Case report

Combined tracheal resection and aortic valve replacement with a cryopreserved aortic valve allograft

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Abstract

A 69-year-old patient presented with an association of tracheal squamous cell carcinoma and severe aortic valve stenosis. As there was no evidence of metastatic spread a potentially curative resection could be considered. The patient underwent tracheal resection and aortic valve replacement in a one-stage procedure. In light of the potential risk of infection to a prosthetic valve, a cryopreserved aortic valve homograft was implanted. The patient made a full recovery and is doing well after 2 years of follow-up.

Keywords: Tracheal carcinoma; Aortic homograft

1. Introduction

Concomitant diseases of the heart and trachea are uncommon. To the best of our knowledge, we report here the first case of combined tracheal resection and aortic valve replacement using a cryopreserved aortic valve allograft.

2. Case report

In February 1995, a 69-year-old man with a tracheal squamous cell carcinoma revealed by wheezing and dyspnea was referred to our institution. The tumor was located between the second and the fifth tracheal rings (Fig. 1). As there was no evidence of metastatic spread, a potentially curative resection could thus be considered. Severe aortic valve stenosis was diagnosed during preoperative investigations. Transthoracic echocardiography (TTE) identified a maximal peak systolic gradient of 125 mmHg across the aortic valve with an effective orifice area of 0.6 cm² and a normal left ventricular function with an ejection fraction of 65%. Cardiac catheterization revealed normal coronary arteries. Relief of tracheal obstruction was obtained by endoscopic laser therapy which allowed for an improved respiratory preparation prior to the surgical resection. A combined tracheal resection and aortic valve replacement was performed on March 24, 1995. A sample of tracheobronchial secretion was microbiologically studied preoperatively. Surgery was commenced with an aortic valve replacement under conventional cardiopulmonary bypass (CBP) through a median sternotomy. Valve pathology indicated a degenerative calcific stenosis. The aortic valve was replaced with a cryopreserved aortic valve allograft of diameter 24 mm provided by the European Homograft Bank (Brussels, Belgium). The allograft was sewn freehand into the aortic position. CBP was discontinued and heparin was neutralized by protamine sulfate. A median cervicotomy extending the sternotomy was then performed. After suprahyoid laryngeal release the trachea was resected from the inferior margin of the first ring to the inferior margin of the sixth ring. A primary anastomosis was performed with interrupted absorbable 2–0 monofilament sutures. Intra-opera-
tive ventilation was carried out conventionally with a 6 F tracheal tube during both the CPB and the tracheal dissection. The cannula was removed to permit tracheal resection and the distal trachea canulated through the operative field. The patient was extubated 20 h post-operative. He remained for 2 days in the intensive care unit and was discharged from hospital on the 10th post-operative day after an uneventful post-operative course. Prophylactic antibiotics (Imipenem 500 mg IV q 6 h, Amikacin 750 mg IV q 24 h) were maintained for 10 days post-operatively. After 2 years, the patient was doing well and had no symptoms or evidence of metastatic spread. The endoscopy was normal. TTE detected a peak systolic gradient of 11 mmHg and a mean systolic gradient of 6 mmHg across the allograft, with normal leaflet motion.

3. Discussion

Primary tracheal tumors are rare, with most being malig-

Fig. 1. CT scan showing the tumor into the tracheal lumen.

nant [1]. Adenoid cystic carcinoma and squamous cell carcinoma are by far the most common histologic forms of tracheal tumors [2], with the radical treatment of these tumors requiring surgery [1,2]. Indications for tracheal resection depend on the feasibility of the procedure and on the presence or absence of contraindications. A severe concomitant aortic valve stenosis is generally regarded as an absolute contraindication to any major surgery even if the patient is considered to be a good candidate. Resecting the tracheal lesion without addressing the cardiac disease poses a significant risk to the patient [2].

Worthwhile long term survival can be obtained in patients with squamous cell carcinoma when a complete and potentially curative resection is possible. Among 94 patients with squamous cell carcinoma, Regnard and associates [3] reported a 55% 5-year survival in patients who had undergone a complete resection, compared to 25% in those that received an incomplete resection. A staged procedure could increase the risk of the tumor becoming unresectable. A combined tracheal resection and aortic valve replacement...
reduces the extent of pain and risk, as well as the expense associated with a second major procedure.

The median sternotomy combined with a median cervicotomy provides easy access for a suprathyroid laryngeal release procedure, together with adequate exposure for an intrapericardial mobilization of the right pulmonary hilum when required. In order to decrease the risk of bleeding it is safer to perform the tracheal resection after CBP and after the neutralization of heparin with protamine sulfate.

The resection of a tracheal cancer is a potentially septic surgery. In the study of Regnard and associates [3], 41% of patients had post-operative complications (anastomotic leakage, pneumopathy, aspiration or deglutulation) and the incidence of complications rate was 3 times higher for squamous cell carcinoma than for other tumors. These complications impart a high risk of infection to a prosthetic heart valve. In this situation a cryopreserved aortic valve allograft would appear to be the most appropriate alternative for aortic valve replacement for several reasons [4]. These include, an intrinsic resistance to infection, freedom from anticoagulation-related complications (which is of particular interest in the case of late tracheal complications requiring adjuvant surgical treatment), and an absence of adverse effects on patient survival.

Depending upon patient characteristics (age, left ventricular function, pulmonary function) and technical considerations (presence or absence of adhesions, location of tumor), a concomitant tracheal resection and aortic valve replacement can be successfully performed in selected cases using a cryopreserved aortic valve allograft. The aortic valve allograft is unique in this situation due to the absence of an early hazard phase of endocarditis [4].

References