EP CASE REPORT

# Oesophagopericardial fistula as a late complication of stereotactic radiotherapy for recurrent ventricular tachycardia

**Jana Haskova [1]*, Kristina Jedlickova[2], Jakub Cvek [3], Lukas Knybel [3], Radek Neuwirth [4], and Josef Kautzner[1]**

[1]Department of Cardiology, Institute for Clinical and Experimental Medicine (IKEM), Vídeňská 1958/9, Prague 4 140 21, Czech Republic; [2]Department of Pathology, Institute for Clinical and Experimental Medicine (IKEM), Prague, Czech Republic; [3]Department of Oncology, Ostrava University Hospital, Ostrava, Czech Republic; and [4]Masaryk University Medical School, Brno, Czech Republic

* Corresponding author. Tel: 00420739686615. *E-mail address*: hasj@ikem.cz

Stereotactic body radiotherapy (SBRT) has been suggested as a promising therapeutic alternative in cases of failed catheter ablation for recurrent ventricular tachycardias (VTs).[1] Early results triggered a wave of enthusiasm, while severe adverse effects have been reported only in an abstract form (Robinson CG, *et al. Int J Radiat Oncol* 2019;**105**:682).

A 67-year-old patient with a history of inferior myocardial infarction and coronary artery bypass grafting using the gastroepiploic artery was implanted with an Implantable Cardioverter-Defibrilator (ICD) for recurrences of VT 16 years later. He underwent catheter ablation in an expert centre, targeting three different morphologies of VT from the inferior wall. Despite non-inducibility at the end, the patient had recurrences of two faster VTs 2 years later. Stereotactic body radiotherapy was performed (CyberKnife, Accuray), based on electroanatomical maps and positron emission tomography/computed tomography (CT) identification of the scar (25 Gy on 76% isodose, target volume 70 $cm^3$, CTV covered entire scar, Clinical and Planning Target Volume (CTV-PTV) margin was isotropic 3 mm) (*Figure 1*). The maximum dose to oesophagus met recommended dose–volume constraints for oesophagus [D5 mL = 9.23 Gy, Dnear max (0.035 ccm) = 13.9 Gy, Dmax = 14.46 Gy]. We used 162 non-coplanar beams instead of arcs. The patient presented with dysphagia and early oesophagitis was confirmed by endoscopy 18 days later. All complaints

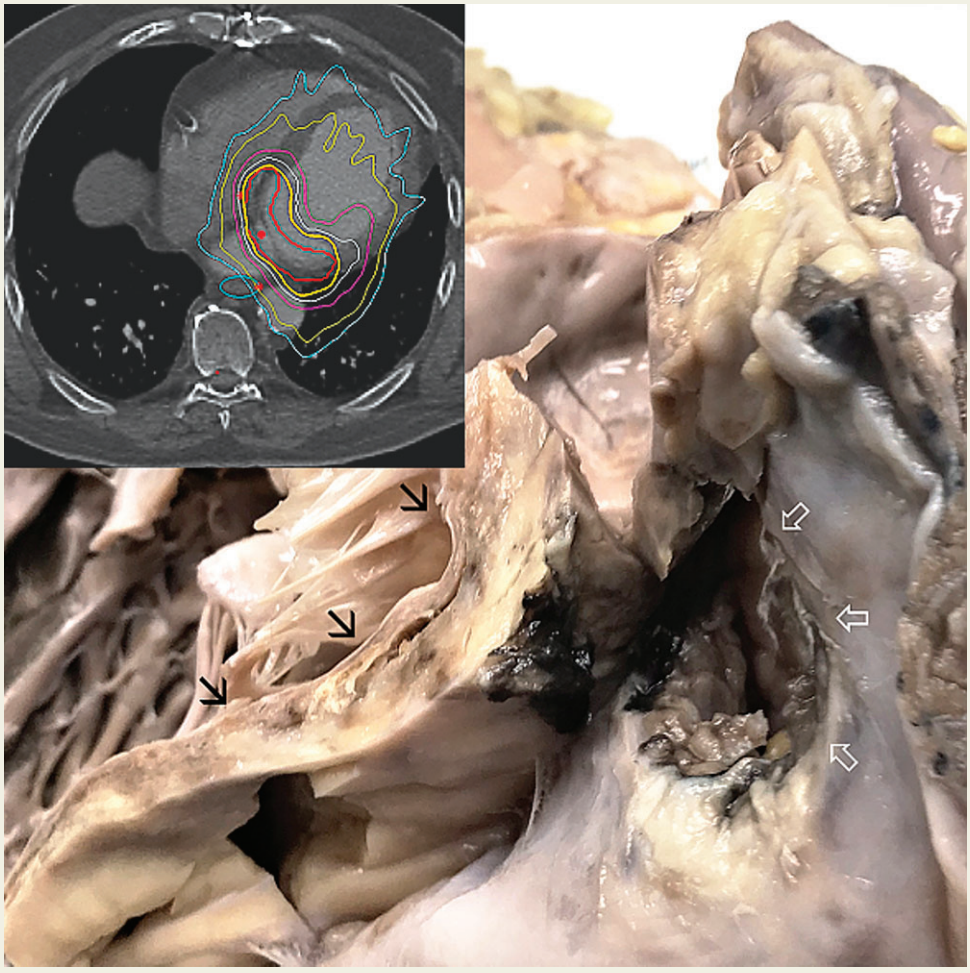

**Figure 1** Post-mortem macroscopic picture of the myocardial substrate in the inferior wall (black arrows) and adjacent oesophagopericardial fistula opening through the parietal pericardium (open arrows). *Inset*: CT angiogram depicting radiosurgical treatment plan with isodose lines.

resolved on a high dose of antiulcer therapy and the patient was asymptomatic, without VT recurrences. Six months later, he was admitted for dysphagia and was diagnosed with a large deep ulcer in the terminal oesophagus. After the insertion of percutaneous endoscopic gastrostomy and antiulcer therapy, the patient underwent contrast oesophagography with no signs of perforation. He was readmitted 3 months from the beginning of symptoms for progression of dysphagia and haematemesis. Endoscopy revealed necrotic ulcer with venous bleeding, unsuitable for any local intervention. On CT, a cavity around the distal oesophagus with air was documented. Corrective surgery was considered high risk. A few days later, more severe bleeding occurred leading to hypovolaemic shock and melena. After volume expansion and repeated cardiopulmonary resuscitation for electromechanical dissociation, the patient presented with episodes of fast VT. After transient stabilization with antiarrhythmics, the shock progressed and the patient died with terminal asystole. A post-mortem examination confirmed oesophagopericardial fistula (*Figure 1*).

Our case illustrates that SBRT may be complicated even in a long-term course. This is well known from oncology literature on cardiac toxicity after higher dose chest radiotherapy.[2] Oesophageal injury was described 5–40 months after radiotherapy.[3] In our patient, previous bypass surgery with gastroepiploic artery might contribute to oesophageal damage. The lessons for planning SBRT may be to consider decreasing the prescribed dose and/or lower coverage with prescribed isodose whenever the PTV is larger or an additional risk factor is present. The risk/benefit of SBRT for VT should be always carefully considered and long-term follow-up is advisable.

## Funding

This work was supported by the research grant NV18-02-00080 of the grant agency AZV (Ministry of Health of the Czech Republic).

**Conflict of interest:** none declared.

## References

1. Van Der Ree MH, Blanck O, Limpens J, Lee CH, Balgobind BV, Dieleman EMT *et al*. Cardiac radioablation-A systematic review. Heart Rhythm 2020;**17**:1381–92. 10.1016/j.hrthm.2020.03.013 32205299
2. Wang K, Eblan MJ, Deal AM, Lipner M, Zagar TM, Wang Y *et al*. Cardiac toxicity after radiotherapy for stage III non-small-cell lung cancer: pooled analysis of dose-escalation trials delivering 70 to 90 Gy. *J Clin Oncol* 2017;**35**:1387–94.
3. Ahn SJ, Kahn D, Zhou S, Yu X, Hollis D, Shafman TD *et al* Dosimetric and clinical predictors for radiation-induced esophageal injury. *Int J Radiat Oncol Biol Phys* 2005;**61**:335–47.