



# Hot potato causing full-thickness esophageal burn and perforation: a case report

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**Background:** Esophageal perforation is a heterogeneous clinical entity. The common denominator is mediastinal contamination by digestive contents possibly evolving to sepsis, multiorgan failure, and death if not timely and appropriately treated. Mortality ranges between 10% and 20% while delay in treatment (>24 hours) has been shown to be a valuable inverse survival predictor. Non-operative management (NOM) and endoscopic treatment may be considered in stable patients with early presentation, limited esophageal disruption, and contained contamination. On the contrary, surgery should be considered in patients who do not meet NOM criteria. General principles of surgical management include exposure, debridement of non-viable tissue, tension-free defect closure, suture buttressing, and drainage. Esophageal exclusion, diversion, or resection should be considered when primary repair is not feasible.

**Case Description:** This case report details our experience managing a large punched-out perforation of the thoracic esophagus caused by ingestion and impaction of a microwave-heated new potato. Thoracic computed tomography (CT) and upper endoscopy were detrimental for diagnosis revealing 4 cm × 2 cm esophageal full-thickness parietal loss with mediastinal contamination. The patient underwent hybrid esophagectomy via laparoscopy and right thoracotomy with gastric conduit reconstruction. The circular stapled anastomosis was located at the apex of the thorax and reinforced with a pleural patch. The postoperative course was uneventful, and the patient was discharged home on postoperative day (POD) 9.

**Conclusions:** To the best of our knowledge, this is the first reported case of full-thickness esophageal burn and perforation after the ingestion of a microwave-heated new potato. Despite this being anecdotal evidence, ingestion and impaction of microwave-heated solid food may potentially cause full-thickness esophageal perforation.

**Keywords:** Esophageal burn; microwave heating; esophageal perforation; case report; esophagus

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## Introduction

The majority (60%) of esophageal perforations are iatrogenic and occur during diagnostic and therapeutic endoscopic procedures (1). Spontaneous, foreign bodies, and trauma

are responsible for 15%, 8%, and 5% of esophageal full-thickness perforation, respectively (2-4). The common denominator of these heterogeneous conditions is mediastinal contamination by digestive contents and the evolution to

severe sepsis and death in the absence of timely diagnosis and appropriate treatment (5,6). Mortality ranges between 10% and 20% and the delay in treatment is the most important survival predictor (7-9).

We describe the case of a swallowed microwave-heated potato causing esophageal thermal injury and punched-out perforation of the thoracic esophagus. We present this article in accordance with the CARE reporting checklist (available at <https://aoe.amegroups.org/article/view/10.21037/aoe-23-17/rc>).

## Case Presentation

A 38-year-old man without apparent psychiatric/neurologic comorbidities was referred to our hospital 36 hours after the acute onset of dysphagia, drooling and worsening thoracic pain after ingestion of a microwave-heated novel potato. The chest X-ray showed evidence of pneumomediastinum. A chest computed tomography (CT) confirmed the presence of pneumomediastinum, left hydropneumothorax and soluble contrast extravasation (*Figure 1*). The upper endoscopy showed a 4 cm × 2 cm esophageal full-thickness parietal loss located at 30 cm from the incisors. The mucosal edges of the perforation were scarred and inflamed as occurs in thermal injuries (*Figure 2* and *Video 1*). On arrival, the patient was febrile (38.6 °C), tachycardic (116 bpm), and tachypneic, with normal blood pressure (130/85 mmHg). The physical examination did not reveal subcutaneous emphysema. White blood cell count (18,500/mm<sup>3</sup>),



**Figure 1** Chest computed tomography examination revealed a subcarinal mid-thoracic esophageal perforation, pneumomediastinum, and contrast extravasation into the left pleural cavity.

C-reactive protein (38 mg/dL), procalcitonin (2.35 ng/mL), and lactate (1.98 mmol/L) were altered. The patient underwent hybrid esophagectomy via laparoscopy and right thoracotomy with gastric conduit reconstruction. A circular stapled 25 mm anastomosis was fashioned at the apex of the thorax and a pleural patch was used to reinforce the suture. Both the right and left chest were drained and a feeding jejunostomy was performed for nutritional support. The postoperative course was uneventful. An upper endoscopy performed on postoperative day (POD) 5 showed regular anastomosis. The patient was discharged home on POD 9 on a soft diet. The histological examination of the specimen did not reveal peculiar alterations. At 8-month follow-up, the patient was doing well with a well-tolerated regular diet. The upper endoscopy showed normal anastomosis and gastric conduit. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with

### Highlight box

#### Key findings

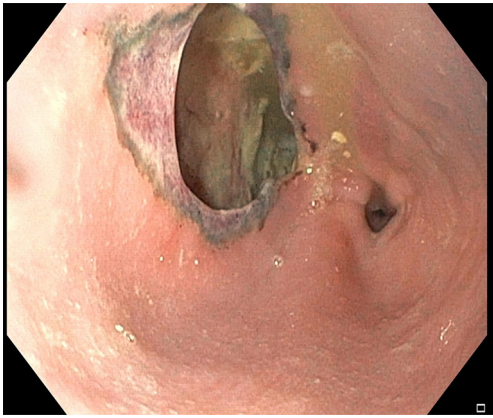
- This report describes a full-thickness esophageal burn and perforation after the ingestion of a microwave-heated new potato.

#### What is known and what is new?

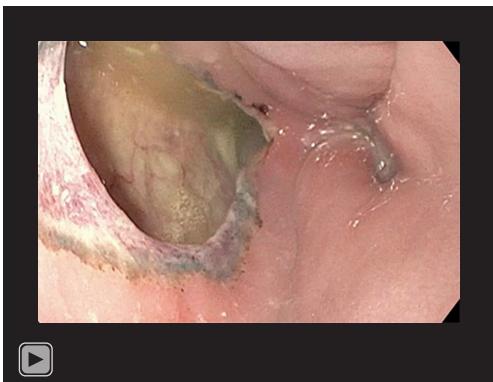
- Acute thermal injuries to the esophagus are uncommon causes of esophageal injury.
- Various degrees of esophageal injury have been reported depending on the temperature, amount of ingested food, physical state, and exposure time.
- We describe the first case of esophageal burn and full-thickness perforation after the ingestion of a microwave-heated new potato.

#### What is the implication, and what should change now?

- Despite this being anecdotal evidence, ingestion and impaction of microwave-heated solid food may potentially cause full-thickness esophageal perforation thus representing an esophageal emergency.



**Figure 2** Upper gastrointestinal endoscopy revealed a large full-thickness punched-out perforation of the thoracic esophagus. The edges of the perforation appeared irregular and burned.



**Video 1** Upper gastrointestinal endoscopy revealed a large full-thickness punched-out perforation of the thoracic esophagus. The edges of the perforation look inflamed as a consequence of the thermal injury induced by the swallowed microwave-cooked potato.

the Helsinki Declaration (as revised in 2013). Publication of this case report and accompanying images was waived from patient consent according to the institutional ethics board of IRCCS Ospedale Galeazzi - Sant'Ambrogio (No. #2023-OGSA1452).

## Discussion

Esophageal perforations are transmural disruptions of the esophageal wall leading to leakage of intraluminal contents into the surrounding mediastinum and pleural cavities. This causes local inflammation with the development of

systemic inflammatory response and sepsis, and high risk of mortality (1). Non-operative management (NOM) and endoscopic treatment can be considered in stable patients with early presentation, limited esophageal disruption, and contained contamination (8-10). On the contrary, surgery should be considered in patients who do not meet NOM criteria. General principles of surgical management include exposure, debridement of non-viable tissue, tension-free defect closure, suture buttressing, and drainage. Esophageal exclusion, diversion, or resection should be considered when primary repair is not feasible.

Acute thermal injuries to the esophagus are uncommon causes of esophageal injury (11). Various degrees of esophageal injury have been reported depending on the temperature, amount of ingested food, physical state (i.e., liquid or solid), and exposure time (12). Linear erythema with white pseudomembranes has been described after ingestion of hot beverages (candy-cane esophagus) (11). These injuries are usually superficial and self-limiting. Similarly, hot solid foods may cause mucosal thermal injury (12,13). The damage pattern is heterogeneous with superficial ulceration, linear erythema, and submucosal blister while no perforations have been described until now. To the best of our knowledge, this is the first reported case of full-thickness esophageal perforation after ingestion of a microwave-heated new potato. New potatoes are not a specific variety; any potato that is harvested early in the season is called new. Other than the small size, a characteristic of new potato is that they keep their shape and consistency once oven or microwave cooked. Differently from the conventional oven heating that involves heat transfer from outside to inside, microwave heating involves energy conversion from electromagnetic to thermal energy. Microwaves are low-energy electromagnetic waves with a wavelength in the range of 0.001–0.3 meters and a frequency in the range of 1,000–300,000 MHz. During the heating process, electromagnetic waves oscillate within the oven and interact with food particles, leading to heat generation and rise in temperature. Specifically, microwaves cause heating from the inner layers toward the outer layers. This generates an inside-out thermic effect while internal parts are heated faster than those located outside. In the present case, we can assume that the ingested potato was warm outside and hot in the core. The single-swallow ingestion of this potato impacted the thoracic esophagus causing acute onset of dysphagia and drooling. The mechanism of damage may be attributable to the protracted thermal injury with consequent punched-out full-thickness delayed perforation.

Because of the significant wall defect with loss of tissue (*Figure 2*) in conjunction with endoscopic evidence of burned and scarred edges, primary repair was not attempted whereas esophagectomy was preferred (14). Thoracotomy was preferred over a minimally invasive approach to obtain a better exposure of the middle third of the esophagus and faster infectious source control. Because of the limited right pleural space contamination, the anastomosis was located at the apex of the thorax and reinforced with a mediastinal pleural patch to possibly reduce the risk of leak (15,16).

## Conclusions

Despite this being anecdotal evidence, ingestion and impaction of microwave-heated solid food may potentially cause full-thickness esophageal perforation.

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## Footnote

*Reporting Checklist:* The authors have completed the CARE reporting checklist. Available at <https://aoe.amegroups.org/article/view/10.21037/aoe-23-17/rc>

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Publication of this case report and accompanying images was waived from patient consent according to the institutional ethics board of IRCCS Ospedale Galeazzi -

Sant'Ambrogio (No. #2023-OGSA1452).

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