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A Rare Case of an Acquired Benign Tracheo-Oesophageal Fistula

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Abstract

This case report describes a 77-year-old lady who developed a benign tracheo-oesophageal fistula (TOF) following oesophageal stent placement for a fishbone-induced perforation. A multimodal diagnostic approach was used to confirm the presence of a TOF. The principal finding was stent erosion into the trachea, resulting in fistula formation and recurrent aspirations. Given the patient's poor performance status (PS) and preference against surgery, conservative management was adopted with enteral feeding. This case highlights the diagnostic and therapeutic challenges of managing acquired benign TOFs in frail, elderly patients.

Keywords

Fishbone Foreign Body, Oesophageal Perforation, Oesophageal Stent, Tracheoesophageal Fistula, Conservative Treatment

1. Introduction

Tracheo-oesophageal fistulas (TOFs) are rare, and when they do occur, they are usually related to malignancy. Benign TOFs are even less common and are often overlooked. This case describes a 77-year-old woman who developed a TOF secondary to oesophageal stent erosion, following stent placement for fishbone-induced perforation. This mechanism was not previously documented in the literature, making this case significant. The case highlights how benign TOFs can be easily missed, especially in frail, elderly patients, and emphasises the need for clinicians to consider this diagnosis in patients presenting with aspiration, regurgitation, or persistent cough after oesophageal procedures.

2. Case Report

A 77-year-old lady, a nursing home resident, dependent on help with activities of

daily living (ADLs), with an Eastern Cooperative Oncology Group (ECOG) PS of 3, was referred to respiratory physicians for a suspected TOF at the level of an oesophageal stent. She has a 15-pack-year smoking history and ceased smoking 25 years ago.

Her medical history includes severe aortic stenosis, managed with transcatheter aortic valve implantation (TAVI) (January 2023); type 2 diabetes mellitus, hypertension, hypothyroidism, congestive heart failure, and dyslipidaemia.

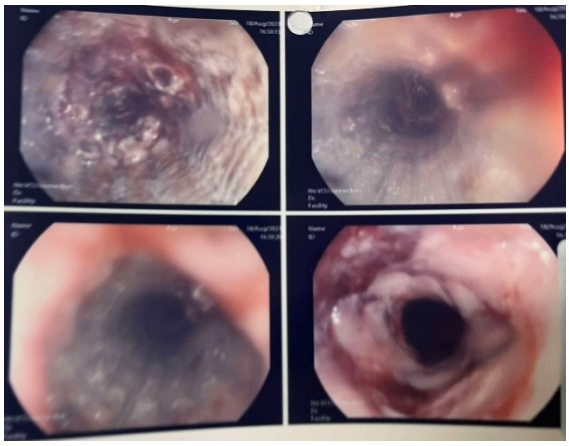
Surgically, she underwent oesophageal stent placement in September 2022 following fishbone-induced perforation. Subsequently, she required nine OGDs with dilatation and argon plasma coagulation (APC) for oesophageal stricture (March 2023 - August 2024). Other procedures included pelvic floor repair (May 2023), radiologically inserted gastrostomy (RIG) tube placement (April 2024), and bronchoscopy (October 2024).

Her medications include metoclopramide, empagliflozin, carvedilol, levothyroxine, esomeprazole, spironolactone, valsartan, clopidogrel, nortriptyline, and macrogol. She relies on Ensure for nutrition (6 - 8 bottles daily) and has a penicillin allergy.

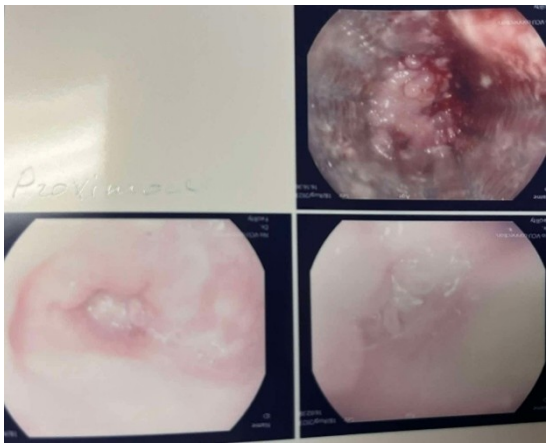
In 2022, she presented with chest pain and odynophagia, persisting for two days after eating fish. A CT of the thoracic aorta revealed an acute oesophageal perforation at the mid-aortic arch secondary to a foreign body, with surrounding soft tissue inflammation, bilateral ground-glass opacities, and interlobular septal thickening suggestive of pulmonary venous congestion (Figure 1). OGD identified a fishbone at 23 cm, which was removed; the mucosal defect was covered and overlapped with an oesophageal stent deployed at 18 - 28 cm. A fully covered self-expandable metal stent (SEMS) was used, measuring 20 mm in diameter and 100 mm in length, constructed from nitinol and covered with a silicone-based polymer. Post-operatively she developed flash pulmonary oedema due to severe aortic stenosis, requiring intensive care. The patient was treated prophylactically with metronidazole, levofloxacin, and fluconazole.

Figure 1. CT Thoracic aorta showing fishbone causing oesophageal perforation at the level of the aortic arch.

In the following months, she experienced dysphagia, coughing, regurgitation, and haematemesis, necessitating multiple OGDs. These revealed granulation tissue overgrowth at both ends of the oesophageal stent, causing stenosis and an inability to pass the scope. Thus, repeated dilatation and APC of the oesophageal stricture were necessary (Figure 2). The stent was not removed due to the patient's frailty, her poor functional reserve, and her consistent preference to avoid interventions. A RIG tube was inserted (April 2024) to ensure adequate nutrition.



(a)



(b)

Figure 2. OGD images showing granulation tissue overgrowth and oesophageal stenosis.

In August 2024, a CT oesophagus done during surgical follow-up suggested a TOF with tree-in-bud and consolidative changes in both lungs, indicative of recurrent aspiration. Video fluoroscopy confirmed aspiration of oral contents during swallowing. Bronchoscopy (October 2024) confirmed a TOF midway between the vocal cords and carina, with the stent visible through it (Figure 3, Figure 4). The fistulous opening measured approximately 5mm in diameter, located on the posterior tracheal wall 4.5 cm above the carina, correlating with the upper third of the stent length. Cultures grew *Pseudomonas aeruginosa,* treated with ciprofloxacin 750 mg BD × 14 days.

(a)

(b)

(c)

Figure 3. Direct visualisation of TOF during bronchoscopy.

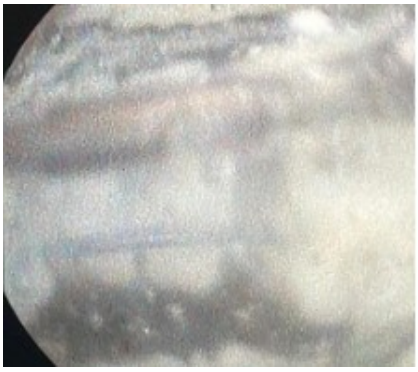


Figure 4. Oesophageal stent visible during bronchoscopy.

Given her poor WHO performance status of 3 and preference against invasive interventions, she was managed conservatively by remaining nil by mouth (NBM) and feeding via a RIG tube. The patient is currently managing well on Ensure feeds without significant shortness of breath, cough, or sputum production. The timeline of the events above can be seen in Figure 5.

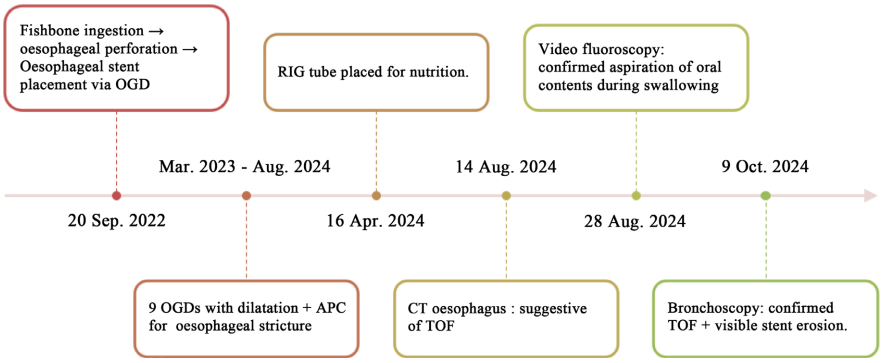


Figure 5. Timeline of events.

3. Discussion

In this case, the acquired benign TOF developed from a fishbone-induced oesophageal perforation and stent erosion. This represents the first such reported case in the literature, showing an 18-month history of stent complications necessitating multiple OGDs, following which TOF formed. It highlights the challenges of managing frail patients and emphasises awareness of this condition, particularly in geriatric populations, which have an increased risk of foreign body ingestion.

A literature search was conducted using PubMed with the following keywords and combinations: "tracheoesophageal fistula", "benign", "fishbone", "oesophageal perforation", "oesophageal stent complication", and "stent erosion". No published reports were found describing a benign TOF caused specifically by fishbone-induced oesophageal perforation followed by delayed stent erosion. Published reports discuss how acquired TOF is a rare complication, as it is typically associated with malignancies, especially oesophageal carcinoma, where tumour invasion and treatment weaken tissue integrity [1]. Acquired benign fistulae are uncommon, usually resulting from intubation (58.9%) or oesophageal procedures (18.9%) [2]. Other rare causes include trauma, corrosive ingestion, foreign bodies, or inflammation [3].

Fishbones cause most adult foreign body ingestions, with 80% - 90% passing spontaneously. The oesophagus has three narrow points, increasing the risk of lodging: the upper oesophageal sphincter, the eminence of the aortic arch, and the lower oesophageal sphincter [4]. Published cases of fishbone oesophageal perforation describe aorto-oesophageal fistulae, vascular and infectious complications rather than TOF. One report is by Sia *et al.* [5]. Our report shows fishbone-induced oesophageal perforation at the level of the aortic arch.

Oesophageal stents effectively seal perforations but exert pressure on the oesophageal and tracheal walls, potentially causing ischaemia, necrosis, and rarely, fistula formation [6]. The combination of perforation and stent erosion led to inflammation and created ideal conditions for TOF formation.

This case highlights TOF's diagnostic challenges and the need for a high index of suspicion in symptomatic patients with chronic cough, regurgitation, and recurrent aspiration pneumonia [7]. In this case, the patient's presenting symptoms could easily be attributed to oesophageal stent stenosis, causing a delayed diagnosis. Thus, it reinforces the importance of multimodal diagnosis using CT, video fluoroscopy, and bronchoscopy, the latter enabling definitive direct visualisation [7].

Whilst surgical closure is the gold standard for benign TOF [8], a conservative approach was chosen due to a PS of 3 and patient preference. Minimally invasive endoscopic techniques—such as over-the-scope clip (OTSC) placement, endoscopic suturing, and the application of tissue sealants—have been described for TOF closure [9]-[11]. Dual stenting, involving both tracheal and oesophageal stents to isolate the fistula tract, has also shown success as a palliative or bridging measure [12] [13]. However, in this patient, these options were deemed unsuitable given the chronicity of the fistula, extensive local tissue changes from previous stents, and the increased procedural risk posed by her frailty.

To prevent further aspirations while maintaining adequate nutrition, the patient was kept nil by mouth and a gastrostomy tube was used for enteral feeding. She continued to be followed up regularly at the respiratory outpatient clinic without further related complications.

4. Learning Points

1) Rare aetiology of TOF—This case uniquely reports a benign tracheo-oesophageal fistula caused by fishbone-induced oesophageal perforation and subsequent oesophageal stent erosion, a mechanism that has not previously been documented in the literature.

2) Complications of oesophageal stents—while stents are commonly used for oesophageal perforations, this case teaches us to be more cautious about long-term risks such as tissue erosion and fistula formation. Thus, this highlights the need for close monitoring.

3) Diagnostic challenges—TOF can present with nonspecific symptoms like chronic cough or aspiration pneumonia. Thus, a high index of suspicion and a multimodal diagnostic approach are of utmost importance.

4) Clinical decision-making in frail patients—the case showcases successful implementation of conservative management measures in a frail patient, where the risks are greater than the benefits of surgical gold-standard care and where the patient has non-invasive preferences.

5) Raising awareness in high-risk populations—given the increased risk of foreign body ingestion in the elderly—clinicians should be especially cautious about

complications in elderly patients with oesophageal pathology.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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