Management of Cutaneously Exposed Carotid Stents in Recurrent and Unresectable Head and Neck Cancer

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Abstract

Objective Carotid blowout syndrome (CBS) is a rare but potentially life-threatening complication of head and neck cancer (HNC) treatment. Patients with CBS are managed with covered stents, limited published information exists regarding the management of delayed complications, specifically cutaneous exposure of stents. Here, we present our experience managing cutaneously exposed carotid artery stents (CAS) in patients with recurrent and unresectable HNC.

Methods A single-institution retrospective analysis was performed to identify recurrent HNC patients who underwent CAS placement for CBS and complicated with cutaneous exposure of the stent between 2014 and 2016. Medical records were reviewed with attention to treatment history, pre-, intra-, and postoperative courses, anticoagulation needs, and durability of the reconstruction.

Results We identified three patients who presented with a right CAS fully exposed in a large, ulcerative wound. All patients underwent a right pectoralis major myocutaneous flap (PMMF) to cover the exposed stent within 30 days of presentation to our institution. Two of three patients attained adequate coverage of the stent for more than 30 days, while one experienced partial flap dehiscence within 12 days. Two patients developed postoperative chest hematomas, which were managed conservatively. Two of three patients were able to undergo further palliative adjuvant treatments within 60 days of the initial surgical procedure.

Conclusion In this small series, durable coverage of an exposed carotid artery with PMMF was successful in two of three patients with extensive disease burden and complex prior treatment history. No mortalities occurred within 30 days postoperatively.

Keywords
- head and neck cancer
- carotid artery stent
- carotid blowout syndrome
- pectoralis major myocutaneous flap
- complication

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Introduction

Head and neck cancer (HNC) is a major cause of morbidity and mortality in the United States with an estimated 61,000 new cases and 13,000 deaths annually.[1] Treatment options for HNC have evolved in recent decades, allowing for longer survival: the 5-year survival rate for oral cavity and pharyngeal cancers has increased from 52.7% in 1975 to 66.2% in 2008.[2] As survival from these cancers continues to improve, an increase in associated treatment- and disease-related complications is expected.

Carotid blowout syndrome (CBS),that is, rupture of the extracranial carotid arteries or their major branches, is one of the most feared complications, with a reported incidence of 3 to 4% in patients with HNC.[3–10] CBS is associated with 60% morbidity and 40% mortality.[3,4,6,7,10–13] In patients with advanced HNC, risk factors for the development of CBS are radiation, stripping of the carotid artery during surgery, skin breakdown, and development of mucocutaneous fistula.[14] CBS has historically been managed with surgical carotid artery ligation. However, more recently developed endovascular techniques, including selective embolization and reconstruction with covered stent grafts, have become the mainstay of treatment.[3–8,10,11,15]

Immediate complications associated with the use of covered stent grafts after CBS have been extensively reported and include acute thromboembolism and iatrogenic dissection. Mid- and long-term complications may involve rebleeding (13–44% incidence) and stent thrombosis associated or not symptomatic ischemic cerebrovascular accidents.[3,5,7,8,10,13–16] Nevertheless, the literature on cutaneous exposure of CAS and its management are scarce.[4,17]

In this retrospective series, we describe our experience with recurrent unresectable HNC that underwent CAS placement for CBS treatment and complicated with cutaneous exposure of the stent. The use and rationale behind selecting the pectoralis major myocutaneous flaps (PMMF) for reconstruction in this particular cohort are discussed.

Methods

A single-institution retrospective analysis was performed to identify recurrent HNC patients who underwent CAS placement for CBS and complicated with cutaneous exposure of the stent between 2014 and 2016. Medical records were reviewed with attention to cancer diagnosis, treatment history, pre-, intra-, and postoperative courses, anticoagulation needs, and durability of the reconstruction. The study was approved by the Rush University Medical Center Institutional Review Board.

Results

We identified three male patients with diagnosis of head and neck squamous cell carcinoma, age ranged from 59 to 64 years, who presented with a right CAS exposed in a large, ulcerative wound. Treatment history for all patients involved at least one oncological surgery in addition to adjuvant chemotherapy and radiation.

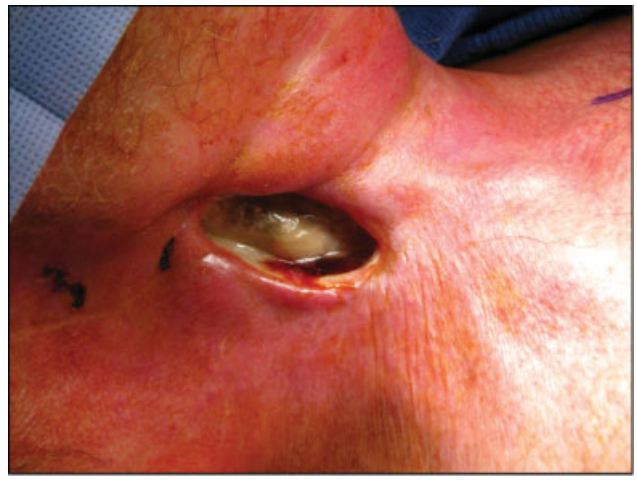

Fig. 1 Preoperative photo exhibiting the severity of the defect, with visible exposed mesh of the right carotid artery stent. This is Case 1.

Timing between CAS placement and cutaneous exposure ranged from 6 to 156 weeks. All patients underwent a right PMMF to cover the exposed stent within 30 days of presentation to our institution.

Reconstruction Technique

Initially the skin edges surrounding the wound of the exposed stent were debrided and freshened to allow for an inset of the planned flap. If the surrounding tissue can be cleared of gross malignancy, this was performed as in case 1 of our series. A myocutaneous pectoralis flap was harvested in the standard fashion centered on the pectoralis branch of the thoracoacromial artery. Sternal attachments and humerus attachments were released to allow for appropriate rotation and inset. Innervations to the pectoralis major muscle was transected during the harvest to allow for thinning of the flap. The skin paddle was fashioned to be inset to the

Fig. 2 Intraoperative photo demonstrating exposed carotid artery stent immediately prior to reconstruction with PMMF. PMMF, pectoralis major myocutaneous flap. This is Case 1.

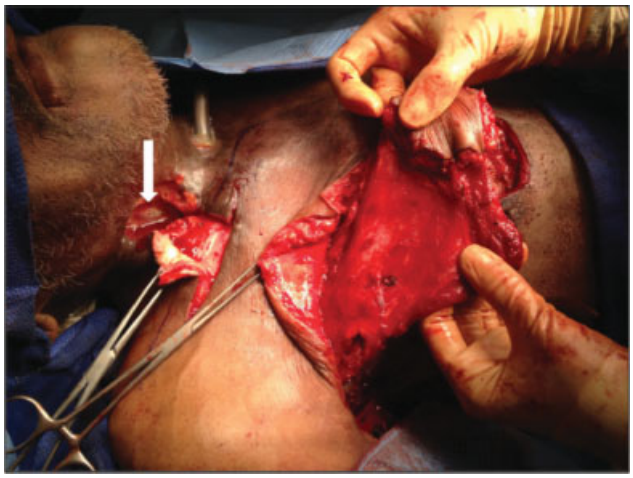

Fig. 3 Intraoperative photo taken prior to reconstruction with harvested PMMF, highlighting exposed right common carotid artery stent with visible mesh (white arrow). This is Case 2. PMMF, pectoralis major myocutaneous flap.

surrounding tissue and the bulk of the pectoralis muscle overlying the stent and inset to the deeper tissue. The donor site was closed with local flaps in all cases and given the anticoagulated states of the patient's appropriate drains were used. (►**Figs. 1**–**3**)

Outcomes

Two of three patients attained adequate coverage of the stent for more than 30 days, while one experienced partial flap dehiscence within 12 days requiring surgical revision for wound debridement. Despite the flap dehiscence, the stent was still covered and the wound was managed conservatively with dressing changes and topical ointment. Two patients developed postoperative chest hematomas that were managed conservatively.

Two of three patients were able to undergo further palliative adjuvant treatments within 60 days of the initial surgical procedure. Wound healing time and, most significantly, the patient debilitating status were the reasons for adjuvant treatment delay.

Case 1 returned to work and upheld a reasonable quality of life within 3 weeks of surgery. Palliative treatment with immunotherapy was started 6 weeks after PMMF surgery due to problems with his port-a-cath. His follow-up in clinic was approximately 4 months after surgery showed adequate wound coverage (►**Fig. 4**), and he eventually expired of regional and metastatic disease progression.

Despite the partial flap dehiscence requiring debridement and wound care, case 3 was able to start palliative treatment with immunotherapy 3 weeks after PMMF surgery. He also underwent subsequent palliative systemic chemotherapy, palliative radiation to metastatic lung lesion and ultimately died in hospice care due to regional and metastatic disease progression 7.5 months after surgery.

The details on each case are summarized in ►**Table 1**.

Fig. 4 Postoperative photo demonstrating well-healed reconstruction approximately 4 months after surgery. This is Case 1.

Discussion

Endovascular techniques designed to treat CBS have more recently come into favor, as they are less invasive than surgery and avoid the need to operate in a field often complicated by prior neck dissection and/or radiation therapy.[3,9,11,12] Covered stent grafting is the preferred alternative in those who cannot tolerate occlusion of the offending carotid artery such as patients with contralateral carotid artery disease.[4,5,7,12–14,16]

Considering the potential catastrophic consequences of a hemispheric ischemic stroke, we believe all attempts should be made to preserve the internal carotid artery (ICA) and intracranial blood flow. Balloon test occlusions (BTO) may be challenging to perform in an emergency setting of a CBS. In addition, 15% of elective BTOs may have false negative results,[18] so ICA sacrifice should be used as a last resort to control bleeding.

In a CBS scenario, embolization or vessel sacrifice is a preferred treatment method when dealing with hemorrhage from external carotid artery or its branches. However, a reconstructive technique with stent is the preferred method when the bleeding source is the common or internal carotid arteries.

The most commonly reported mid- and long-term complications related to CAS in this patient population are rebleeding, infection, and stent thrombosis associated or not symptomatic ischemic cerebrovascular accidents. The complication of exposed CAS is an uncommonly reported in literature,[4,17] and minimal published information exists regarding the management of such cases. As observed in our patient cohort, we believe this complication is likely associated with extensive history for the HNC treatment (multiple surgeries, radiation therapies, and chemotherapies), advanced disease, comorbidities, and poor nutritional

Table 1 Summary of cases with exposed CAS

Case no.	1	2	3
Age at presentation (y)/gender	59/male	64/male	61/male
1-degree cancer site	SCC of tongue	SCC: 1-degree site unknown	SCC of right tonsil
HPV status	Unknown	Unknown	Positive
Smoking status	Former smoker	Former smoker	Never smoker
Number of prior oncologic surgeries	2	1	2
Prior adjuvant treatments	Chemotherapy, radiation	Chemotherapy, immunotherapy, radiation	Chemotherapy, radiation
Prestent radiation dose	N/A	70 Gy to lesion; 60 Gy to bilateral neck	70 Gy to lesion; 30 Gy neck recurrence (×2)
Time from carotid stent placement to cutaneous exposure (wk)	16	6	152
Reconstruction method	PMMF	PMMF	PMMF
Excised skin margins positive for SCC?	No	Yes	Yes
Site of distant metastatic disease	Right neck	Right neck	Right neck, right lung
Postoperative anticoagulation	Aspirin, clopidogrel, enoxaparin (for PE)	Aspirin, clopidogrel	Aspirin, clopidogrel
Postoperative complications	Chest wall hematoma, cellulitis of neck with mild dehiscence	Mild flap dehiscence (stent remained covered)	Flap dehiscence, chest wall hematoma
Durable flap coverage[a]?	Yes	Yes	No, 12 days
Further postoperative adjuvant treatments?	Palliative with chemotherapy and immunotherapy	No	Palliative with chemotherapy, immunotherapy and palliative radiation to the lung

Abbreviations: CAS, carotid artery stents; HPV, human papillomavirus; N/A, not available; PE, pulmonary embolism; PMMF, pectoralis major myocutaneous flap; SCC, squamous cell carcinoma.
[a]Greater than 30 days of flap coverage is considered durable in this series.

status. We will likely see an increase in treatment- and disease-related complications as HNC survival continues to improve with better immunotherapies and chemotherapies.

Despite the widespread use of vascularized flaps to cover persistent soft tissue wounds in which the carotid artery is exposed,[4,10,13] there are no reports on the impact of having an exposed implant in these reconstructions. To the best of our knowledge, this is the first reported case series delineating the use of PMMF in this patient cohort.

Warren et al[4] published an excellent review and report of three patients with carotid blowout managed with endovascular stents and questioned the long-term safety of indwelling stents in the setting of head and neck malignancy. Although initial results in this article were favorable, two patients extruded their stent resulting in cerebrovascular accident in one case and thrombosis in the second.

Simental et al[17] reported two patients with poor outcomes with CAS exposure after treatment of CBS. The wound defect was covered with a total arm myocutaneous flap in the first case. The patient had new bleeding within 30 days after procedure requiring sacrifice of the common carotid artery, which resulted in an ischemic stroke and death. The second patient presented with CAS exposure after 8 weeks of placement. The common carotid artery had thrombosed and the patient subsequently expired to generalized inanition from recurrent carcinoma with no further bleeding.

Although microvascular surgery in vessel-depleted necks has been described in head and neck reconstruction, the extent of disease and severely debilitated and the anticoagulated state of this particular patient cohort persuaded us against free-tissue transfer. Our goal was to achieve an extremely low incidence of complete flap failure; as such, a pedicled flap was an ideal choice. The PMMF is particularly useful in salvage procedures, where the neck is vessel depleted, and also may allow for shorter operative times for wound coverage that is critical in this patient cohort. Often selected for its reliability, versatility, ease of harvest, and ability to cover large tissue defects in the head and neck region, the PMMF is easily mobilized and far reaching with the thoracoacromial artery as the axial vessel.[19] One distinct advantage of the short postoperative recovery period is the ability to undergo further systemic treatments after surgery, as seen in two patients in this series.

In the present series of salvage procedures, all patients faced posttreatment complications, including two patients who experienced postoperative bleeding and two with mild flap dehiscence. Patients with advanced HNC who have undergone numerous salvage treatments suffer treatment-related complications more readily, and rates of partial PMMF necrosis after salvage surgery tend to be higher than those undergoing primary surgery.[20] Therefore, discussion of the risks and benefits of palliative treatments is crucial.

In this case series, PMMF was used to cover exposed CAS and resulted in durable coverage in two of three cases. All patients experienced greater than 30 days of survival (range: 73–232 days) and were able to be discharged from the hospital after flap placement, and two of the three patients were able to undergo further palliative adjuvant therapies within 60 days of surgery. Although uncommon, cutaneously exposed intraluminal CAS present critical management considerations that are not yet well elucidated in the literature.

Conclusion

Our experience suggests PMMF provide a durable, safe, and reliable option for coverage of exposed CAS, allowing patients to pursue further therapeutic or palliative treatments. Future comparative studies will aid in guiding the management of HNC patients with neck wounds containing exposed endovascular carotid artery stents.

Funding
None.

Conflict of Interest
None declared.

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