Common carotid artery pseudoaneurysm secondary to erosion by an oesophageal stent: a case report

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Case presentation

A 59-year-old woman had inoperable carcinoma of the upper oesophagus and had undergone chemoradiotherapy and immunotherapy. A covered oesophageal stent (Niti-S, 20 mm in diameter, 80 mm in length; Taewoong Medical, South Korea) was inserted in August 2021 to manage a tracheoesophageal fistula. The proximal end of the stent was located just distal to the cricopharyngeal constriction. Five months after stent placement, the patient developed erosions at the proximal and distal ends of the stent into the trachea and bronchi, respectively. A covered tracheal stent (AERO, 18 mm in diameter, 40 mm in length; Merit Medical, South Jordan [UT], US) and a distal extension with a covered oesophageal stent (Niti-S) were inserted on two separate occasions.

The patient presented to the emergency department 7 months after initial oesophageal stent insertion with haemoptysis. Her haemoglobin level had fallen to 6.3 g/dL and she developed hypotension and desaturation requiring intubation and admission to the intensive care unit. Upper endoscopy revealed blood clots over the proximal part of the oesophagus but no active bleeding following clot removal. Computed tomography showed no contrast extravasation. The upper end of the oesophageal stent was close to the left common carotid artery. A small suspicious outpouching of the artery was also seen at that location (Fig 1a and 1b).

Surgery was performed under general anaesthesia via a left neck incision. Retrograde puncture of the left common carotid artery was performed and an 8-Fr vascular sheath (AVANTI+; Cordis, Miami Lakes [FL], US) was placed. Digital subtraction angiogram revealed a small pseudoaneurysm confirming our clinical suspicion (Fig 1c). Oesophageal stent erosion was suspected to be the cause due to its proximity. Complete exclusion of the pseudoaneurysm was achieved (Fig 2) using a covered vascular stent (Covera Plus, 8 mm in diameter, 60 mm in length; Becton, Dickinson and Company, Franklin Lakes [NJ], US).

Postoperatively, the patient's condition improved with no rebleeding. She refused further surgery to repair the fistula via a manubrial resection. Further covered tracheal stenting (Dumon Y, 15 mm in diameter; Boston Medical

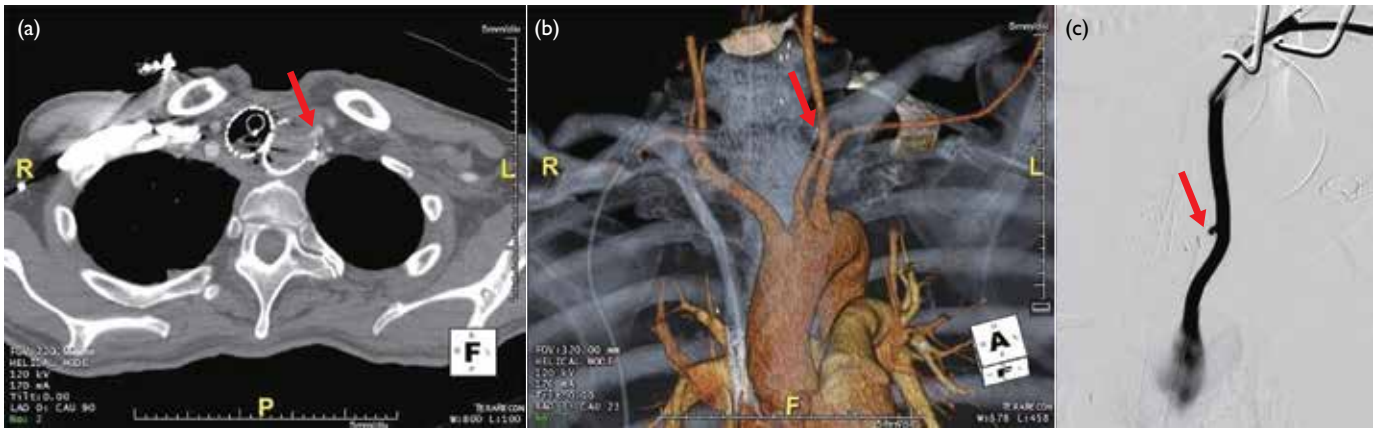

FIG 1. (a) Axial image, (b) three-dimensional reconstruction image, and (c) on-table digital subtraction angiography image showing close proximity of the upper part of oesophageal stent and left common carotid artery. A small outpouching from the carotid artery raises the suspicion of a carotid pseudoaneurysm (arrows)

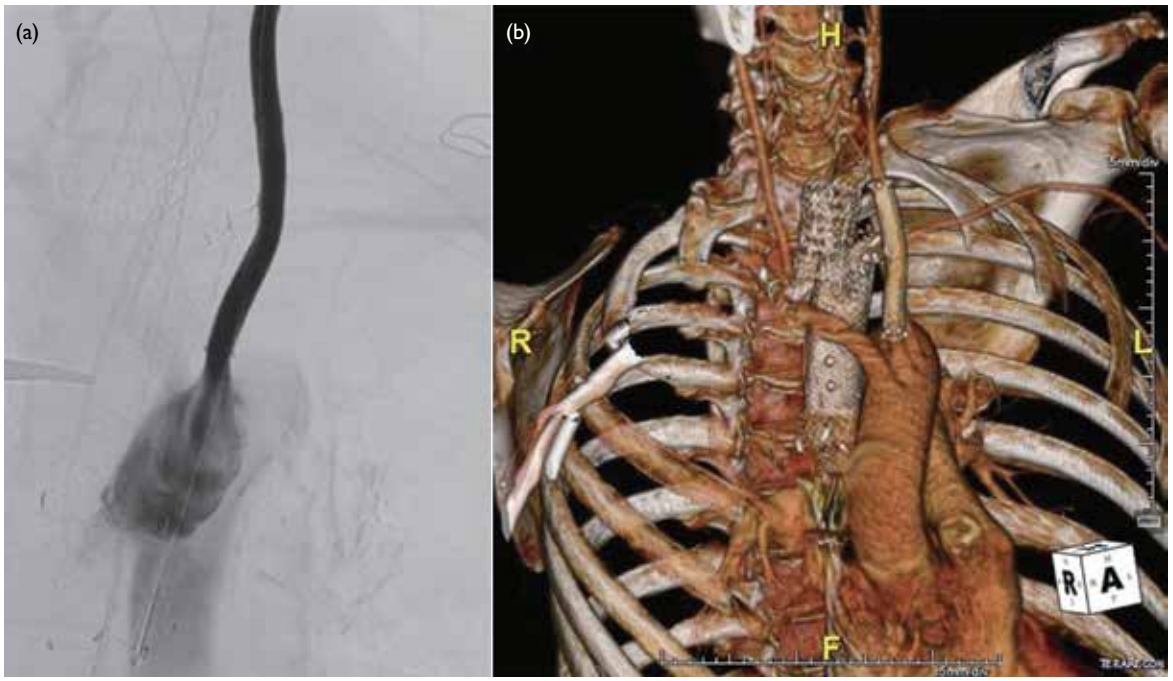

FIG 2. (a) Completion angiogram showing complete exclusion of pseudoaneurysm following deployment of a covered vascular stent. (b) Reassessment computed tomography showing relationship between all stents in the carotid artery and aerodigestive tract

Products Inc, Shrewsbury [MA], US) was performed to exclude residual tracheoesophageal fistula and prevent aspiration pneumonia. The patient was prescribed long-term moxifloxacin because of the potential communication with the aerodigestive tract and contamination. She was well 6 weeks later. Reassessment computed tomography showed a patent carotid stent with no features of stent infection and no residual pseudoaneurysm.

Discussion

Upper gastrointestinal bleeding is a frequent presentation following oesophageal stenting. Endoscopy has both diagnostic and therapeutic roles in common bleeding pathologies such as tumour and peptic ulcer. The presence of a stent often makes identification of a bleeding site difficult. Diagnosing fistulation with major arteries requires a high level of suspicion, especially if the bleeding is extensive.

Although it is tempting to remove a blood clot during endoscopy, care should be exercised to avoid rupture of any underlying pseudoaneurysm with consequent torrential bleeding. Endoscopic biopsy of tissue around the oesophageal stent can also lead to pseudoaneurysm rupture as reported in an early case report by Kohl et al.[1]

Computed tomography is often useful to show the site of bleeding and corresponding anatomical relationship. Nonetheless a negative imaging may provide false reassurance. The pseudoaneurysm may be small because of impingement by the pointed oesophageal stent struts. This can be missed if the slice thickness of scan is not thin enough. Three-dimensional reconstruction images may provide more information. An on-table angiogram should be considered when the diagnosis is in doubt.

Fistulation of the carotid artery by a metallic oesophageal stent is rare and was first reported in 2001.[1] Four previously reported cases were found in the literature.[1-4] Among these cases, three adult patients had complications of previous treatments for carcinoma in the head and neck region, where two had oesophageal stricture[1,3] and one had a tracheoesophageal fistula[2]; another 4-year-old paediatric patient had an oesophageal stent inserted for anastomotic stricture following surgical repair of oesophageal atresia.[4]

In Kohl et al's report,[1] resection was performed with a bypass using homograft made from the ascending aorta to the carotid bifurcation. Asymptomatic blockage of the graft was found soon after the procedure. The patient died of rebleeding 2 months later. Ali et al[2] used endovascular coiling of pseudoaneurysm and stenting with a self-expandable nitinol stent. The patient had a rebleed 2 weeks later that required placement of a covered vascular stent. Staged open ligation of the common carotid artery was performed as a definitive treatment.[2]

A complete endovascular approach has been reported more recently. One patient received stenting to control bleeding and a staged operation to sacrifice the common carotid artery by endovascular coiling, but the long-term outcome was not reported.[3] The paediatric patient was successfully treated with repeated coiling of the pseudoaneurysm and stenting with a bare-metal stent. He remained asymptomatic at a follow-up 1 year later.[4]

Endovascular treatment acted as a bridge to definitive management if quick open access is difficult due to anatomical constraints, as in our patient. Balloon occlusion test and cerebral perfusion scan can confirm adequate collateral supply before carrying out a second-stage operation to sacrifice the common carotid artery.[2,3]

The two major concerns with this temporising treatment are the risks of rebleeding and endograft infection. Definitive management should include surgical separation of the fistula. The oesophageal defect can be repaired primarily with or without reinforcement using diaphragm, intercostal muscle, serratus muscle, or omentum. Oesophagectomy or diversion are the other options if primary repair is not possible.

The diseased artery can be too friable for primary repair. Open ligation and endovascular coiling of the proximal carotid artery can be considered to prevent rebleeding provided an adequate collateral supply to the brain is confirmed.[2,3] Revascularisation can be performed if required using bypass grafts from the aorta or subclavian artery. Operative risks include stroke, graft thrombosis and graft infection, especially when the surgical field is contaminated.

Similar fistulation between an aberrant right subclavian artery and oesophagus has been reported following oesophageal stent placement due to the anatomical relationship. Experience shows that most cases required immediate open surgery followed by tamponade using a hydrostatic dilator or Sengstaken–Blakemore tube. Surgery can be performed via a median sternotomy, thoracotomy or a manubrial resection. In patients with endovascular stenting as a temporising measure, the stent should be removed at the time of surgery to prevent oesophageal pressure necrosis due to a 'sandwich effect' with the oesophageal stent.[5]

For patients in whom definitive treatment is not possible, removal of an oesophageal stent can promote fistula healing. Proximal extension of a covered oesophageal stent may also minimise contamination from the aerodigestive tract. Long-term prophylactic antibiotics should be given but efficacy is not guaranteed. Alternatively, sacrificing unilateral carotid artery via an endovascular technique such as coils or plugs may prevent rebleeding. There is nonetheless no long-term evidence to support this technique.

Author contributions

All authors contributed to the concept or design of the study, acquisition of the data, analysis or interpretation of the data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Ethics approval

The patient was treated in accordance with the Declaration of Helsinki and provided written informed consent for all treatment and procedures and for publication of this case report.

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