

Management of double carotid blowout with definitive repair after temporizing stent graft placement

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ABSTRACT

Carotid blowout syndrome is a life-threatening complication for patients with head and neck cancer. Temporizing stent graft procedures improve short-term survival and can be the definitive treatment for various reasons, including a poor oncologic prognosis, unsuitability for definitive reconstruction, or a lack of operative options. A second carotid blowout will often be fatal. Preventing such events requires multidisciplinary strategic planning because of a hostile reoperative field. We have described a case of a 44-year-old man with a history of laryngeal cancer who had experienced a carotid blowout. Treated with a stent graft, the patient had experienced a second event 6 weeks later. Treatment involved excision and suture ligation with rotational muscle flap coverage. (*J Vasc Surg Cases Innov Tech* 2022;8:606-9.)

Keywords: Carotid blowout; Carotid ligation; Laryngeal cancer; Stent graft

Carotid artery blowout syndrome (CBS), caused by compromised integrity of the carotid wall, is a potentially fatal complication that can occur after treatment of head and neck pathology.^{1,2} The identification and emergent management of a carotid blowout event is essential for patient survival. The presentation of CBS can be grouped into one of three categories: threatened, impending, and active.³ A threatened carotid blowout refers to patients without active bleeding but with wound breakdown and exposure of the underlying carotid artery or associated branches. Impending carotid blowout will present as acute transoral or transcervical hemorrhage that is self-limiting or will resolve with externally applied pressure. Finally, acute carotid blowout identifies patients with acute, uncontrollable hemorrhage due to rupture of the affected carotid artery.¹ Although clearly a medical emergency, at present, no clear guidelines or treatment algorithm exist for CBS. For patients with a primary event of carotid blowout, the laboratory values, tumor location, and time to treatment have been associated with varied patient outcomes.^{2,4} Patients with a rebleeding event will require additional

intervention; however, the overall patient survival outcomes have not been well defined.^{4,5}

In the present case report, we have shown the utility of multimodal treatment options for a patient with an initial carotid blowout event who had experienced a second carotid blowout with a herald bleeding event. During the 1-year follow-up after treatment, the patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

A 44-year-old man with laryngeal cancer after resection and radiation therapy had experienced a carotid blowout (Figs 1 and 2), which was treated with a stent graft (Fig 3). He subsequently underwent debridement and rotational flap coverage. He had required multiple debridements to control the oral secretions and allow him to undergo definitive repair. He had reportedly failed a balloon occlusion test at a referring facility; thus, the working plan for definitive repair was to perform arterial reconstruction with a bypass. Approximately 6 weeks later, he had experienced a brief episode of massive hematemesis deemed to be a herald bleeding event from a second carotid blowout.

Therefore, we planned to perform an awake balloon occlusion test and common carotid ligation if the patient was neurologically asymptomatic. If he did fail the balloon occlusion test, we planned to perform vein interposition bypass or embolize his left external carotid artery and extend the common carotid stent graft proximally and distally if the chronically inflamed tissues rendered bypass prohibitive. Balloon occlusion was performed using an 8 by 40-mm balloon (Fig 4) to occlude both the common and the internal carotid arteries. After >3 minutes of balloon occlusion, the patient remained asymptomatic. At that point, he was placed under general anesthesia, the left neck incision was opened, and the neck was explored. The covering rotational flap was mobilized, and ultrasound was used to identify the common carotid artery and distal extent of the stent graft. After 3 hours of meticulous dissection

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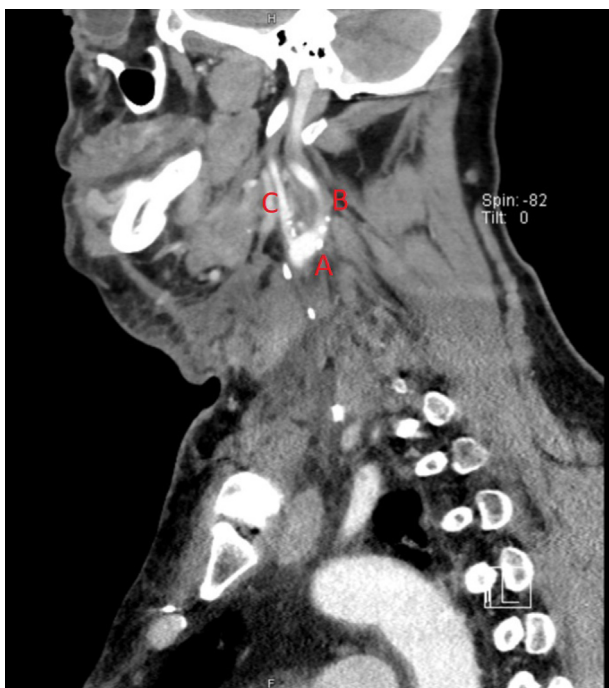


Fig 1. Patient's carotid anatomy before first carotid blowout event: A, carotid bulb; B, internal carotid artery; and C, external carotid artery.

and 2 L of blood loss from the raw surgical surface, two holes in the common carotid artery were identified. The first large hole was in the mid-portion of the visible stent graft. A smaller hole was identified at the distal aspect of the stent graft. The common carotid artery was clamped proximally and distally to the stent graft where the artery was healthy. We then transected the common carotid artery, excised the intervening arterial segment containing the infected stent graft, and debrided back to healthy artery. Next, we performed suture ligation on both ends of the common carotid artery (Fig 5). The flap was secured over the exposed neck, and the wound was closed. The patient had no neurologic complications and was discharged 1 week later. The patient was seen at 1 year of follow-up and was doing well at home. He reported minor drainage from a small skin opening due to a persistent neck fistula but otherwise tolerated food and drink by mouth.

DISCUSSION

The management options for carotid artery blowout events include open ligation and endovascular reconstruction.⁶ Historically, carotid artery ligation was the standard treatment of a carotid artery blowout; however, ligation or embolization of the common or internal carotid artery can lead to potential neurologic compromise. To reduce the risk, techniques such as balloon occlusion have been developed to identify potential neurologic sequela before ligation.^{7,8} Endovascular stenting has mitigated the concern for neurovascular compromise, with improved neurologic outcomes in surviving patients.⁹ Therefore, endovascular techniques



Fig 2. Angiogram of initial carotid blowout event showing blowout at common carotid artery (arrow).

have been used more frequently.¹⁰ Stent graft placement has the advantage of maintaining flow through the involved artery and decreasing the risk of catastrophic stroke secondary to ligation. However, this measure can only be a temporary solution. The rates of rebleeding have been greater after stent graft placement compared with those after embolization and ligation.⁴ For patients who develop recurrent carotid blowout, suture ligation should be the definitive treatment option, although more technically challenging.

Endovascular treatment of CBS has largely replaced open surgical intervention.⁶ Embolization sacrifices the affected vessel and, thereby, has a lower risk of rebleeding.¹¹ In a large study of 1218 patients, 138 of whom had undergone stenting and were compared with those who had undergone embolization, the rebleeding rates were equal between the two interventions. However, they had only identified rebleeding events during the initial hospitalization.¹² Liang et al⁴ reported an average of 44 days between intervention and episodes of rebleeding, which often occur after the date of initial hospitalization discharge. These findings reflect the experience of our patient who had experienced rebleeding 6 weeks after his initial CBS repair.



Fig 3. Image after stent graft placement following initial carotid blowout event.

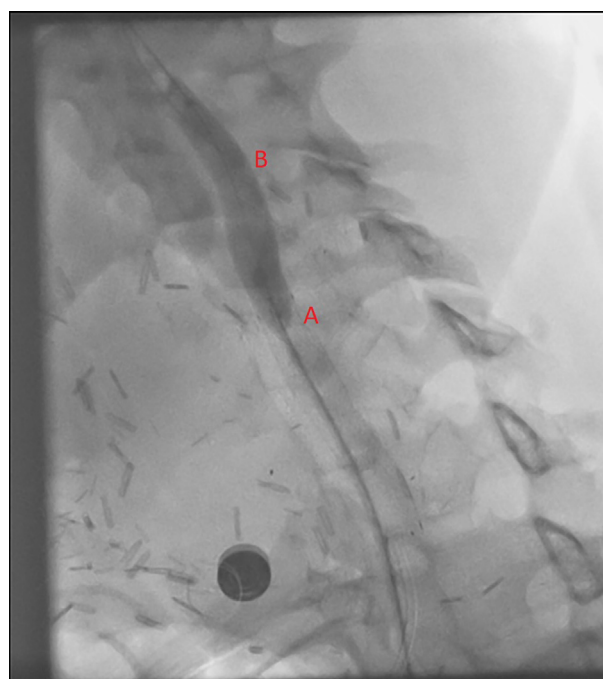


Fig 4. Balloon occlusion test covering both the common (A) and the internal (B) carotid arteries during the second carotid blowout event.

The rebleeding risks can also increase when postoperative antiplatelet medications are administered to mitigate the thrombogenicity of the stent grafts.^{11,13} Additionally, stent graft placement will not alter the underlying weakness of the diseased vessel wall, which is prone to further breakdown and degeneration. With respect to these and other risk factors, stent graft placement should be considered a temporizing measure to definitive repair if neurologic compromise is not likely.^{14,15}

Embolization confers a higher risk of perioperative stroke compared with stenting. To mitigate the risk of neurovascular ischemic deficits, a balloon occlusion test should be performed before coiling the internal or common carotid artery.^{11,15} However, $\leq 20\%$ of patients who pass the occlusion test will develop delayed ischemic stroke.^{3,11} Chang et al¹⁶ reported similar stroke rates (10.5% after embolization; 11.1% after stent graft placement) in their large case series of 96 patients. An occlusion test is not indicated for external carotid artery lesions because the risk of neurologic deficit is negligible and are, therefore, more likely to be safely treated with embolization.^{1,12}

Although rebleeding is a significant consideration with stenting, stent grafts also carry a higher risk of infection, especially when placed in an infected field. In other case reports, stent grafts have led to brain abscesses.^{1,13} In cases of uncontrolled infection or soft tissue necrosis, stent grafts should only be used as a temporizing measure.¹⁷

Overall, CBS is a serious adverse event occurring after treatment of head and neck pathology. With the

increased use of endovascular repairs, stent graft placement has become a popular management strategy for CBS. However, owing to the high risk of rebleeding and infection and the need for postoperative antiplatelet therapy, stent grafts should be considered primarily a temporizing measure before definitive embolization or ligation of the carotid artery for patients who tolerate a balloon occlusion test.

CONCLUSIONS

CBS carries a risk of mortality and is commonly repaired via an endovascular approach with embolization or stent graft placement. Stent graft placement has the advantage of maintaining flow through the involved artery and is preferred for patients who do not tolerate the balloon occlusion test. The rates of rebleeding and infections have been greater for patients with stent grafts compared with embolization, suggesting that stent grafts are best suited as a temporizing measure until definitive reconstruction can be achieved. For patients who develop recurrent CBS, suture ligation will be technically challenging but is the definitive treatment option, especially when previous endovascular repairs have failed. Although many case reports have described the use of stent grafts as a temporizing measure, very few have described the natural history of patients receiving either palliative care or definitive revascularization. In the present case report, we have described the successful management of double carotid blowout by stent graft placement and definitive treatment via excision

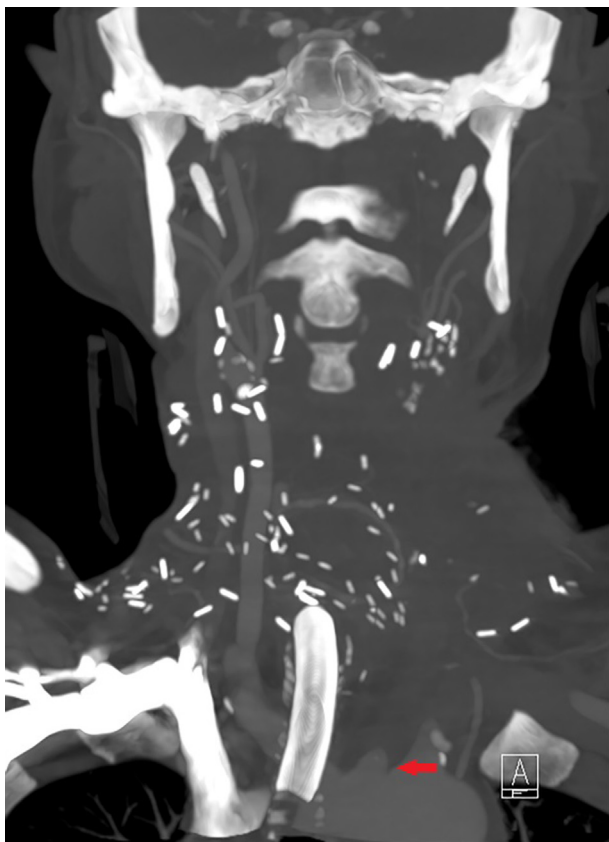


Fig 5. After carotid ligation as surgical management of the second carotid blowout event. Arrow indicates left common carotid artery stump.

and ligation of the common carotid artery. We believe that stent graft repair can be a temporizing treatment leading to a palliative approach or open surgical repair. Open surgical repair can range from carotid ligation to arterial reconstruction and subsequent tissue flap coverage.

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