Type IIIB endoleak from stent suture lines of a thoracic endograft

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ABSTRACT

We report a case of a patient with type IIIB endoleak after thoracic endovascular aortic repair that remained undetected by computed tomography and was first diagnosed during open conversion surgery. The aneurysm enlarged gradually from 60 to 78 mm without type I and type II endoleaks during 3 to 6 years after thoracic endovascular aortic repair. Type IIIB endoleaks from nitinol stent suture lines were detected, and the endograft was then explanted and replaced by a vascular graft. (J Vasc Surg Cases and Innovative Techniques 2019;5:214-7.)

Keywords: Type IIIB endoleak; Thoracic endovascular aneurysm repair; Endograft

Although thoracic endovascular aortic repair (TEVAR) has largely replaced open repair in patients with descending thoracic aortic aneurysms, endoleaks can lead to aneurysm rupture. Of all types of endoleaks, type III endoleaks are divided into two subtypes; type IIIA endoleak is a leak between graft components, and type IIIB endoleak originates from a structural defect within the endograft, such as fabric fracture or tear.[1] The incidence of type III endoleak after TEVAR was reported to be 2.1% in a summary of results from the current literature.[1] Case reports of type IIIB endoleak after endovascular aneurysm repair have been published.[2,3] This case report, however, is the first to describe the details of a rare type IIIB endoleak after TEVAR.

Here, we report the case of a patient with type IIIB endoleak 6 years after TEVAR that remained undetected by computed tomography (CT). It was first diagnosed as multiple oozing sites from the fabric holes along the nitinol stent suture lines of the thoracic endograft.

CASE REPORT

A 73-year-old man who had undergone elective TEVAR for an asymptomatic 60-mm descending aortic aneurysm was admitted because of aneurysmal sac enlargement. He had a history of gastrectomy and chest wall resection for multiple carcinomas 30 years ago. The patient was receiving anticoagulation therapy for atrial fibrillation and past cerebral infarction. TEVAR with a 34-×34-×200-mm Medtronic Valiant thoracic endograft (Medtronic, Santa Rosa, Calif) was performed under fluoroscopy guidance from the right femoral artery. There was adequate distance from the left subclavian artery and the celiac axis for the proximal and distal landing zones, and the final angiogram showed no endoleak (Fig 1). Although the annual CT examination at 1 year and 2 years after TEVAR demonstrated exclusion of the aneurysmal sac with no endoleak (Fig 2, *a*), CT at 4 years after TEVAR showed sac expansion (Fig 2, *b*). Type I endoleak was completely excluded, and no obvious sign of type II endoleak was detected on CT. However, the aneurysmal sac had been rapidly expanding in subsequent years, reaching 78 mm at 6 years (Fig 2, *c* and *d*). Therefore, to confirm a definite diagnosis of rapid expansion of the aneurysmal sac and to reduce the risk of reintervention, open conversion surgery was indicated.

The aneurysmal sac was exposed through a left thoracotomy. The preoperative enhanced CT examination confirmed that the critical intercostal artery that supplies the Adamkiewicz artery arose from the left first lumbar artery. Motor-evoked potentials were monitored during the operation without the initiation of cerebrospinal fluid drainage. The aneurysm was opened longitudinally to examine endoleaks before cardiopulmonary bypass was started. Mural and old thrombi were carefully removed, and the endograft was exposed. An apparently different thrombus, dark red and fresh, was encountered around the stent graft, and multiple oozing sites were observed from the fabric holes along the nitinol stent suture lines (Fig 3). Type I or type II endoleak was not detected. Partial cardiopulmonary bypass from the femoral artery and vein was then started. Because the distal aortic arch was slightly dilated at 38 mm in diameter, the clamps were placed on the proximal aorta at the level of the bare stent of the endograft and on the native aorta close to the distal edge of the endograft to maintain the blood supply to the remaining intercostal arteries. After aortic cross-clamping, all components of the endograft other than the proximal bare stent and a part of the endograft with one stent were removed and replaced with a vascular graft (J-Graft; Japan Lifeline Co Ltd, Tokyo, Japan; Fig 4). Operation time was 310 minutes, and partial cardiopulmonary bypass time was 73 minutes. The patient stayed in the intensive care unit for 4 days, and the hospital stay was 16 days after rehabilitation without any complications.

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Author conflict of interest: none.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287

https://doi.org/10.1016/j.jvscit.2019.02.003

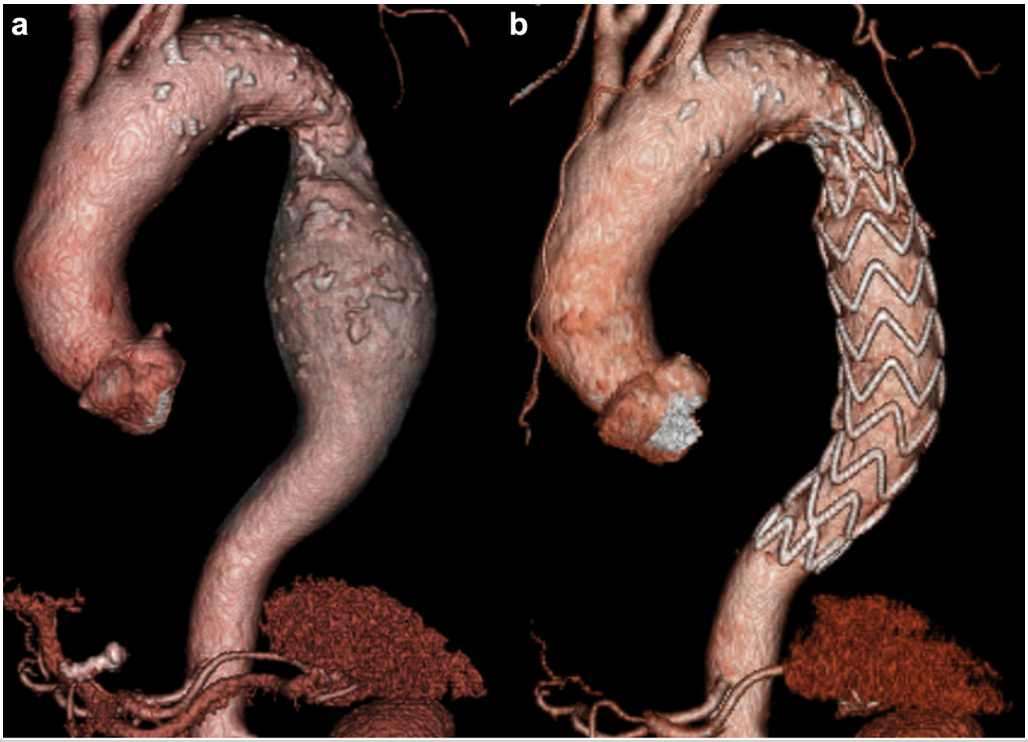

Fig 1. Three-dimensional reconstructed computed tomography (CT) scan **(a)** before and **(b)** after thoracic endovascular aortic repair (TEVAR).

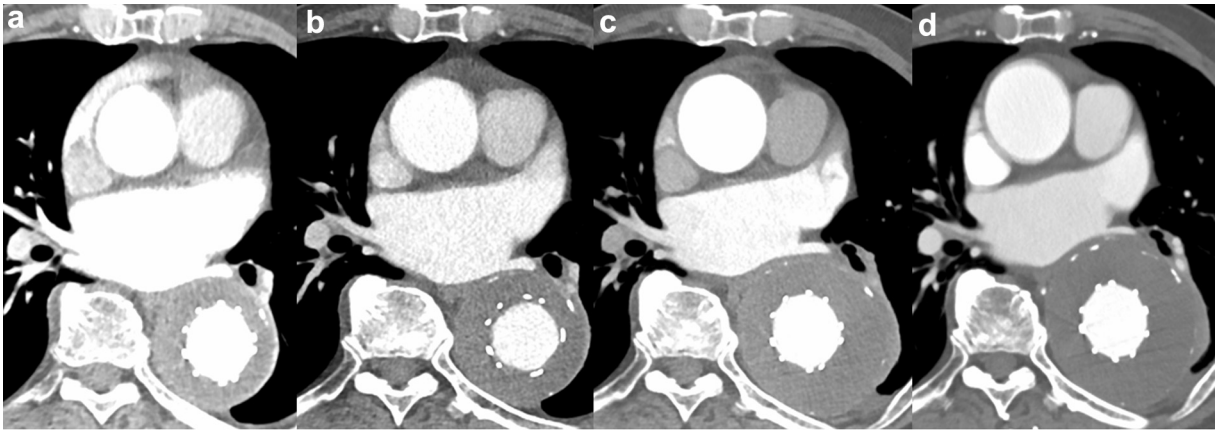

Fig 2. Computed tomography (CT) images after thoracic endovascular aortic repair (TEVAR) showed rapid expansion of the aneurysm sac in later years.

The Ethics Review Board of the National Cerebral and Cardiovascular Center approved this study, and consent for this study was obtained from the patient in a written form.

DISCUSSION

Type III endoleak is a rare complication but is associated with a high risk of aortic rupture because of its direct pressurization of the aneurysmal sac.[1-3] Although type III endoleak after TEVAR has been reported to range from 0.8% to 7.5% of all procedures,[4-9] this endoleak, especially type IIIB endoleak, may be difficult to detect in annual CT examinations.[2,3]

In this case, after the detection of aneurysmal sac expansion, close follow-up by high-resolution CT was performed every 6 months. However, the small amounts of oozing from the suture holes were not detected

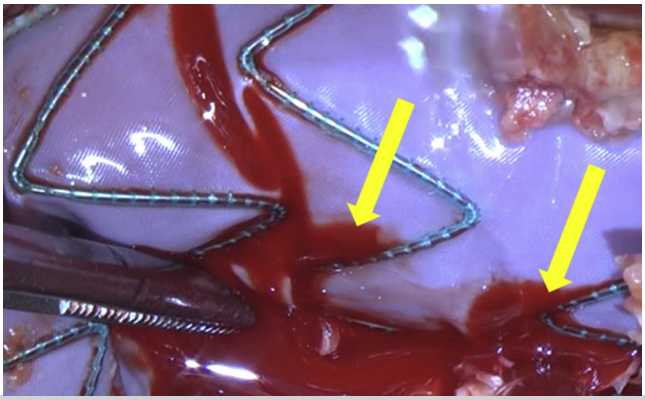

Fig 3. Intraoperative findings showed multiple leaks from the endograft through the suture holes (*arrows*).

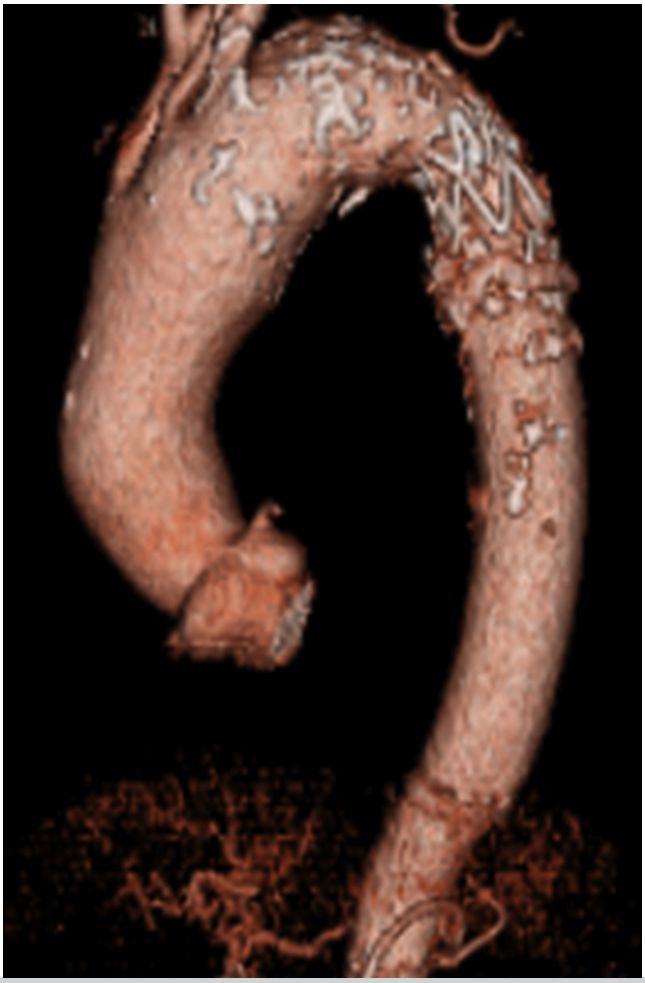

Fig 4. Three-dimensional reconstructed computed tomography (CT) scan after open conversion surgery.

because the 30-second delay might not have been long enough for the accumulation of contrast medium around the endograft. Although microscopic holes and fabric wear should resolve spontaneously by normal hemodynamics, the patient showed a rapid 16-mm aneurysm sac expansion in the last 2 years. The patient could not discontinue anticoagulation therapy because of atrial fibrillation and cerebral infarction. Anticoagulation and increasing or larger suture holes caused by the fabric fatigue may have resulted in this rapid rate of aneurysm sac expansion. Nakai et al[10] reported the utility of technetium Tc 99m-human serum albumin diethylenetriamine pentaacetic acid single-photon emission CT to depict slow-filling endoleaks. Although this single-photon emission CT proved less sensitive than three-phase CT for visualizing small filling endoleaks, including type IIIB endoleak, the detection of type IIIB endoleak would make a significant contribution to the treatment of endoleaks.

Type IIIB endoleak was not detected before open conversion surgery in this case; therefore, open conversion surgery was performed to clarify the existence of an endoleak and to repair the failed graft with graft replacement. When the diagnosis of type IIIB endoleak is made, additional TEVAR should be considered to reline the implanted endograft.[1,4-9] However, in our patient, the relined endograft may also have type IIIB endoleaks during the follow-up period because the patient requires lifelong anticoagulation therapy. To reduce the potential risks of reintervention, the implanted endograft was replaced by a vascular graft. Although type III endoleaks have been reported and were repaired by the relined endograft,[1,4-9] this report showed a direct view of a rare type IIIB endoleak.

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Submitted Aug 24, 2018; accepted Feb 1, 2019.