoenergy was recommended (Arctic Front Advance; Medtronic, Inc., Minneapolis, MN, USA). The procedure was performed 5 years later, under full anesthesia without muscle relaxation in order to monitor the phrenic

nerve during right side pulmonary vein (PV) ablation. All 4 veins and their independent ostia were isolated on the first attempt, but an additional 240-millisecond ablation was also performed in each.

The balloon temperature was constantly monitored and never fell below 50°C. That same afternoon, the patient began to complain of severe retrosternal pain, which was initially treated with ibuprofen and proton pump inhibitors. When there was no resolution and even worsening of the pain, an urgent esophagoscopy was performed. At 24 cm from the teeth, 2 ulcers (1 cm and 0.6 cm in diameter) with fibrin and a small clot in the center were observed in the anterior wall of the mucosa. No active bleeding stigmas were noticed (Fig. 1). Treatment with ibuprofen, acetaminophen, and sucralfate was initiated, but there was incomplete resolution of the symptoms. It took almost 2 months to be completely resolved.

DISCUSSION

The development of atrio-esophageal fistula has only seldom been described,^[3] but it is now better recog-

Abbreviations:

AF	Atrial fibrillation
CA	Cryoablation
CB	Cryoballoon
PV	Pulmonary vein
RF	Radiofrequency

Received: January 05, 2017 Accepted: September 21, 2017

Correspondence: Dr. Alejandro Quijada-Fumero. Ctra/ El Rosario, 145 38010 S/C de Tenerife, Spain.

Tel: +0034922602963 e-mail: aqf1988@gmail.com

© 2018 Turkish Society of Cardiology



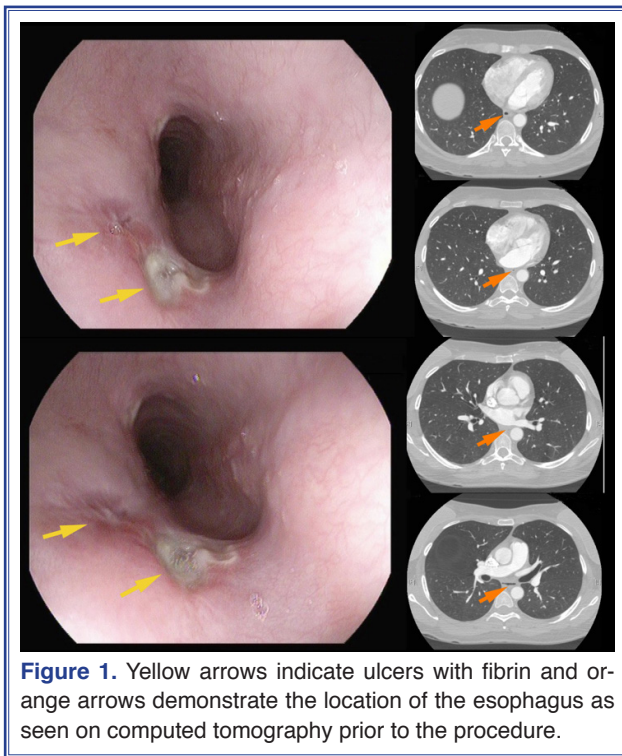


Figure 1. Yellow arrows indicate ulcers with fibrin and orange arrows demonstrate the location of the esophagus as seen on computed tomography prior to the procedure.

nized that the energy used during a CB procedure may lead to esophageal lesions more often than previously reported. CB produces minimal disruption of the endothelium and creates discrete lesions;^[4] therefore, it was supposed that esophageal lesions would be less common than with RF ablation.

Lesions usually develop in the posterior wall of the atrium, where it is only 2 to 4 mm thick, and the esophagus has no serosa and is only 2 to 3 mm thick (Fig. 1). The severity of the injury can vary from simple esophageal erythema to esophageal ulcers, or atrio-esophageal fistula, and esophagus location cannot predict the formation of such lesions since it is a moving structure. Esophageal temperature control could decrease the formation of such lesions to as low as 3.2% (instead of 19%) with a luminal esophageal temperature cutoff of 12°C to 15°C.^[5-7] It has also been postulated that an esophageal probe used in general anesthesia may contribute to ulcer formation, since it has been seen even without pulmonary vein ablation,^[7] but in our case no transesophageal echocardiography was performed. Some other measures have also been considered to avoid this complication, especially in the setting of RF ablation.^[8]

We wanted to demonstrate with this case that large

esophageal lesions are possible with a 28-mm CB and that therefore, atrio-esophageal fistulas could develop. It is clear that these large lesions (fistula or ulcer) are extremely rare, but as they are potentially fatal, we still have to try to understand the pathophysiology and try to improve the procedure in order to avoid such complications.

Peer-review: Externally peer-reviewed.

Conflict-of-interest: None.

Authorship contributions: Concept: L.AA., A.QF.; Design: L.AA., J.H.A.; Supervision: J.H.A.; Materials: L.AA., A.QF., R.PG.; Data collection: L.AA., A.QF., R.PG.; Literature search: L.AA.; Writing: L.AA., A.QF., R.PG.

REFERENCES

1. Packer DL, Kowal RC, Wheelan KR, Irwin JM, Champagne J, Guerra PG, et al; STOP AF Cryoablation Investigators. Cryoballoon ablation of pulmonary veins for paroxysmal atrial fibrillation: first results of the North American Arctic Front (STOP AF) pivotal trial. *J Am Coll Cardiol* 2013;61:1713–23.
2. Evonich RF 3rd, Nori DM, Haines DE. A randomized trial comparing effects of radiofrequency and cryoablation on the structural integrity of esophageal tissue. *J Interv Card Electrophysiol* 2007;19:77–83. [CrossRef]
3. Stöckigt F, Schrickel JW, Andrié R, Lickfett L. Atrio-esophageal fistula after cryoballoon pulmonary vein isolation. *J Cardiovasc Electrophysiol* 2012;23:1254–7. [CrossRef]
4. Ripley KL, Gage AA, Olsen DB, Van Vleet JF, Lau CP, Tse HF. Time course of esophageal lesions after catheter ablation with cryothermal and radiofrequency ablation: implication for atrio-esophageal fistula formation after catheter ablation for atrial fibrillation. *J Cardiovasc Electrophysiol* 2007;18:642–6.
5. Fürnkranz A, Bordignon S, Böhmig M, Konstantinou A, Dugo D, Perrotta L, et al. Reduced incidence of esophageal lesions by luminal esophageal temperature-guided second-generation cryoballoon ablation. *Heart Rhythm* 2015;12:268–74. [CrossRef]
6. Fürnkranz A, Bordignon S, Schmidt B, Böhmig M, Böhmer MC, Bode F, et al. Luminal esophageal temperature predicts esophageal lesions after second-generation cryoballoon pulmonary vein isolation. *Heart Rhythm* 2013;10:789–93. [CrossRef]
7. Kumar S, Brown G, Sutherland F, Morgan J, Andrews D, Ling LH, et al. The transesophageal echo probe may contribute to esophageal injury after catheter ablation for paroxysmal atrial fibrillation under general anesthesia: a preliminary observation. *J Cardiovasc Electrophysiol* 2015;26:119–26. [CrossRef]
8. Nair GM, Nery PB, Redpath CJ, Lam BK, Birnie DH. Atrio-esophageal fistula in the era of atrial fibrillation ablation: a review. *Can J Cardiol* 2014;30:388–95. [CrossRef]

Keywords: Atrial fibrillation; cryoablation; esophageal; ulcers.

Anahtar sözcükler: Atriyal fibrilasyon; kriyoablasyon; özofageal; ülserler.