

# Swallowing-induced atrial tachycardia in an adolescent with hypertrophic cardiomyopathy: a case report

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## Abstract

Swallowing-induced tachycardia is a rare phenomenon, with only 50 cases documented worldwide. We present a unique case of an adolescent with hypertrophic cardiomyopathy (HCM) who presented with palpitations and a near syncopal episode. The patient was found to have a swallowing-induced atrial tachycardia. He underwent radio-frequency isolation of the right superior pulmonary vein and ablation of the right anterior ganglionated plexus, which led to a resolution of his symptoms. This case highlights the possible association between HCM and autonomic instability as potential aetiological mechanism for the tachycardia.

## Keywords

Tachycardia • Swallowing • Hypertrophic cardiomyopathy • Case report

## Learning points

- Swallowing-induced tachycardia is a rare entity.
- There is a possible relationship between autonomic instability and the swallowing-induced atrial tachycardia observed in this patient with hypertrophic cardiomyopathy.

## Introduction

Swallowing-induced tachycardia is defined as a tachyarrhythmia reproducible with deglutination, in the absence of underlying cardiac or gastrointestinal pathology. Approximately 50 cases of swallowing-induced tachycardia have been reported worldwide since 1926.<sup>1</sup> We present a unique case of a swallowing-induced atrial tachycardia in an adolescent with hypertrophic cardiomyopathy (HCM). Hypertrophic cardiomyopathy, also referred to as hypertrophic obstructive cardiomyopathy, results from a genetic defect that causes asymmetric hypertrophy of the interventricular septum. The pathophysiology of HCM involves left ventricular outflow obstruction, mitral regurgitation, diastolic dysfunction, ischaemia, autonomic dysregulation, and arrhythmias.<sup>2–4</sup> The clinical manifestations of this disorder range from patients who are asymptomatic to those who develop dyspnoea, chest pain, syncope, arrhythmias, and even sudden cardiac death.<sup>2</sup> This case adds to the body of literature supporting a possible aetiological relationship between arrhythmias and autonomic dysregulation in patients with HCM.

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## Timeline

3 months prior to presentation	Patient reports palpitations while eating. Holter monitor reveals paroxysms of atrial tachycardia. Near syncopal event occurs while swallowing.
Inpatient hospital course (4 days)	Telemetry reveals non-sustained atrial tachycardia when patient swallows. Cine esophagram is unremarkable.
Radiofrequency ablation (5 hours)	Activation mapping of left atrium is performed while patient swallows. Successful radiofrequency ablation of ectopic focus in right superior pulmonary vein.

## Case report

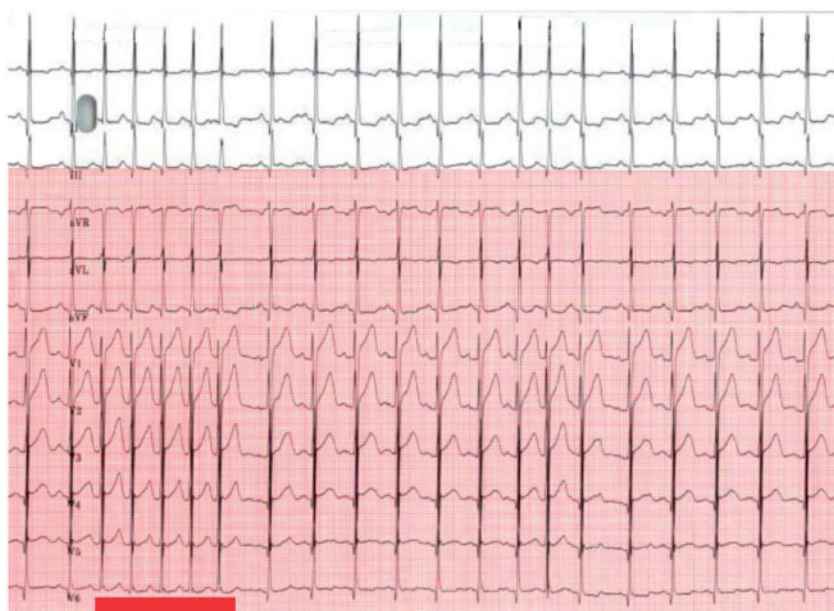
A 17-year-old man with HCM presented to the emergency department with a 3-month history of palpitations that lasted up to 5 s and occurred multiple times throughout the day. He was found to have paroxysms of atrial tachycardia on an outpatient Holter monitor and had experienced a near syncopal episode associated with swallowing. On presentation, his examination was notable for a resting heart rate of 65 b.p.m. with a blood pressure of 125/60 mmHg. On cardiac examination, his rate and rhythm were regular without audible murmurs, rubs or gallops, or a displaced point of maximal impulse. The remainder of the physical

examination was unremarkable. The patient was admitted to telemetry, which consistently demonstrated a non-sustained atrial tachycardia when the patient swallowed. A cine oesophogram was performed and was unremarkable. A timeline of the patient's outpatient and inpatient course is outlined. A 12-lead rhythm strip of the patient's paroxysmal atrial tachycardia can be seen in *Figure 1*.

After obtaining consent, the patient was brought to the electrophysiology (EP) lab, where tachycardia could not be induced with programmed electrical stimulation. Activation mapping was performed using the Biosense-Carto™ system (Biosense Webster, Diamond Bar, CA, USA). By having the patient periodically swallow 10–20 cm<sup>3</sup> of saline, non-sustained atrial tachycardia was induced (*Figure 2*). The Lasso catheter (Biosense Webster) was used to take multiple simultaneous activation points from a single premature atrial contraction. The earliest activity was localized to the anterior aspect of the right superior pulmonary vein (RSPV). After radiofrequency isolation of the RSPV and ablation of the right anterior ganglionated plexus, the tachycardia was non-inducible despite repeated swallowing and isoproterenol medication. The patient remained asymptomatic, without any further palpitations, in the 12 months of follow-up after the ablation.

## Discussion

Deglutition-induced atrial tachycardia is a rare phenomenon that has never been documented in adolescents and in the setting of HCM. Previous cases have documented swallowing as a trigger for both bradyarrhythmias and a wide range of supraventricular tachyarrhythmias. In a similar case to our patient, Engel *et al.*<sup>5</sup> reported an autonomic focus in the left atrium as a trigger for a swallowing-induced tachyarrhythmia.



**Figure 1** A 12-lead rhythm strip of the paroxysmal atrial tachycardia (red box) induced by swallowing.



**Figure 2** Surface and intracardiac electrograms of swallowing-induced arrhythmia. Top 4 leads (I, II, aVF, and V1) reflect surface electrocardiogram tracings. CS 1–10 and PV1–10 reflect intracardiac electrograms originating from coronary sinus and right superior pulmonary vein, respectively. The patient is in normal sinus rhythm until swallowing water (longitudinal black line), followed by three beats of non-sustained atrial tachycardia (black arrows) with earliest activation in the Lasso catheter located in the right superior pulmonary vein. CS, coronary sinus; PV, pulmonary vein.

Reports have raised the possibility of autonomic dysregulation as a mechanism for atrial arrhythmias in patients with HCM.<sup>3,4,6</sup> Exaggerated sympathetic activity, manifesting as hyper-responsiveness of the myocardium to catecholamines has been described in swallowing-induced atrial fibrillation.<sup>6</sup> The relationship between increased sympathetic activity and swallowing-induced tachyarrhythmias is supported by Tandeter *et al.*<sup>7</sup> in their report of a swallowing-induced atrial tachyarrhythmia that was also initiated by the  $\beta$ -agonist salbutamol. In our case, it is possible that autonomic changes associated with the patient's HCM may have played a role in the patient's swallowing-induced atrial tachycardia.

Successful radiofrequency ablations of swallowing-induced atrial arrhythmias targeting the pulmonary vein ostia or the posterior walls of the left or right atria have been performed. Although pulmonary vein isolation is the standard target for atrial fibrillation ablation, another strategy involves targeting the parasympathetic input to the heart. Thus, the ability to cure swallowing-induced atrial tachycardia with pulmonary vein isolation may be related either to isolation of the culprit vein or denervation of the ganglionated plexus. In our patient, both isolation of the RSPV and ablation of the right anterior ganglionated plexus, might have contributed to the successful long-term cure.

## Consent

Informed consent was obtained from this patient for publication of this case history and associated images in line with COPE recommendations.

**Conflict of interest:** none declared.

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