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Delayed Spontaneous Superior Vena Cava Perforation Associated with a SVC Wallstent

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Abstract

A patient was referred for superior vena cava (SVC) stenting prior to surgical biopsy of a mediastinal mass. A technically satisfactory insertion was followed 6 months later by cardiac tamponade with two legs of the Wallstent having perforated the wall of the SVC.

Key words: Superior vena cava—Stenting—Perforation—Complications

Superior vena cava (SVC) occlusion is a common consequence of mediastinal malignancy. The use of radiologically inserted percutaneous metallic stents to relieve the obstruction is an accepted technique which is associated with few serious complications. We report a case where delayed perforation of the SVC occurred which led to the death of the patient. As far as we are aware this is the first such report.

Case Report

A 30-year-old man presented with a 3-month history of swelling of the face and neck, dizziness and worsening dyspnea. There was no significant past medical history. Apart from facial swelling and engorgement of the neck veins there were no significant findings on physical examination. Initial blood investigations were normal. A CT scan of the thorax revealed a large soft-tissue mass in the superior mediastinum which was compressing the SVC. The patient was referred to the thoracic surgeons for biopsy of this mass.

In order to reduce the venous pressure in the upper thorax and diminish the risk of hemorrhage, stenting of the SVC was requested. A bilateral arm venogram showed preferential filling of multiple thoracic collateral vessels without obvious opacification of the SVC. A catheter was introduced from the femoral vein and advanced to the SVC. The SVC was obstructed just above the right main bronchus. After balloon dilatation a 14-mm Easy Wallstent (Boston Scientific, Natick, MA, USA) was deployed using a standard technique [1]. The stent was deployed in a good position and there were no immediate complications. Following stenting there was good flow from the brachiocephalic vein to the lower SVC and right atrium. A postprocedural chest radiograph showed a satisfactory stent position.

A subsequent mediastinoscopy and biopsy of the thoracic mass gave the diagnosis of high-grade diffuse B cell non-Hodgkin's lymphoma. The patient was treated with combination chemotherapy and went into remission.

Six months after the initial presentation the patient collapsed suddenly and died at home. At post-mortem examination approximately 300 ml of blood was found in the pericardium giving rise to cardiac tamponade. Fibrous thickening of the pericardium overlying the lower part of the SVC was noted. Two wires from the tip of the stent had penetrated the wall of the SVC and were extending into the pericardial cavity. The rest of the examination was normal and there was no evidence of recurrent lymphoma.

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Discussion

The SVC is a low-pressure vessel that is readily compressed by adjacent masses. The commonest cause of SVC obstruction is malignancy, which accounts for between 85% and 97% of cases [2]. It is estimated that between 3% and 20% of patients with thoracic malignancy will have symptoms of SVC obstruction [3, 4]. These symptoms are related to elevated pressure in the veins that drain the head and upper torso and include dyspnea, chest pain, cough, dysphagia, headache, visual disturbance, and syncope [5].

The first reports of balloon dilatation and stenting in the SVC were in 1982 and 1986 respectively [6, 7]. Current experience is largely with three makes of stent: the Gianturco Z-stent (Cook, Bloomington, IN, USA), the Wallstent (Boston Scientific), and the Palmaz stent (Cordis, Miami, FL, USA). Most reported experience is with the Wallstent, which is a self-expanding flexible stent composed of tightly woven stainless steel. Studies have shown high rates of success with this device, with high rates of long-term patency and good symptomatic relief [8–10]. In a review of experience of 75 patients treated with Wallstents, 100% showed improvement in symptoms within 2 days of stent placement and 90% showed persisting beneficial effects until death [11].

Stenting is generally recommended as a palliative procedure in patients with aggressive malignancy. The use of stents in patients with potentially curable disease is more controversial given the theoretical problems of stent occlusion after prolonged placement. In the case reported here the thoracic surgeons considered the risk of hemorrhage at biopsy too high without relief of the SVC obstruction. Therefore, despite the fact that the patient was young and had a potentially treatable malignancy a stent was felt to be warranted.

Complications appear to be relatively uncommon. In a review of 56 SVC stenting procedures, Ouderk et al. [12] found a morbidity and mortality rate of 29% and 4% respectively. The commonest complications appeared to be stent misplacement and thrombosis, both occurring in 10% of patients. Stent migration and thoracic pain were seen to occur in 5% and 4% [12], respectively.

Stent migration is often attributed to inaccurate stent placement [13]. Mobile stents can embolize, both to the heart and to the pulmonary circulation, causing serious clinical consequences, including death. Dramatic shortening and migration has been reported in a patient despite optimal positioning at insertion [14]. Furni et al. [15] reported delayed migration of a Gianturco stent which occurred some 5 weeks after deployment.

There are other reports of less common complications. Cardiac failure can result after stent placement as a consequence of the increase in venous return to the heart [16]. Transient elevation of the right hemidiaphragm, presumably secondary to phrenic nerve compression, has also been described [17]. In the same paper, Watkinson and Hansell [17] also reported a case where flow of contrast into the pericardium during stent placement was observed. This was presumed to be secondary to puncture of the right atrium by the stent, but no undue sequelae resulted.

In our patient perforation appears to have occurred spontaneously some 6 months after stent insertion. The stent was inserted using a standard technique and without immediate complication. The patient underwent routine chemotherapy and was in disease remission. It is significant that at post-mortem the stent was found to be in a satisfactory position with no evidence of migration from its site of original deployment. We can only presume that gradual erosion through the wall of the SVC occurred, eventually resulting in hemorrhage into the pericardial sac with subsequent tamponade and cardiac compromise. It is possible that chemotherapy and subsequent tumor shrinkage left the wall of the SVC in a more fragile state and more susceptible to pressure erosion.

As far as we are aware, this is the first reported case of a delayed perforation with a Wallstent. Indeed, to date, Boston Scientific has sold approximately 85,000 similar devices and there have been no reports of other similar complications [personal communication].

In conclusion, SVC stenting is generally considered to be a safe and efficient method of relieving venous obstruction. Numerous, mainly minor, complications have been described, but to the best of our knowledge this is the first report of a mortality as a consequence of delayed spontaneous perforation.

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