

Technical Notes & Surgical Techniques

Viabahn stent extrusion into the airway in association with nasopharyngeal squamous cell carcinoma[☆]Kyle P. O'Connor (BS), Bradley N. Bohnstedt (MD)^{*}

Department of Neurosurgery, University of Oklahoma Health Sciences Center, Oklahoma City, OK, United States of America

ARTICLE INFO

Keywords:

Viabahn
Extravasation
Carotid blowout
Nasopharyngeal squamous cell carcinoma
Airway extrusion

ABSTRACT

Carotid blowout syndrome is a rare condition where blood extravagates from the carotid artery due to vessel damage. Frequently, this is an emergency that needs to be treated by endovascular stent deployment. Rarely, these stents erode through the blood vessel wall and extrude into the airway or oropharynx. Here, we present the case of a 48-year-old male with a history of nasopharyngeal squamous cell carcinoma that had a Viabahn stent placed due to carotid blowout. Six months later, the stent was extruded into the airway and the patient coughed up the stent. The patient remained asymptomatic during stent extrusion and a computerized tomography angiography demonstrated cessation of flow in the carotid artery. This is a rare but serious side effect of stent placement in the setting of nasopharyngeal cancer and carotid blowout syndrome.

1. Introduction

Carotid artery blowout syndrome is a rare but dangerous condition when a cervical carotid artery bleeds into the soft tissues, the oropharynx, or in rare cases externally. A common cause of vessel damage with resulted carotid blowout syndrome is cancerous infiltration of the vessel wall. Rupture can result when damage reaches the critical point. This can result in a pseudoaneurysm, hematoma, hemoptysis, brain ischemia, and death. At this point options include surgical exploration and endovascular treatment. Angiography with endovascular management can be performed with the use of coils, liquid embolization material, or covered stent deployment. Covered stent use provides a unique benefit of preservation of cerebral blood flow while providing hemostasis [1]. A rare but reportable complication that will be presented in this report is stent extrusion into the airway in a delayed fashion.

2. Case presentation

We report a case of a 48-year-old male with carotid blowout syndrome due to carotid artery erosion from nasopharyngeal squamous cell carcinoma. Neurosurgery was consulted due to copious bleeding from the oropharynx with active extravasation of blood from the internal carotid artery. Angiography demonstrated vascular blush, and after

attempted embolization with coils and n-BCA glue, surgeons ultimately deployed a Viabahn stent (Fig. 1). This resulted in resolution of the hemorrhage with continued patency of the vessel.

Approximately sixth months after placement, the patient returned to the clinic stating that he coughed out his stent while at home (Fig. 2). Examination of the oropharynx revealed no signs of ulceration and his neurological examination was unchanged. Computerized tomography (CT) angiogram of the neck was performed and demonstrated occlusion of the left common carotid just off the aortic arch through the internal carotid at the level of the cavernous sinus (Fig. 3). The patient had no sequela suggestive of a cerebral ischemia.

3. Discussion

Carotid blowout syndrome is a rare life-threatening condition caused by infiltration or erosion of an artery wall by various potential insults. These insults can include radiation, infection, tumor involvement, chemotherapy, and neck surgery, which cause damage due to free radical formation [2]. When the tissue damage reaches the critical point, hemorrhage can occur with symptomatology ranging from pain to bleeding to death [2]. Three types of carotid blowout exist: type I, type II, and type III. Type I is a threatened extravasation secondary to the vessel infiltration or erosion. Type II is an impending sanguineous extravasation such as a sentinel bleed that can be temporarily solved

[☆] Sources of support: There was no assistance with funding. No conflict of interest exists.

^{*} Corresponding author at: Department of Neurosurgery, University of Oklahoma Health Sciences Center, 1000 N Lincoln Boulevard, Suite 4000, Oklahoma City, OK 73104, United States of America.

E-mail address: bradley-bohnstedt@ouhsc.edu (B.N. Bohnstedt).

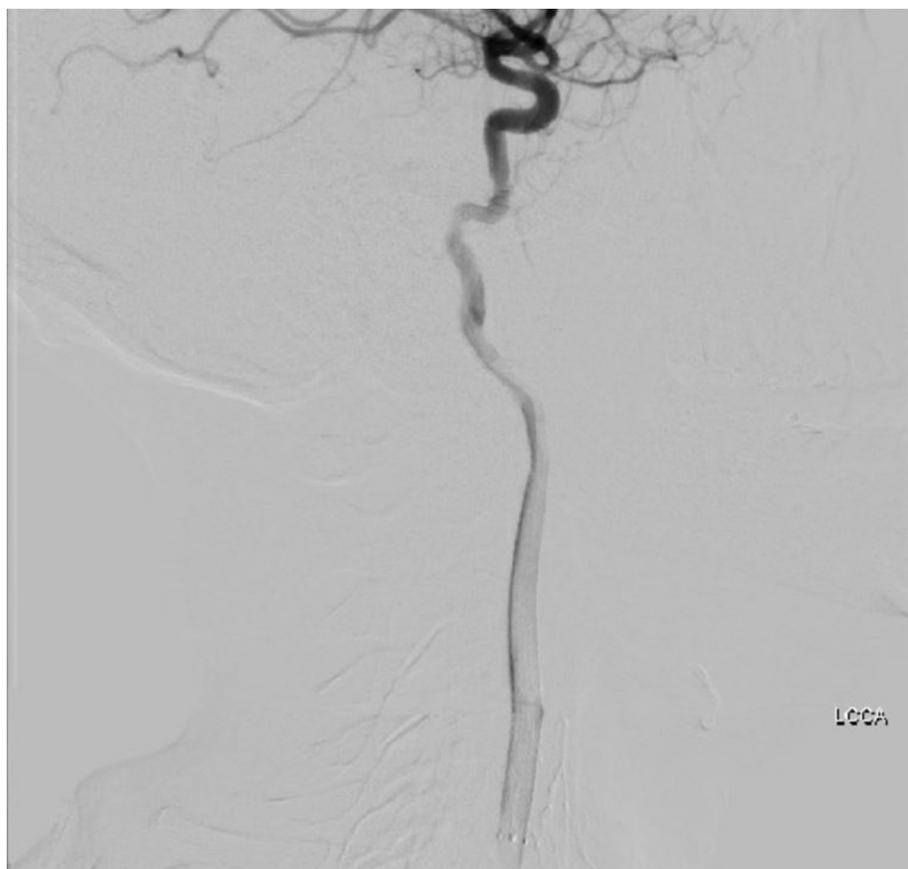


Fig. 1. Deployment of the Viabahn stent in the carotid artery with adequate embolization of feeder vessels to the tumor and cessation of oropharyngeal bleeding.



Fig. 2. Viabahn stent that extruded into the airway that the patient brought to his clinic visit.

with pressure and wound packing before an ultimate extravasation in the future. Type III is an active bleed that is considered fatal if left untreated. Our patient was classified as a type III extravasation necessitating treatment [3]. Potential treatments include liquid embolization material, coils, stents, or a combination of these. While diagnosis can be made with a computed tomography, endovascular management and angiogram allows for both diagnosis and treatment. In our case, the stent seemed to be the most rapid and reasonable option for our patient.

Warren et al. [4] states that stent placement should only be considered for the short-term; and later replaced with a more permanent solution such as embolization with coils or a detachable balloon. This occurs because each of these treatments introduces a foreign body into the vessel causing ongoing inflammation and necrosis. Warren, et al., reports 3 cases of stent placement with extrusion of 2 of these cases.

Our patient had stent extrusion into the airway approximately six months after placement (Fig. 4). The patient reported to the clinic one week after extrusion without bleeding or symptomatology. CT neck angiography demonstrated that the vessel thrombosed from the common carotid at the level just off the aortic arch to the internal carotid at the level of the cavernous sinus. The patient also had sufficient collateral flow from the contralateral side which allowed avoidance of neurological symptoms secondary to brain ischemia. We believe this to be a unique situation following vessel protection. The patient experienced vessel occlusion with stent extrusion.

Conflicts of interest

No authors have conflicts of interest pertain to this article.

Dr. Bohnstedt's Other Conflicts of Interest.

Consultant, Speaker, Site PI for Penumbra.

Consultant, Speaker, Site PI for Stryker Neurovascular.

Site PI and Speaker for Ceranovos.

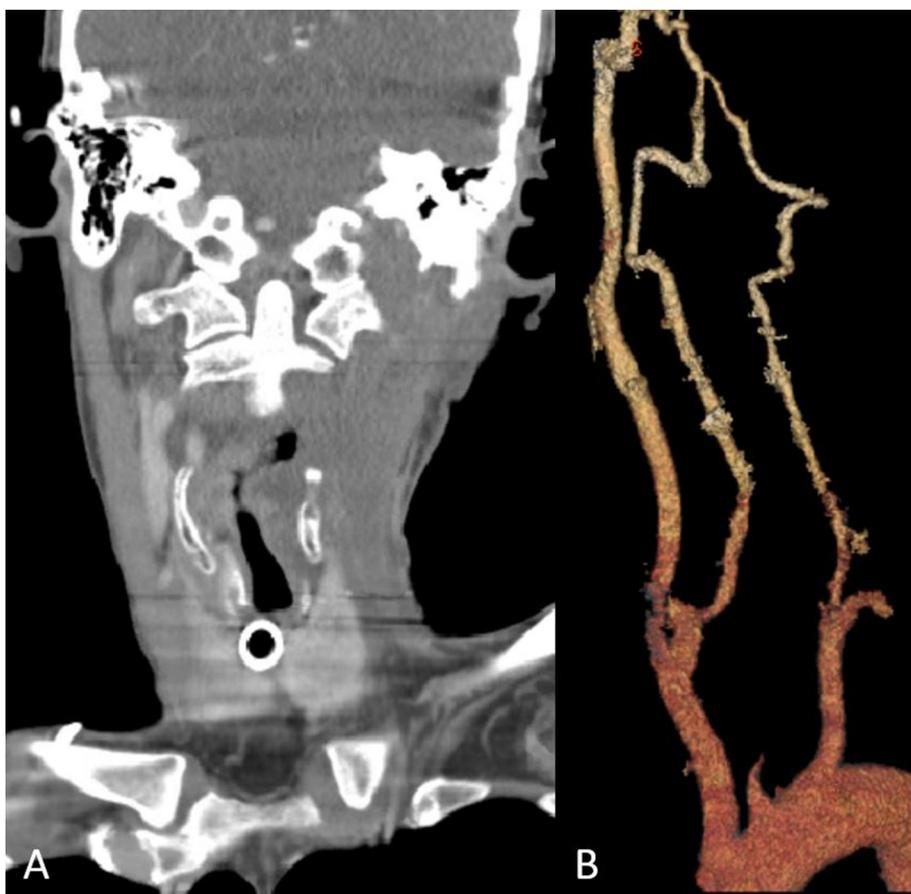


Fig. 3. (a) Coronal CTA at 12-month follow-up demonstrating complete occlusion of the left common carotid artery, left internal carotid artery, and left external carotid artery. The right internal carotid artery and right external carotid artery are preserved in this image. (b) 3D reconstruction of neck CTA with occlusion of the left common carotid artery just beyond the origin. The brachiocephalic, right common carotid, right internal carotid, right external carotid, left subclavian, left vertebral, and right vertebral arteries are preserved.

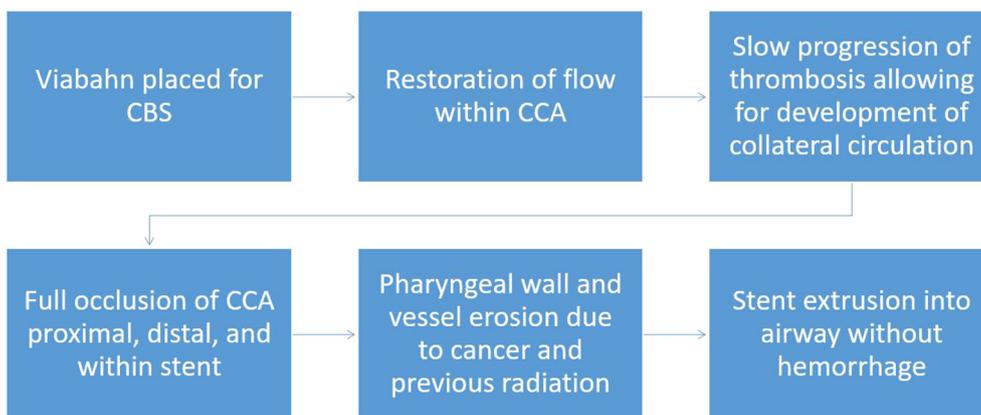


Fig. 4. Schema depicting potential schema for stent extrusion.

Site PI and Speaker for Nico.

Acknowledgements

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosures

There is nothing that any of the authors need to disclose.

References

- [1] H.C. Choi, S.E. Park, D.S. Choi, H.S. Shin, J.E. Kim, H.Y. Choi, M.J. Park, E.H. Koh, Ruptured extracranial carotid artery: endovascular treatment with covered stent graft, *J. Neuroradiol.* 45 (4) (2018) 217–223 Epub 2018/02/24 <https://doi.org/10.1016/j.neurad.2018.01.057> (PubMed PMID: 29474881).
- [2] Y.J. Chen, C.P. Wang, C.C. Wang, R.S. Jiang, J.C. Lin, S.A. Liu, Carotid blowout in patients with head and neck cancer: associated factors and treatment outcomes, *Head Neck* 37 (2) (2015) 265–272 Epub 2014/01/01 <https://doi.org/10.1002/hed.23590> (PubMed PMID: 24375817).
- [3] Chiesa Estomba CM, Betances Reinoso FA, Osorio Velasquez A, Castro Macia O, Gonzalez Cortes MJ, Araujo Nores J. Carotid blowout syndrome in patients treated by larynx cancer. *Braz. J. Otorhinolaryngol.* 2017;83(6):653–8. Epub 2016/10/30. doi: <https://doi.org/10.1016/j.bjorl.2016.08.013>. PubMed PMID: (27789194).
- [4] F.M. Warren, J.I. Cohen, G.M. Nesbit, S.L. Barnwell, M.K. Wax, P.E. Andersen, Management of carotid 'blowout' with endovascular stent grafts, *Laryngoscope* 112 (3) (2002) 428–433 Epub 2002/08/01 <https://doi.org/10.1097/00005537-200203000-00004> (PubMed PMID: 12148848).