


## CASE REPORT

# Dangerous noodle: A case of swallowing syncope and a review of 122 cases from the literature

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## Abstract

Swallowing syncope is a rare medical condition. Even though it has been known as a neurally mediated syncope, the definitive mechanism of this condition remains unclear. We show in this study an additional case of swallowing syncope and review the 122 reported cases from the literature. A 47-year-old Japanese man had been suffering from recurrent syncopal attacks, when he fainted immediately after swallowing. Holter electrocardiogram monitoring demonstrated a sinus pause (maximum R-R interval of 3.8 seconds) after he swallowed a noodle quickly. A permanent pacemaker was implanted because the frequency of syncope increased.

## KEYWORDS

deglutition, permanent pacemaker, sinus arrest, situational syncope, swallowing syncope

## 1 | INTRODUCTION

Swallowing syncope is a situational syncope occurring during or immediately after swallowing.<sup>1</sup> A vagal reflex is a possible mechanism as the cause of this type of consciousness loss. To the best of our knowledge, the clinical features and susceptible age of swallowing syncope have not been detailed. We report here an additional case of swallowing syncope and review the literature.

## 2 | CASE REPORT

A 47-year-old Japanese man was referred to the Department of Otolaryngology for evaluation of recurrent syncopal episodes during deglutition. For more than 10 years, he had been suffering from recurrent syncopal attacks, fainting immediately after swallowing a noodle quickly. Coughing induced clogged throat and also loss of consciousness for a few seconds. Cold beverages, carbonated drinks, and solid

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food did not cause syncopal attacks. He had experienced syncopal episodes approximately once a month in the early days. He was able to control syncope by means of masticating well and swallowing slowly.

The patient has a past history of percutaneous coronary intervention, with stents inserted for unstable angina when he was 46 years old. He has also had hypertension, hypercholesterolemia, and arteriosclerosis obliterans, and received medications (amlodipine besylate, carvedilol, aspirin, prasugrel hydrochloride, candesartan cilexetil, rosuvastatin calcium, and esomeprazole). He smoked two packs of cigarettes per day from age 20 to 37. His family history is significant for arteriosclerosis obliterans in his father and ischemic heart disease in his brother.

Examinations including a blood test, 12-lead electrocardiogram (ECG), magnetic resonance imaging of the brain, contrast-enhanced computed tomography scans of the cervicothoracic region, and electroencephalography were normal. No abnormal neurological finding was detected. Ultrasound echocardiography revealed normal cardiac function (ejection fraction = 67.4%) without wall asynergy and valvular dysfunction. Endoscopic examination and esophagography revealed a small paraesophageal hiatal hernia. No significant finding was detected in his oral cavity, pharynx, and larynx. Videofluoroscopic examination of swallowing was normal.

Twenty-four-hour Holter electrocardiogram monitoring demonstrated a sinus pause (maximum R-R interval of 3.8 seconds) after he swallowed a noodle quickly (Figure 1). At the same time, he experienced loss of consciousness. Swallowing of cold beverages, carbonated drinks, solid food and the Valsalva maneuver did not reproduce the syncopal attacks and abnormal electrocardiogram findings. He was diagnosed as having swallowing syncope.

He did not want to receive any pharmacotherapy. Because a gradual increase in the frequency of syncopal attack was observed, a permanent pacemaker (Medtronic Advia MRI; Medtronic, Inc.,

Minneapolis, MN, USA; Dual-chamber pacing mode; Basic rate, 60 ppm) was implanted. Just before the pacemaker implantation, he had syncopal episodes almost every day. Although coughing still induced clogged throat, the patient has not experienced a syncopal attack in the 3 years after the pacemaker implantation.

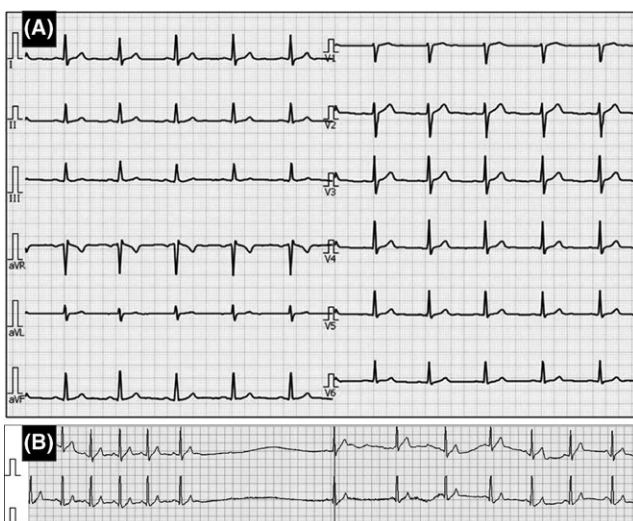
### 3 | DISCUSSION

Swallowing syncope is a rare type of syncope induced by deglutition. It was reported that two patients out of 641 recurrent syncope patients

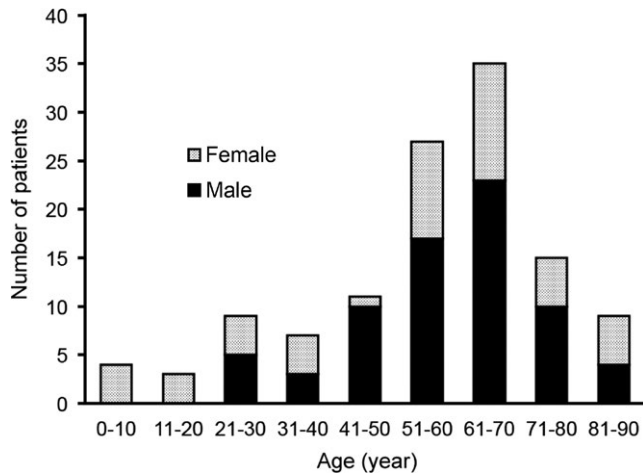
**TABLE 1** Patient characteristics, associated neuralgia, and meals that caused syncope in the 122 previously reported cases and this case of swallowing syncope. The gender and age in three cases were not reported

	122 reported cases	This case
Gender (Male/female/not described)	71/48/3	Male
Age (in years, mean $\pm$ SD, n = 119)	56.1 $\pm$ 19.2 (4-89)	47
Neuralgia		
Chest pain	12	
Throat pain	3	
Ear pain (otalgia)	2	
Back pain	1	
None	81	(+)
Not described	23	
Type of food or beverage		
Solid		
Sticky food	3	
Meat	2	
Bread	6	
Chicken	2	
Noodles	1	(+)
Sandwich	5	
Hamburger	1	
English muffin	1	
Pizza	1	
Other kind of solid food	24	
Liquid		
Broth or soup	2	
Water	7	
Carbonated beverage	16	
Hot tea or coffee	2	
Other kind of liquid	13	
Other kind of meal	25	
Not described	32	

SD, standard deviation.



**FIGURE 1** A 12-lead electrocardiogram and the Holter electrocardiogram monitor: A, a sinus rhythm and no ST segment change; B, a sinus pause (maximum R-R interval of 3.8 s) during the swallowing of a noodle



**FIGURE 2** Age distribution of patients with swallowing syncope (122 reported cases and this case)

were swallowing syncope (0.3%).<sup>2</sup> We reviewed the 122 reported cases (limited data was reported in three cases) in the literature, which revealed that the mean age of the disease is 56.1 years old ( $n = 120$ , including this case) (Table 1). There was no significant difference in age between male and female patients (mean age  $\pm$  standard deviation [in years]; male,  $58.7 \pm 14.7$  [ $n = 72$ ]; female,  $52.1 \pm 24.1$  [ $n = 48$ ]). However, there was a statistically significant difference in age distribution between genders (Figure 2,  $P = 0.025$ , Chi-square test, IBM SPSS Statistic, IBM, New York, NY, USA). The younger age groups had more female patients than male patients. In addition, the middle age groups had more male than female. Although the cause of difference in gender has not been clarified, a population-based study reported that syncope occurred more commonly in girls.<sup>3</sup>

The mechanism of swallowing syncope remains a controversy. However, because the administration of anticholinergic medicine is effective at preventing the syncope in some cases, a hypersensitive vagal reflex is thought to be a major cause of swallowing syncope associated with bradyarrhythmia. The possible reflex arc involved in the swallowing syncope was detailed in the previous study.<sup>4</sup> The difference of vagal reflex may be related to the patient distribution in reported cases. The literature review showed that some patients had neuralgia (Table 1). Chest pain is the most common neuralgia accompanied by swallowing syncope. In addition, the neuralgia in a head and neck lesion was also observed. Swallowing syncope should be considered as differential diagnosis in these patients.

Patients with swallowing syncope present syncope or presyncope (or dizziness) lasting for seconds to minutes. Because the patients have the symptoms during or immediately following deglutition, a detailed history about the syncopal attacks is very important for diagnosis. Particularly, ingestion of solid food, a cold drink, or a carbonated beverage has a tendency to cause swallowing syncope because it easily stimulates or distends the esophagus<sup>5</sup> (Table 1).

Swallowing syncope has been related to underlying diseases (Table 2).<sup>4,6</sup> In the case of this patient, he had risk factors for swallowing syncope (hiatus hernia and unstable angina). Intracranial lesion,

**TABLE 2** Underlying diseases in the 122 previously reported cases and this case of swallowing syncope

	122 reported cases	This case
<b>Cardiac disease</b>		
Acute myocardial infarction	3	
Old myocardial infarction	4	
Angina pectoris	4	(+)
Heart failure	3	
Post-CABG state	2	
Digitalis toxicity	3	
Rheumatic heart disease	1	
Sick sinus syndrome	2	
Atrial fibrillation	2	
Atrioventricular block	3	
Diastolic dysfunction	1	
Sinus venosus atrial septal defect	1	
<b>Digestive disease</b>		
Esophageal spasm	11	
Esophageal cancer	3	
Esophageal diverticulum	2	
Esophageal stricture	2	
Hiatus hernia	12	(+)
Gastroesophageal reflux	10	
Achalasia	4	
Schatzki ring	3	
Nutcracker esophagus	1	
Megaesophagus	1	
Dilated esophagus	1	
<b>Other</b>		
Lung cancer	2	
Thoracic aortic aneurysm	2	
Carotid artery stenosis	1	
Carotid endarterectomy	1	
Graves' disease	1	
Neck lymph node metastasis	1	
Fundoplication	1	
Gastrectomy	1	
None	44	
Not described	6	

CABG, coronary artery bypass grafting.

head and neck lesion, digestive tract, thoracic lesion, and cardiovascular lesion examinations are needed to determine the diagnosis of swallowing syncope.

Diagnosis was established by a clinical history of reproducible syncope or presyncope in connection with swallowing trigger foods or liquids. During syncope, various types of transient ECG abnormalities have been reported (Table 3). There are several treatment options for

**TABLE 3** Arrhythmias causing syncope and the treatments in the 122 previously reported cases and this case of swallowing syncope

	122 reported cases	This case
Type of arrhythmia		
Sick sinus syndrome	40	(+)
Atrioventricular block	57	
PAF or AF tachycardia	3	
Ventricular asystole	5	
Junctional rhythm	1	
Atrial escape	1	
None	8	
Not described	7	
Treatment		
Pacemaker implantation	55	(+)
Drug administration		
Anticholinergics	11	
Ephedrine	2	
Beta blocker	2	
Propranolol	2	
Proton pump inhibitor	2	
Termination of unsuitable drug	5	
Operation		
Gastroesophageal operation	8	
Vagal resection	3	
Balloon dilatation of achalasia	2	
Radiofrequency ablation	1	
Dietary modification	5	
None	7	
Not described	17	

PAF, paroxysmal atrial fibrillation; AF, atrial fibrillation.

the management of swallowing syncope. The treatment of this patient was according to the guidelines.<sup>7,8</sup> Avoiding trigger foods and swallowing slowly are recommended as a conservative treatment. Caffeine and oral medicine such as anticholinergic medications and catecholamines are used to prevent bradyarrhythmia, but none is effective enough. Permanent pacemaker placement is a common and effective medical intervention for situational syncope, particularly swallowing syncope with bradyarrhythmia. The guideline (2018 European Society

of Cardiology Guidelines for the diagnosis and management of syncope) recommends that cardiac pacing should be considered to reduce recurrence of syncope when the correlation between symptoms and abnormal electrocardiogram findings is established in patients >40 years of age.<sup>8</sup>

## 4 | CONCLUSION

We have reported a case of swallowing syncope successfully treated by permanent pacemaker implantation. The cause of syncope in this patient was sinus node dysfunction with documented symptomatic bradycardia (sinus pauses) induced by the swallowing of a noodle. Taking a detailed clinical history of the syncopal patients was important to the diagnoses.

## CONFLICT OF INTEREST

Authors declare no conflict of interests for this article.

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