**Self expandable polytetrafluoroethylene stent for carotid blowout syndrome**

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**Abstract.** *Self expandable polytetrafluoroethylene stent for carotid blowout syndrome.* Carotid blowout syndrome (CBS) is an emergency complication in patients undergoing treatment for head and neck cancers. The classical management of CBS is the ligation of the common carotid artery, because suturing is not be possible due to infection and necrosis of the field. In this case report, we present a patient with CBS, in whom we applied a self-expandable polytetrafluoroethylene (PTFE) stent and observed no morbidity. Endovascular stent is a life-saving technique with minimum morbidity that preserves blood flow to the brain. We believe that this method is preferable to ligation of the artery in CBS.

**Introduction**

Carotid blowout syndrome (CBS) is a life threatening complication in head and neck cancer patients, with high morbidity and mortality rates. CBS usually occurs due to post-operative complications such as infections, wound dehiscence, flap necrosis, and pharyngocutaneous fistulas. Radiation therapy and tumour recurrences can also lead to this complication. It is an emergency situation, and the classical approach to salvage the patient’s life is to ligate the carotid artery. Repairing the artery is almost impossible, since the exploration and suturing of the vessel wall in a previously-irradiated and infected field is very difficult. Endovascular therapies with permanent balloon occlusion or stent deployment were recently reported as good alternatives to surgical ligation. We hereby report a patient who underwent several surgical procedures and radiation treatments for laryngeal cancer, in whom we applied a self-expandable stent for CBS.

**Case presentation**

A 52-yearold male patient presented at our clinic with a wide open neck wound extending from the tongue base to a tracheostoma, which involved the area around both carotids (Figure 1). He had an history of partial (vertical) laryngectomy for squamous cell cancer of the larynx at another institution 18 months previously. He also received adjuvant chemotherapy and post-operative radiation for positive surgical margins. Ten months after the operation he had difficulty breathing. Local recurrence was suspected, and he received brachytherapy to the larynx. His symptoms did not resolve, and he continued to have dyspnea. A PET/CT showed local increased uptake (SUV:9.2). Subsequently, he underwent total laryngectomy, and the
pathological examination revealed necrosis but no malignancy.

Two weeks after this operation, he developed a pharyngocutaneous fistula and, despite wound care, the fistula progressed. He was re-operated to repair the pharyngocutaneous fistula with a pectoralis major myocutaneous flap. He had partial flap necrosis and wound dehiscence, which resulted in failure to close the fistula. He was then referred to our clinic for further management.

The patient had wide necrotic areas around the huge pharyngocutaneous fistula. The tissue around both carotids was pale and necrotic. We removed the devitalized tissue and applied wound care twice daily along with systemic wide-spectrum antibiotics. Two days following hospitalization, heavy bleeding began on the right side of the neck. The patient was immediately taken to the operating theatre with finger pressure on the right carotid artery. After taking general precautions, the right neck was explored under general anesthesia. Bleeding from the right common carotid artery was found. There was a 2-mm perforation on the medial side of the common carotid artery almost 2-3 cm below the bifurcation. Our Interventional Radiology Department was contacted immediately. After a brief consultation, we decided to proceed with the application of an intra-arterial self-expandable polytetrafluoroethylene (PTFE) covered stent.

Using a right transfemoral artery approach, selective catheterization of the right common carotid artery was performed. We marked the location of the perforation with a metal surgical clamp. An 8 × 100 mm self-expandable PTFE-covered stent (Viabahn, GORE, Flagstaff, Arizona, USA) was deployed under fluoroscopic control, covering the perforation of the right common carotid artery. There was no visible bleeding after the deployment of the covered stent. Stent patency was controlled by Doppler ultrasound (Figures 2 a and b). The entire procedure was performed under the guidance of C-armed fluoroscopy. The procedure was completed without any complications.

The patient is now 4-months post-procedure. He still receives twice-daily wound care. The wound and the fistula are much smaller now, and both carotid areas are covered by healthy granulation tissue (Figure 3). He has a gastrostomy, and no sign of local or regional recurrence. He is receiving anti-coagulation (Clopidogrel bisulfate 75 mg/day) therapy, and his antibiotics were stopped at week 4. He is planned for radial forearm free flap in the next couple of months to close the fistula.

Discussion

CBS, or rupture of the carotid artery, is an important and life-
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threatening complication in head and neck surgical practice. CBS can take variable clinical incarnations depending on the degree of the carotid rupture, ranging from acute hemorrhage to partial exposure of the artery. CBS is classified into three grades. Grade 1 carotid blowout (threatened) is characterized by physical and radiological findings suggestive of inevitable hemorrhage such as neoplastic invasion or nonhemorrhagic pseudoaneurysm. Grade 2 carotid blowout (impending) is characterized by a transcervical or transoral short-term hemorrhage, which usually resolves spontaneously or with surgical packing. Grade 3 carotid blowout (acute) is characterized by abundant hemorrhage, which is neither self-limiting nor controlled with surgical packing. Risk factors and the etiology of CBS can be summarized as radiation-induced necrosis, flap necrosis, surgical wound dehiscence, recurrent tumours, pharyngocutaneous fistulas, or iatrogenic mechanical vascular injury. Irradiated patients who have non-healing skin ulcerations are especially at risk of injury to important structures. In patients with head-and-neck cancers, previous irradiation increases the risk of CBS 7.6 fold. The formation of pseudoaneurysms is reported to occur within a time period of 2 to 20 years following radical neck dissection and irradiation. Surgical repairment of CBS is almost impossible, since exploration and repair of the previously-irradiated and infected fields is difficult. The reported neurological morbidity (25%) and mortality (40%) rates of a surgical approach are reported at nearly 50% in the English literature, because the only choice is to ligate the carotid artery. Endovascular therapy with permanent balloon occlusion or stent deployment was recently reported as a good alternative to surgery. An endovascular method provides three major advantages compared with open surgical approaches. Firstly, it is less invasive, and it can also be performed under local anesthesia. Secondly, surgical repair has a risk of cerebral ischemia because of temporary clamping of the carotid artery for vascular replacement. Exploration in the soft tissue of the irradiated neck region and repair of the vessel wall would be very difficult. Thirdly, it is also suitable for palliative care.

CBS is a rare complication in head and neck practice, but its management is very critical and difficult. A multidisciplinary approach is very important in the management of CBS. Correct and suitable management can be life saving. An endovascular technique is a good alternative with much lower morbidity and mortality rates than surgical repair or ligation. The mainstay of this approach is the preservation of blood flow to the brain, which is vital for life and brain functions.
References


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