Yeditepe Medical Journal 2011;5(20): 468-472

BALLOON-EXPANDING COVERED STENT REPAIR OF CAROTID BLOWOUT

Case Report

KAROTİS BLOW-OUT SENDROMUNDA BALONLA GENİŞLEYEN KAPLI STENT İLE TAMİR

Batuhan KARA

Bakırköy Dr. Sadi Konuk Teaching Hospital, Department of Radiology, Istanbul/TURKEY

M.Guven GUVENC

Istanbul Bilim University, Faculty of Medicine, Department of Otorhinolaryngology, Istanbul/TURKEY

Ayhan MUTLU

Florence Nightingale Hospital, Department of Radiology, Istanbul/TURKEY

Levent ULUSOY

Florence Nightingale Hospital, Department of Radiology, Istanbul/TURKEY

Levent ONAT

Florence Nightingale Hospital, Department of Radiology, Istanbul/TURKEY

Hakan SELCUK

Bakırköy Dr. Sadi Konuk Teaching Hospital, Department of Radiology, Istanbul/TURKEY

Corresponding Author

Batuhan KARA

Bakırköy Dr. Sadi Konuk Teaching Hospital,
Department of Radiology
Istanbul/TURKEY
Phone: 0090 212 4147485
Fax: 0090 212 4147485
e-mail: kara_batuhan@yahoo.com

ABSTRACT

Carotid blow-out syndrome (CBS) is a life-threatening condition characterized by the rupture of the carotid artery, which presents one of the most urgent situations in interventional neuroradiology. Since patients can bleed to death in minutes, prompt and adequate treatment is of great importance. Self-expanding covered stents are used in most of the reported cases and they are generally preferred to balloon-expanding stents; especially if the underlying pathology is a head and neck malignancy. Herein, we present our experience with a case of CBS caused by radiation necrosis, which was treated successfully with a balloon-expanding covered stent.

Keywords:*Carotidblow-out;endovascular; covered stent.*

ÖZET

Karotis rüptürü hayatı tehdit eden bir olay olup girişimsel nöroradyoloji uygulamalarındaki en acil durumlardan biridir. Rüptüre bağlı kanama dakikalar içerisinde ölüme yol açabildiğinden, hızlı ve doğru tedavi büyük önem taşımaktadır. Literatürdeki olgu sunumlarında, özellikle karotis rüptürünün altında yatan etyolojinin baş-boyun malinitesi olduğu durumlarda, kendiliğinden açılabilen kaplı stentlerin balonla açılabilen stentlere tercih edildiği bildirilmektedir. Bu olgu bildiriminde radyasyon nekrozuna sekonder bir karotis rüptürünün balonla açılabilen kaplı stent ile tedavisine ait deneyimimiz sunulmuştur.

Anahtar Kelimeler:*Karotis blow –out sendromu ; endovasküler tedavi ;kaplı stent .*

INTRODUCTION

Carotid blow-out syndrome (CBS) is a life-threatening condition characterized by the rupture of the carotid artery. The term often refers to any sudden and massive

bleeding from the extracranial carotid tree, which is one of the most urgent situations in interventional neuroradiology (1). Aggressive surgery for head and neck tumors, penetrating trauma, radiation necrosis, recurrent malignancies and pharyngocutaneous fistulas are responsible for the disintegration of the carotid wall (2). Since patients can bleed to death in minutes, prompt and adequate treatment is of great importance. Emergent operative ligation of the common carotid artery (CCA) or internal carotid artery (ICA) is the traditional management of carotid blowout. However, this approach was found to be associated with high rates of major morbidity and death (average mortality of 40%, and average major neurologic morbidity of 60%) (3). Endovascular counterpart of surgical carotid ligation is balloon occlusion of the parent artery, which also has the risk of delayed ischemic complications seen in 15-20% of the patients (4). These ischemic complications led the investigators to develop reconstructive methods, which enable preservation of the patency of the parent artery. In this case report, we present our experience with a case of CBS caused by radiation necrosis, which was treated successfully with balloon-expanding covered graft-stent.

CASE REPORT

A 54-year-old man with a history of head and neck irradiation due to nasopharyngeal carcinoma was admitted with a massive oral hemorrhage. Physical examination revealed that the bleeding focus was a defect on the right buccal mucosa, just in front of the right anterior tonsillar pillar. An emergency tracheotomy was performed and a tight intraoral gauze tamponade was applied. When he was hemodynamically stable, a digital subtraction angiography (DSA) was performed to detect the underlying pathology. Under local anesthesia, a complete angiogram of the bilateral carotid tree and vertebral arteries was obtained using a transfemoral approach. For anticoagulation, a bolus of 2500 IU of heparin was given intravenously, followed by an infusion of 1000 IU /hr. Right ICA injections showed the filling of a pseudoaneurysm arising from the anterior wall of the subpetrous segment, which extended to the oropharynx (**Figure 1a**).

Figure a) *Right ICA injection demonstrates the pseudoaneurysm arising from the anterior wall of the subpetrous segment.*

Due to its high location in the upper neck, the pseudoaneurysm was not suitable for surgical treatment. Further, proximal ligation of the ICA would not stop the bleeding, since the left CCA injections, with compression of right CCA, demonstrated retrograde filling of the aneurysm via the anterior communicating artery. Left CCA injections with cross-compression showed simultaneous filling of both hemispheres without venous delay on the right side. However, we did not prefer to sacrifice the affected ICA, since we were not able to perform a balloon occlusion test due to the emergent condition of the case. We had to select a rapid strategy. Therefore, we decided to use a covered stent both for the treatment of the pseudoaneurysm and the

preservation of the patency of the parent artery. For this reason, 5F introducer was replaced by an 8F sheath and a 7F guiding catheter was advanced into the right CCA over a 0.035 inch hydrophilic guide wire. Under fluoroscopic road map guidance, the neck of the pseudoaneurysm was bypassed with a 0.014 inch microguide wire (HT Extrasupport, Abbott Vascular Instruments, Rangendingen, Germany). A balloon expandable covered stent (JOSTENT Graftmaster Coronary Stent Graft, Abbott Vascular Instruments, Rangendingen, Germany) sized 5x26 mm was navigated over the wire and placed across the aneurysm neck, so that the ends of the stent-graft covered more than 1 cm over the margin of the neck. Following IV administration of 0.5 mg Gp IIb/IIIa inhibitor (Aggrastat, Merck & Co., Inc., Whitehouse Station, N.J.,U.S.A.), the covered stent was deployed with inflation of the balloon up to nominal pressure of 8 atm. Immediately after deployment of the stent, control angiographies showed total exclusion of the pseudoaneurysm from the circulation (**Figure 1b**).

Figure b) *After deployment of the covered stent, immediate pseudoaneurysm exclusion was achieved.*

An angiogram repeated after 10 minutes also demonstrated complete cessation of aneurismal filling without evidence of thromboembolism in the cerebral circulation. With this confirmation, the otolaryngologist removed the surgical packing and confirmed the cessation of bleeding by physical examination. An antiplatelet regimen of 75 mg clopidogrel and 300 mg acetylsalicylic acid was started immediately after stent deployment. Additionally, IV administration of 1000 IU/h heparin was continued for 24 hours in the intensive care unit. During the follow-up of 8 months, we did not observe complications such as thromboembolism or rebleeding.

DISCUSSION

Endovascular management of CBS secondary to head and neck malignancies is still challenging. Since the parent artery occlusion has a substantial risk for delayed ischemic complications, the continuing advances in endovascular therapy lead to development of reconstructive methods. Successful use of stent-graft in vascular lesions, such as dissections, pseudoaneurysms and arteriovenous fistulas encouraged the investigators to use it in CBS. However, the efficacy is still controversial. Some authors favor the use of covered stents in CBS as a permanent treatment (5). Others have mentioned that stent-grafts were useful only for the initial control of carotid bleeding and that they might be associated with delayed complications, such as rebleeding, thrombosis, or occlusion. In a series of three patients, two stent-grafts thrombosed or were exposed (6). A study by Chang et al. evaluated the hemostatic efficacy, safety and outcome of using self-expandable stent-grafts in the management of CBS seen in patients with head and neck cancer. Although they achieved immediate hemostasis in all of their patients, they experienced initial complications such as acute thromboembolism, in-stent thrombosis and delayed complications such as

rebleeding, carotid thrombosis and brain abscess formation. Therefore, they suggested that stent-graft placement should be a temporary or emergency, rather than a permanent, method to manage CBS in patients with history of head and neck malignancy (3).

If the underlying pathology is a head and neck malignancy, some authors advocate that a self-expanding covered stent is more preferable to a balloon-mounted stent in CBS because of several factors. Firstly, self-expanding stents easily accommodate varying diameters of the carotid tree and are more forgiving when determining the necessary diameter. Secondly, self-expanding stents have a superior flexibility in conforming to tortuous segments of the carotid tree. Lastly, the carotid wall has been damaged by a variety of processes such as radiation, tumor invasion or infection in these patients. It is reasonable to think that high inflation pressures needed for deployment of balloon expanding covered stents may worsen the underlying carotid wall weakness and clinical picture (5). These concerns have been addressed by Kwok et al. They used a balloon-expanding stent-graft in a CBS patient with a history of oropharyngeal carcinoma. Immediately after stent deployment, angiography showed extravasation of contrast material above and below the stent margin and profuse oral bleeding continued. The authors postulated that the carotid artery was ruptured due to the high pressure required to inflate the stent (7). Considering the experiences of the above-mentioned authors, the use of a self-expanding rather than balloon-expanding stent-graft seems to be more reasonable. However, we had to use a balloon-expanding stent-graft, as it was the only type available at the time, in our institution. Fortunately, we could navigate the stent easily to the neck of the pseudoaneurysm, since there was no tortuosity in the affected carotid tree, and the ICA segment harboring the pseudoaneurysm neck was very smooth. Additionally, we did not inflate the balloon over the nominal pressure and we did not oversize the stent. During or immediately after the procedure, we did not experience any complication such as in-stent thrombosis, thromboembolism or rebleeding.

CONCLUSION

The number of balloon-expanding covered stents used in the treatment of CBS is limited in the literature. Self-expanding stents were used in most of the reported cases and they are generally preferred to balloon-expanding stents. However, our case demonstrated that the use of balloon-expanding covered stents may also be feasible in selected cases, especially when the carotid vasculature is smooth and permits the navigation of the covered stent. For prevention of an additional injury to the carotid wall, the balloon should be inflated very gently and the nominal pressure should not be exceeded during inflation. Further studies are needed to determine the efficacy of these stents in the management of CBS.

REFERENCES

1)Harrigan MR, Deveikis JP. Extracranial embolization. In: Harrigan MR, Deveikis JP eds. Handbook of Cerebrovascular Disease and Neurointerventional Technique. New York, Humana Press; 2009; 293.

2)Macdonald S, Gan J, McKay AJ, et al. Endovascular treatment of acute carotid blow-out syndrome. J Vasc Interv Radiol. 2000; 11: 1184-1188.

3)Chang FC, Lirng JF, Luo CB, et al. Carotid blowout syndrome in patients with head-and-neck cancers: reconstructive management by self-expandable stent-grafts. AJNR 2007; 28: 181-188.

4)Chaloupka JC, Putman CM, Citardi MJ, et al. Endovascular therapy for the carotid blowout syndrome in head and neck surgical patients: diagnostic and managerial considerations. AJNR *1996; 17: 843-852.*

5)Lesley WS, Chaloupka JC, Weigele JB, et al. Preliminary experience with endovascular reconstruction for the management of carotid blowout syndrome. AJNR *2003; 24: 1234-1236.*

6)Warren FM, Cohen JI, Nesbit GM, et al. Management of carotid 'blowout' with endovascular stent grafts. Laryngoscope *2002; 112: 428-433.*

7)Kwok PC, Cheung JY, Tang KW, et al. Re: Endovascular treatment of acute carotid blow-out syndrome. J Vasc Interv Radiol *2001;12: 895-896.*