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Endovascular treatment paradigm of carotid blowout syndrome: Review of 8-years experience

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ABSTRACT

Objectives: Endovascular treatment is effective in treating carotid blowout syndrome (CBS). We reviewed our experience in addressing CBS over eight years and presented an account of the treatment paradigm and management algorithm.
Method: All cases of CBS from 2003 to 2010 with endovascular treatment performed in our center were reviewed. 15 CBS in 14 patients were recruited. Based on our management algorithm, treatment regimen was stratified into deconstructive or constructive methods. Their clinical presentations, angiographic features, angiographic and clinical outcomes were reviewed.
Results: 10 patients were treated with deconstructive method by means of permanent vessel occlusion (PVO) and 4 patients were treated with constructive method by means of placement of covered stent ($n = 3$) or flow diverting device ($n = 1$). Immediate hemostasis was achieved in all cases. 7 (50%) patients, in whom 5 treated with PVO and 2 with covered stent, had favorable outcomes and survived at a median follow-up period of 4 months (range: 1–84 months).
Conclusion: Permanent vessel occlusion remains the gold standard of treatment and tends to show a favorable long-term outcome. Off-label use of covered stent and flow-diverting device can produce satisfactory results should balloon occlusion test fail, but long-term follow up would be required for definitive assessment.

1. Introduction

Carotid blowout syndrome (CBS) is a dangerous condition with high mortality rate. Direct surgical repair of the ruptured internal carotid artery is often not technically possible due to the difficult anatomy and underlying poor co-morbid status. Endovascular treatment is recognized to be an effective mean in treating CBS [1,2]. We reviewed our experience in addressing CBS over a period of eight years and compared various clinical parameters in relation to clinical outcomes. We also presented an account of evolving endovascular techniques as well as our algorithm of management in this disease entity.

2. Materials and methods

We retrieved and reviewed all cases of CBS from 2003 to 2010 referred to our institution, in which endovascular treatment was chosen as a management strategy. Total of 15 carotid blowout events occurring in 14 patients (10 males, 71%; 4 females, 29%) with a mean age of 58.6 years ± 11.5 [SD] (range: 39–77 years) were managed with endovascular intervention, and hence recruited. All patients had prior history of head and neck cancers (nasopharyngeal carcinoma, $n = 10$ (71%); carcinoma of larynx, $n = 3$ (21%); carcinoma of thyroid, $n = 1$ (8%)) previously treated by external radiation therapy ± surgery. They all presented with massive or recurrent epistaxis not amenable to conservative treatment. Diagnostic digital subtraction carotid angiograms were performed in all cases for definitive diagnosis.

Choices between different approaches of endovascular treatment were primarily based on the considerations of adequacy of intracranial collateral circulation judging from results of balloon occlusion tests (BTO), and availability of suitable therapeutic devices. The purpose of BTO was to assess the availability of collateral circulation to the ipsilateral cerebral hemisphere if the ruptured carotid artery was permanently occluded (Fig. 1), as well as to identify possible deterioration or development of focal neurological deficits by intermittent neurocognitive assessment during the test over a period of not less than 15 min.

Basing on the results of BTO, the following treatment regimen was adopted:

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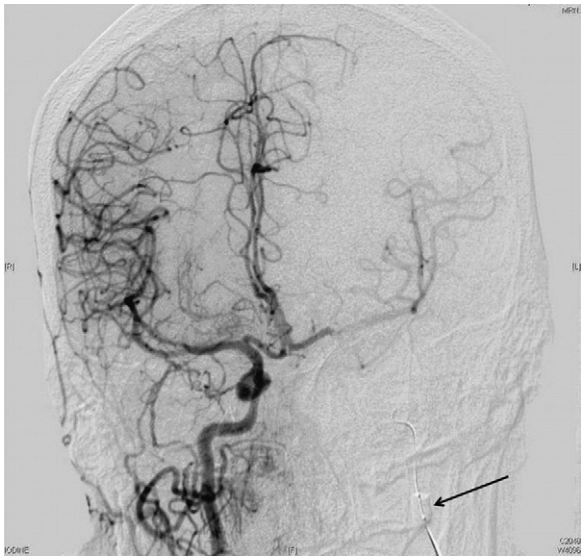

Fig. 1. Balloon test occlusion. Occlusion of left internal carotid artery by placement of balloon (arrow) at its proximal cervical portion and with contralateral internal carotid artery injection to test for adequacy of collateral circulation.

(1) *De-constructive management*: For patients passing the BTO with permanent occlusion of the involved internal carotid artery by endovascular trapping of the ruptured segment as well as its immediate proximal and distal segments (Fig. 2).
(2) *Constructive management*: For patients failing the BTO with deployment of stent across the ruptured segment (Fig. 3) to avoid the extreme high impending risk of major cerebral infarction. As the long-term effect of using such devices in CBS was not known and hence, the status of mural integrity of the whole internal carotid artery was uncertain.

Their angiographic and clinical presentations and outcomes were reviewed.

Fig. 3. Covered stent placement across right distal common carotid artery with obliteration of pseudoaneurysm.

3. Results

Initial diagnostic carotid angiograms confirmed presence of pseudoaneurysm (Fig. 4) or tear at carotid artery in all 15 carotid blowout events of the 14 patients, with their locations of the injured segment as follows: cervical portion of left internal carotid artery ($n = 4$, 26%); petrous portion of left internal carotid artery ($n = 3$, 20%); left distal common carotid artery ($n = 3$, 20%); cervical portion of right internal carotid artery ($n = 2$, 13%); right distal common carotid artery ($n = 1$, 7%), petrous portion of right internal carotid artery ($n = 1$, 7%), right internal carotid siphon ($n = 1$, 7%).

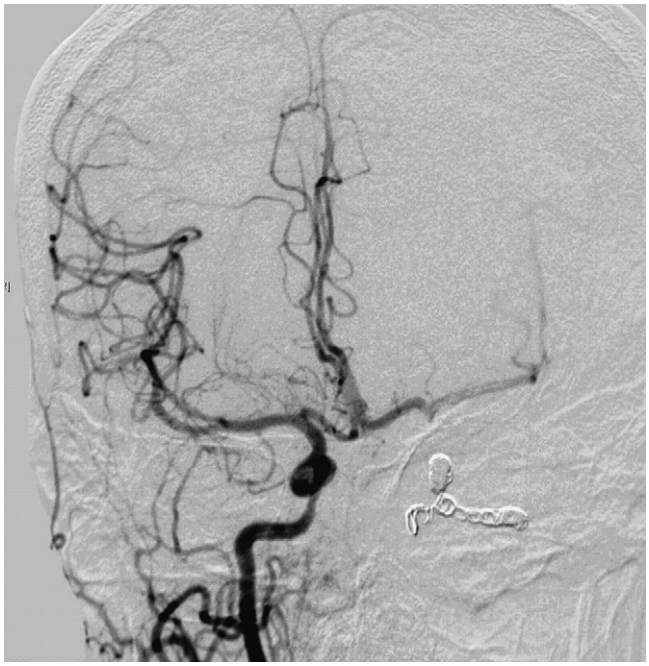

Fig. 2. Permanent vessel occlusion by endovascular coil trapping of the left internal carotid artery.

Fig. 4. Lateral view of digital subtraction carotid angiogram showing presence of pseudoaneurysm (arrow) at left distal internal carotid artery.