Tachyarrhythmias triggered by swallowing and belching

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Abstract
Three cases with supraventricular tachyarrhythmias related to oesophageal transit are reported. A 61 year old man had episodes of atrial tachycardia on each swallow of food but not liquids; this has been reported only rarely. A 55 year old man had atrial fibrillation initiated by drinking ice cold beverages; this has not been described previously although atrial tachycardia triggered by drinking ice cold beverages has been described once. A 68 year old man had supraventricular tachycardia initiated by belching; this has not been described previously. These cases illustrate the diversity of atrial tachyarrhythmias that can be precipitated by oesophageal stimulation and suggest that what is regarded as a very rare phenomenon may be found more commonly when sought.

(Keywords: atrial tachycardia; atrial fibrillation; deglutition; eructation; arrhythmias)

Case 1
A 61 year old man had a two month history of episodes of brief palpitations when he swallowed solids but not liquids; this has been reported only rarely. A 55 year old man had atrial fibrillation initiated by drinking ice cold beverages; this has not been described previously although atrial tachycardia triggered by drinking ice cold beverages has been described once. A 68 year old man had supraventricular tachycardia initiated by belching; this has not been described previously. These cases illustrate the diversity of atrial tachyarrhythmias that can be precipitated by oesophageal stimulation and suggest that what is regarded as a very rare phenomenon may be found more commonly when sought.

Case 2
A 55 year old man had a 10 year history of paroxysmal atrial fibrillation. The first episode occurred after he had been involved, but not injured in, a road traffic accident. Each subsequent episode occurred when he drank an ice cold beverage quickly. He was able to demonstrate the causal relation during ECG monitoring by drinking an ice cold soft drink, which immediately precipitated atrial fibrillation. Most episodes spontaneously reverted to sinus rhythm. 

Figure 1  A representative ECG for case 1 showing the onset of atrial tachycardia corresponding with swallowing.
rhythm within a few hours. Six episodes were cardioverted, electrically or with flecainide. Cardiovascular examination was normal. When in sinus rhythm, his ECG was normal. Echocardiogram, chest radiography, and thyroid function tests were normal. He avoids rapidly drinking cold liquids and he is asymptomatic without regular medication.

Case 3
A 68 year old man was admitted with prolonged palpitations associated with dizziness and dyspnoea, which had been precipitated by belching. He had had similar episodes for many years. They usually started 20 to 30 minutes after a meal and were always precipitated by a belch. A Valsalva manoeuvre usually terminated an attack, but failed to do so on the day he was admitted. The ECG on admission showed a narrow QRS complex tachycardia at 180 beats/min (fig 2A). Retrograde P waves simultaneous with the QRS complexes were apparent when compared with an ECG during sinus rhythm, which resulted from carotid sinus massage. (B) Brief sinus rhythm was followed by atrial flutter with 2:1 block and a ventricular rate of 155 beats/min, which converted to supraventricular tachycardia at 180 beats/min identical to that on admission.

Discussion
Deglutition tachyarrhythmias are rare with fewer than 50 cases in the world literature. Most reports describe single cases. In English language journals there is a single series comprising three cases.3

Deglutition tachyarrhythmias are reported in association with an Eisenmenger ventricular septal defect and after ventricular aneurysmectomy and coronary grafting.4 6 In most individuals with deglutition tachyarrhythmias there is no demonstrable cardiac abnormality, coronary artery disease or myocardial ischaemia.6 7 Unlike deglutition bradyarrhythmias, deglutition tachyarrhythmias are not usually associated with oesophageal abnormalities.

In some cases swallowing caused atrial ectopic activity that triggered atrioventricular reentry tachycardias via accessory pathways.9 In those cases identical tachyarrhythmias could be triggered by paced atrial ectopic beats. In most patients with deglutition tachyarrhythmias, atrial pacing does not trigger similar arrhythmias.9 10 11 In most cases enhanced or triggered automaticity is suggested as the mechanism for deglutition atrial tachyarrhythmias because of demonstration of warm up and cool down phenomena and by continuation of the tachycardia when there is atrioventricular block.10 11 In a few patients atrial fibrillation or atrial flutter was the sole detected tachyarrhythmias.15 Other patients had both atrial fibrillation and atrial tachycardia.10 11

The mechanism causing deglutition tachyarrhythmias is debated. Direct stimulation of the left atrium by the passage of contents or contraction of the oesophagus is suggested in some patients because inflation of a balloon in the oesophagus at the level of the left atrium precipitated the tachyarrhythmias until the balloon was deflated.15 16 Certainly external compression of the left atrium can precipitate atrial tachyarrhythmias,17 but so can neural mechanisms.18 The oesophageal distension that triggers the tachyarrhythmia is not always at the level of the heart.17 19 Dry swallowing can precipitate the arrhythmia.19 Local anaesthetic spray to the pharynx can abolish the arrhythmia.20 Mapping in many cases has demonstrated that the arrhythmia originated in the high right atrium or interatrial septum rather than in the left atrium.19 21

If deglutition tachyarrhythmias are neurally mediated, does this result from activation of parasympathetic or sympathetic nervous systems? Parasympathetic stimulation causes bradycardia in most individuals, but triggers atrial tachyarrhythmias in a minority.18 Shirayamama et al described three patients with deglutition tachyarrhythmias.1 In one the atrial tachycardia was prevented by treatment with atropine and potentiated by cholinergic stimulants and propranolol. That patient had identical tachyarrhythmias precipitated by coughing. Cough syncope and deglutition bradyarrhythmias are both mediated by activation of the parasympathetic nervous system. It seems likely in that case that cough and deglutition tachyarrhythmias were also parasympathetically mediated. In a second patient the atrial tachycardia was abolished by propranolol but increased by atropine and catecholamines, suggesting that the sympathetic nervous system was involved. In the third patient, atrial tachycardia was prevented by a combination of atropine and propranolol but not by either alone.

The observations by others also suggest that in individual cases the parasympathetic nervous system, the sympathetic nervous system, direct
physical stimulation or a combination of these have causative roles.

There is no universally successful treatment. In individual cases satisfactory control has been achieved with a variety of drugs, including verapamil, β-blockers, class I antiarrhythmic drugs, and amiodarone. Drugs that control symptoms in some patients aggravate them in others. In intractable cases, deglutition tachyarrhythmias have been cured by repositioning the oesophagus. This could be the result of surgical denervation or removal of direct stimulation.

My patients with deglutition atrial tachyarrhythmias had unusual features. In most patients deglutition tachyarrhythmias are triggered by swallowing solids or liquids and commonly by dry swallowing. Deglutition tachyarrhythmias triggering by swallowing solids but not liquids, as in case 1, have been reported rarely. In case 2 atrial fibrillation was precipitated only by drinking ice cold beverages. This has not been reported previously but one case of atrial tachycardia triggered by ice cold beverages has been described. There is also a report of triggering by hot food and drinks. Deglutition bradycardias can also be triggered by cold drinks or by hot food and drinks.

Case 3 is, as far as I am aware, an unreported condition. Bradycardias are well recognised as a consequence of belching and vomiting and they are probably mediated by the parasympathetic nervous system. A MEDLINE search of the literature published between 1966 and January 1998 revealed no case of association between tachyarrhythmias and eructation as a heading (or eructation, belching or burping as a text word). It is probable that similar oesophageal triggered autonomic reflexes were involved to those triggering deglutition tachyarrhythmias.

1 Tomlinson JW, Fox KM. Carcinoma of the oesophagus with "swallow syncope". BMJ 1975;ii:315–16.