Respiratory Medicine Case Reports 33 (2021) 101392

Contents lists available at ScienceDirect

Respiratory Medicine Case Reports

journal homepage: http://www.elsevier.com/locate/rmcr

Case report

Use of a covered self-expanding metal airway stent for severe dynamic collapse within a bronchial aortic graft conduit in a post-lung transplant patient

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ARTICLE INFO

Keywords:
Airway stent
Bronchoscopy
Transplant complications
Bronchomalacia
Interventional pulmonology

ABSTRACT

We present a novel case in which a self-expanding, covered metal airway stent was utilized for severe dynamic collapse within a cadaveric aortic bronchial graft conduit in a post-lung transplant recipient with thoracic situs inversus.

1. Introduction

Airway complications after lung transplantation occur in approximately 10–15% of the recipients [1]. These often occur at the anastomosis site and range from the most common complication of stenosis, to the rarer but more devastating complication of dehiscence [2]. The management of severe dehiscence can be challenging and involve both bronchoscopic and surgical techniques including airway stenting, re-anastomosis, flap bronchoplasty and rarely retransplant [1]. The use of reconstructed airways for severe dehiscence with tissue grafts has been described however can be complicated by dynamic airway collapse within the graft. We present the first case in which a covered self-expanding metal airway stent was utilized for severe dynamic collapse within a cadaveric aortic bronchial graft conduit in a post-lung transplant recipient with thoracic situs inversus.

2. Case report

Fifty-three year old Caucasian male with thoracic situs inversus and end-stage pulmonary fibrosis who underwent bilateral lung transplant on December 17, 2019. Due to his congenital condition in which there was a complete right-to-left reversal of the position of the thoracic organs (NIH), there was a substantial size mismatch between the donor and native lung at the anastomotic closure site of the left main stem bronchus. This subsequently led to a left bronchial dehiscence.

An open surgical repair was initially performed on post-transplant day 14, with the placement of a 4cm cadaveric abdominal aortic graft and creation of an omental flap for stabilization. Despite proper coverage and repair of the dehiscence, the patient continued to have left lung collapse due to mucus impaction resulting in impaired gas exchange and ventilator dependence.

Bronchoscopic exam revealed complete end-expiratory dynamic collapse of the aortic graft conduit with retention of thick secretions in the distal airways causing atelectasis. Due to the lack of structural integrity of the graft conduit, the decision was made to pursue stent placement to maintain conduit patency.

The patient underwent successful deployment of a self-expanding metal stent (Bonastent™12 × 30mm) into the left aortic conduit graft with complete coverage of the collapsible segment of the left main stem bronchus. The distal end of the stent was located 10mm proximal to the distal anastomosis suture line and the proximal portion of the stent traversed the proximal anastomosis suture line by 5mm and terminated at the level of the main carina. He was liberated from the ventilator 23 days after stent placement without incidence. With the stent in place, the cadaveric aortic graft has remained patent and in stable position without any evidence of significant collapse on follow-up bronchoscopic exams (Fig. 1).

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https://doi.org/10.1016/j.rmcr.2021.101392
Received 9 November 2020; Received in revised form 8 March 2021; Accepted 15 March 2021
Available online 19 March 2021

3. Discussion

To our knowledge, we present the first case of a bronchoscopically deployed fully covered self-expanding metal stent (SEMS) within a reconstructed left main stem airway of a post-lung transplant patient to maintain structural patency of an otherwise collapsible conduit.

The use of stented aortic matrices has been previously described for tracheal and bronchial reconstruction in the management of lung carcinomas and tracheal stenosis. The goal of stenting the matrices in these patients was to prevent airway collapse [3].

Although in 2005 the United States Food and Drug Association (FDA) cautioned the use of metallic stents in benign airway disease, advancement in manufacturing and development of hybrid SEMS have demonstrated satisfactory safety profiles. In this case a silicone stent would require navigation of the rigid bronchoscope into the left main stem placing the conduit at risk of perforation. Additionally, with the tortuous anatomical shape of the graft, a SEMS better shapes to the airway due to its higher malleability across the stent. A straight silicone stent would not have shaped to the airway further putting it at risk of torsion and therefore perforation.

While the circumstances around this case are unique, we were able to demonstrate safe deployment of a self-expanding metal stent into an aortic graft airway reconstruction as stabilizer for maintaining patency.

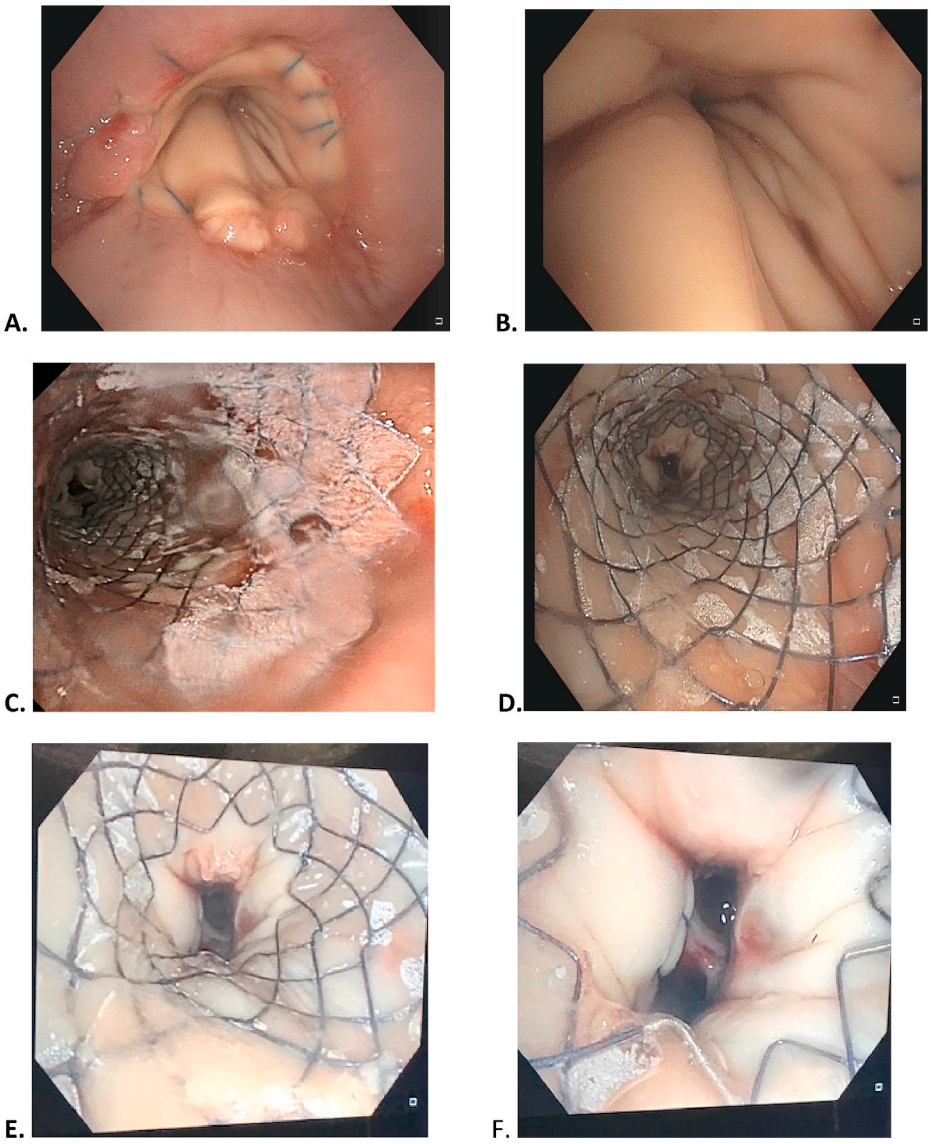

Fig. 1. Bronchial aortic conduit before and after stent placement.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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