Aortic stent-grafting facilitates a successful resection after neoadjuvant treatment of a cT4 esophageal cancer

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Standard surgical techniques are ineffective in the management of cT4 esophageal cancer (EC) with aortic invasion. Although radical esophagectomy with partial resection of the aortic wall has been reported,¹ fatal hemorrhage may occur during the operation, and the patient's prognosis does not necessarily improve. Meanwhile, chemoradiation therapy (CRT) may induce tumor necrosis, leading to rupture of the aortic wall and fatal hemorrhage.

Endovascular treatment of aortic diseases with stents has emerged as an alternative to conventional surgical intervention. Currently, there are some reports regarding the use of stents for aortomediastinal fistula caused by EC.² We hypothesized that the prophylactic use of aortic stent-grafting could facilitate subsequent surgical resection of T4 EC penetrating into the aorta after CRT. Here we report a novel and effective application of intra-aortic stent-grafting.

CLINICAL SUMMARY

A 66-year-old man was admitted to our department with dysphagia. An upper gastrointestinal endoscopy identified squamous cell carcinoma in the middle thoracic esophagus (28–35 cm from the incisors; [Figure 1, A](#)). Computed tomography showed a large tumor invading the descending aorta, with locoregional lymph node metastases ([Figure 1, B](#)). Although induction CRT (concurrent administration of 50 Gy radiation and 2 courses of a cisplatin regimen with fluorouracil) was performed, penetration of the tumor into the descending aorta unfortunately occurred 4 weeks after the completion of CRT ([Figure 1, C and D](#)). Thoracic aortography revealed a pseudoaneurysm of the descending aorta caused by tumor penetration, and an intra-aortic stent (TAG 34-15; W.L. Gore and Associates, Flagstaff, Ariz) was prophylactically inserted with success ([Figure 1, E and F](#)). On the next day, radical surgical resection (subtotal esophagectomy followed by replacement by gastric conduit through the retrosternal route) was successfully performed through the right chest approach without fatal

hemorrhage ([Figure 2](#)). The greater omentum of gastric conduit was pulled down through the window of incised mediastinal pleura to fill the space above the descending aorta. Histopathologically, there was only a scattering of viable cells remaining in the adventitial layer of the esophagus indicating grade 2 histologic effect (ypT3N0M0, stage IIB). Broad-spectrum intravenous antibiotic therapy was continued for 17 days after the insertion of the aortic stent. The postoperative course was uneventful, and the patient was discharged on postoperative day 44. At the last follow-up examination, 11 months after the operation, the patient remains free of any sign of disease recurrence.

DISCUSSION

Aortoesophageal fistula is a life-threatening complication of EC treated with irradiation. Fatal hemorrhage develops in 7% of patients with irradiated EC, and more than half of fatal hemorrhages are caused by aortoesophageal fistula.³ Once aortoesophageal fistula develops, long survival cannot be expected unless immediate and extensive surgical procedures are undertaken.

Endovascular stent-grafting was originally indicated for endovascular repair of aortic aneurysms in patients who could not undergo radical operation. The indications for thoracic intra-aortic stenting have rapidly been expanded, however, to cases with hemorrhage caused by aortic ulceration due to arteriosclerosis, cases with dissecting aneurysm, and cases with aortomediastinal fistula. Stenting has also been used to prevent aortoesophageal fistula after CRT and as an emergency procedure to control massive hemorrhage from aortoesophageal fistula. Here we propose a novel and effective use of prophylactic aortic stent-grafting in the surgical resection of T4 EC penetrating into the aorta after CRT.

The theoretic advantages of endovascular treatment include the following: need for only a simple arteriotomy, without thoracotomy or intraoperative single-lung ventilation and aortic clamping; low risk of medullary ischemia, possibly because of the absence of aortic clamping and the location of the aortic injury; and a relatively low risk of major bleeding complications because the stent-graft can be inserted with only mild anticoagulation, so there is no need for prophylactic anticoagulation therapy afterward. High fever and CRP after stent-grafting are reported as symptoms of “postimplantation syndrome”; this, however, was not observed in our case.⁴ Considering the risk for infection of the prosthesis, particularly in the setting of gastrointestinal

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FIGURE 1. A, An upper gastrointestinal endoscopy identified a type3 tumor in the middle thoracic esophagus. B, Computed tomography showed a large tumor (arrows) invading the descending aorta. C and D, The axial (C) and sagittal (D) computed tomographic scans demonstrated the penetration of the tumor into the descending aorta (arrow) 4 weeks after the completion of chemoradiation therapy. E and F, Findings of thoracic aortography. Arrows indicate pseudoaneurysm of the descending aorta caused by tumor penetration (E) and an intra-aortic stent successfully inserted to right distal of the origin of the left subclavian artery (F).

surgery, long-term antibiotic therapy should be considered.⁵ In addition, surgical measures, including the use of the greater omentum to cover the exposed graft as in this case, are important to reduce the risk of infection.

Although the clinical indication of intra-aortic stent-grafting should be carefully determined because of the

procedure's relative invasiveness and high cost, and because of the large number of cases necessary to evaluate its utility, we conclude that the prophylactic use of stent-grafting for T4 EC penetrating into the aorta after CRT is a novel and effective option that enabled us to perform a potential subsequent radical resection without fatal hemorrhage.

FIGURE 2. Intraoperative finding: Arrows point to the descending aortic wall lacking the adventitia, through which the intra-aortic stent could be seen.

References

1. Kabuto T, Yasuda T, Furukawa H, Higashiyama M, Takami K, Yokouchi H, et al. Combined resection of the aorta for an esophageal carcinoma invading the aorta through a right transthoracic approach. *Jpn J Thorac Cardiovasc Surg.* 1999;47:611-6.
2. Metz R, Kimmings AN, Verhagen HJ, Rinkes IH, van Hillegersberg R. Aortoesophageal fistula successfully treated by endovascular stent-graft. *Ann Thorac Surg.* 2006;82:1117-9.
3. Nemoto K, Takai Y, Ogawa Y, Kakuto Y, Ariga H, Matsushita H, et al. Fatal hemorrhage in irradiated esophageal cancer patients. *Acta Oncol.* 1998;37:259-62.
4. Schoder M, Cartes-Zumelzu F, Grabenwöger M, Cejna M, Funovics M, Krenn CG, et al. Elective endovascular stent-graft repair of atherosclerotic thoracic aortic aneurysms: clinical results and midterm follow-up. *AJR Am J Roentgenol.* 2003;180:709-15.
5. Canaud L, D'Annunzio T, Ozdemir BA, Marty-Ané C, Alric P. Combined endovascular and surgical approach for aortobronchial fistula. *J Thorac Cardiovasc Surg.* January 21, 2014 [Epub ahead of print].