



Protecting the oesophagus during left atrial ablation: A surplus of options but an absence of evidence

Oesophageal injury (OI) is a potentially catastrophic complication of left atrial catheter ablation. The anatomic location of the oesophagus, lying directly adjacent to the posterior wall of the left atrium, exposes it to the risk of thermal injury from both radiofrequency (RF) and cryotherapy modalities of ablation. Atrioesophageal fistula (AEF), associated with air embolus, severe sepsis and a mortality rate of 55% [1], is the most devastating consequence of OI from catheter ablation, although post-ablation endoscopic studies suggest that oesophageal erosions, ulceration and dysmotility can also be attributed to ablation [2].

Protecting the oesophagus during left atrial ablation has been the source of much clinical investigation in recent years but has been limited by the fact that AEF occurs so infrequently (0.07% of cases [2]), meaning prospective randomized studies are difficult to appropriately power. However, endoscopic studies monitoring the development of thermal lesions on the luminal surface of the oesophagus post-ablation have proved useful. Techniques proposed to reduce OI include reduced RF power and irrigation rates when ablating the left atrial posterior wall [3,4], minimised posterior wall ablation with single ring isolation [5] and luminal oesophageal temperature monitoring [6]. More aggressive techniques have also been suggested such as active oesophageal cooling with injected ice-water [7] and even mechanical oesophageal deviation [8]. However, to-date, no single technique has been shown to be significantly effective in reducing oesophageal risk. This clinical equipoise is reflected in AF ablation guidelines, in which the only class I recommendation is reducing RF power when ablating the posterior wall [9]. As a result, anecdotal experience and physician preference more commonly guide current practice.

Pre-procedural imaging defining the relationship between the anterior wall of the oesophagus and the posterior left atrium has been investigated as a way to inform the risk of OI but was found to be significantly limited by the fact that the mobile oesophagus was often in a different position by the time of the procedure [10]. Real-time oesophageal location during ablation has also been previously assessed with barium oesophagram and intracardiac echocardiography (ICE) in small cohorts of patients [10,11]. In this context, the article presented by Santoro et al. [12] in this issue of the 'Indian Pacing and Electrophysiology Journal' is a welcome addition, providing further information on oesophageal location during left atrial ablation with ICE in a larger cohort of patients. In this single-centre, prospective, two-arm cohort study, the authors use ICE to define the relationship between the oesophagus and the posterior wall of the left atrium in patients undergoing left

atrial ablation. In group A (109 patients), 2D-ICE with CARTO-SOUND was used to create a 3D reconstruction of the oesophagus and this was added to the electroanatomical map (EAM) of the left atrium to help guide ablation. In group B (71 patients), a standard quadripolar catheter was placed in the oesophagus and ICE was used to identify its location without 3D reconstruction.

The final analysis determined that there was no difference in clinically important OI between the two groups. Perhaps surprisingly, procedure duration and fluoroscopy time was significantly reduced in the 3D reconstruction group, with mean time required to create the 3D reconstruction of the oesophagus only 5 minutes. Most importantly, however, this work by Santoro et al. reaffirms the fact that the relationship between the left atrium and the oesophagus is highly variable, with the oesophagus lying in the midline of the left atrium in 53.2% of patients, rightward in 34.8% of patients and leftward in 11.9% of patients.

Whilst Santoro et al. are to be commended on investigating a relatively novel method for imaging the oesophagus during left atrial ablation, several limitations must be considered. This was a relatively small, single-centre observational study. There was no attempt to validate the findings of ICE with either alternative forms of oesophageal imaging or oesophageal temperature monitoring. The study recruited a heterogeneous cohort of patients requiring left atrial ablation, including those with AF, incisional atrial tachycardias and other left atrial tachycardias meaning the amount of posterior wall ablation carried out may have been divergent between groups. In addition, there was a lack of clarity on how the oesophageal reconstruction was used to guide ablation. It should further be noted that oesophageal location was defined at a single time-point prior to transseptal puncture, meaning the impact of intraprocedural movement of the oesophagus was not considered. Significant movement of the oesophagus during left atrial ablation has been recognized in previous studies [10,13]. Finally, the presence of subclinical OI was not assessed with follow-up endoscopy. Given the relatively low numbers recruited to the study and the infrequent nature of clinically important ablation-related OI, endoscopic assessment of thermal lesions would have been a useful adjunct to help identify if either technique was superior.

Protecting the oesophagus during left atrial ablation presents specific challenges to both clinicians and academics; the catastrophic nature of AEF means every effort should be made to minimize the risk but its infrequency makes it extremely difficult to academically investigate. A number of techniques have now been proposed for minimizing OI during left atrial ablation (Fig. 1) but, other than reduced power on the posterior wall, none have strong clinical data to support them. In particular, peri-procedural imaging appears to be limited by movement of the oesophagus during

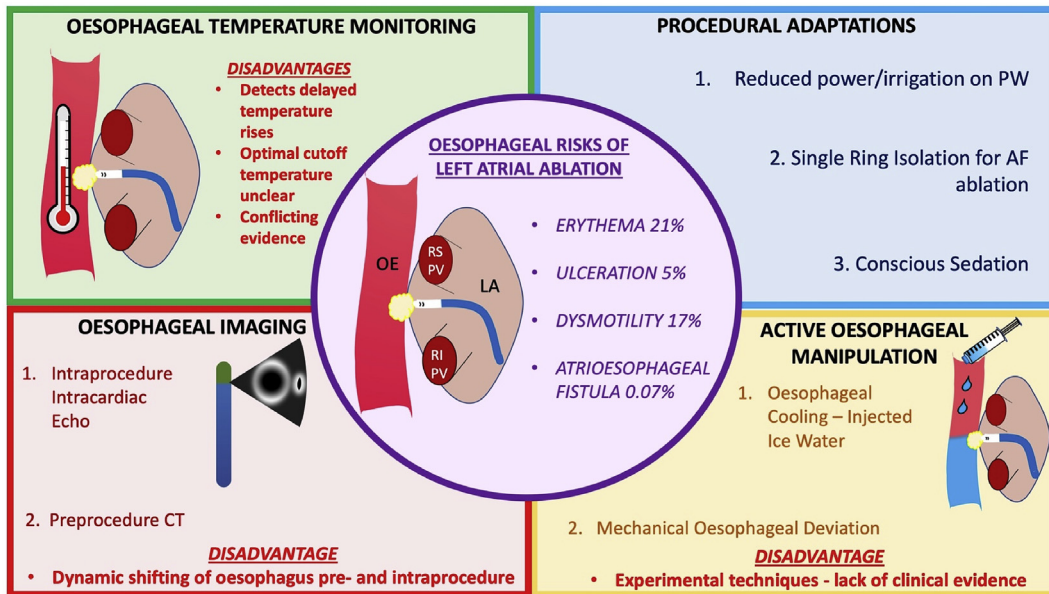


Fig. 1. Risks to the oesophagus associated with left atrial ablation and proposed methods to reduce this risk. LA – Left atrium, OE – oesophagus, RSPV – right superior pulmonary vein, RIPV –right inferior pulmonary vein, PW – posterior wall.

ablation. A recent systematic review and meta-analysis suggested that ablation under conscious sedation rather than general anaesthesia may reduce the risk of endoscopically significant thermal lesions but this was based on only two studies [2]. Otherwise there was no evidence that either oesophageal temperature monitoring or oesophageal manipulation reduced the development of endoscopic thermal lesions. Given the ongoing absence of evidence, minimising posterior wall ablation wherever possible should be prioritised. Techniques such as single ring isolation of the pulmonary veins and the posterior wall for atrial fibrillation ablation should be considered given the reduced amount of posterior wall ablation often required [5,14]. Whilst further investigation into techniques to reduce thermal injuries of the oesophagus with endoscopic follow-up remains important, novel, non-thermal ablation modalities such as pulsed field ablation may hold the key to the avoidance of OI in the long-term [15].

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