Management of Carotid Blowout from Radiation Necrosis

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KEYWORDS

• Carotid blowout • Endovascular • Radiation complication

KEY LEARNING POINTS

At the end of this article, the reader will:

- Understand the main risk factors for the development of carotid blowout syndrome.
- Understand how carotid blowout syndrome can be prevented.
- Recognize the difference between threatened and impending carotid blowout syndrome.
- Appreciate the role of computed tomography in the management of carotid blowout syndrome.
- Understand the role of angiography in the management of carotid blowout syndrome.
- Define the role of surgery in the management of carotid blowout syndrome.

Carotid blowout syndrome (CBS) remains one of the most serious and dramatic complications of head and neck surgery. Prevention of the syndrome is paramount and is primarily accomplished by prophylactic coverage of the major vasculature with well-vascularized tissue, especially in an irradiated field. Modern reconstructive techniques have therefore significantly decreased its occurrence and the development of endovascular techniques has significantly altered its management, with an associated decrease in short-term morbidity and mortality.[1–3] However, the long-term mortality of patients experiencing this complication remains essentially unchanged because it usually occurs in the setting of recurrent and/or uncontrolled tumors in the head and neck region.[4]

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This article outlines a practical and rational approach to this problem, incorporating modern diagnostic and therapeutic techniques that can be applied to any patient in whom this possible complication is considered.

The most effective management of CBS is preventing it from developing in the first place. Although some cases are inevitable, recognition of the long-term risk of CBS at the time of patients' primary or salvage surgery may steer surgeons toward the use of various reconstructive techniques that may prevent CBS from developing. As mentioned previously, the incidence of CBS has been decreasing with the development of more modern surgical techniques. The shift from true radical neck dissection to selective neck dissection with preservation of the internal jugular vein (IJV) and/or the sternocleidomastoid muscle (SCM) over the past few decades has resulted in fewer patients with the carotid artery covered only by the skin and platysma muscle.[1,5] When a radical neck dissection is needed and both the IJV and SCM are sacrificed, placement of a pectoralis flap or a fasciocutaneous free flap into the neck may provide coverage of the carotid with healthy vascularized tissue and prevent the development of CBS.[6] Similarly, it has been shown that use of either a pectoralis overlay flap or an interposed fasciocutaneous free flap for pharyngeal closure after salvage laryngectomy is superior to primary closure in reducing fistula formation,[7] which is a key risk factor for the development of CBS. Thus, every effort should be made at the time of surgery to provide well-vascularized tissue coverage of the carotid artery, particularly in previously irradiated patients. Despite this, there is a subset of patients who inevitably develop CBS (**Table 1**).

Patients facing this potential complication generally present in one of 3 different categories. Perhaps most common are patients who have an exposed carotid artery in the neck, from prior surgery, wound breakdown, or tumor, but no history of bleeding. This condition has been termed threatened carotid blowout. The second group, termed impending carotid blowout, are patients with the same physical findings as group 1 but who have also experienced a self-limited bleeding event (sentinel bleed) thought to have arisen from the carotid artery system. The third group is the patients who present with active carotid bleed or carotid rupture. With this group, diagnosis is straightforward and clinicians proceed directly to active management (discussed later). In the threatened and impending groups, decision making can be more difficult because the likelihood that carotid bleeding will occur or has occurred and the degree to which further diagnostic and therapeutic strategies are needed must be determined.

Factors associated with CBS
• Prior radiotherapy
• Prior radical neck dissection
• Mucocutaneous fistula
• Flap necrosis
• Wound infection
• Poor nutrition or compromised wound healing
• Recurrent tumor

Carotid blowout is almost exclusively associated with patients who have undergone prior radiation therapy, although prior neck dissection, mucocutaneous