

Carotid Artery Pseudoaneurysm Formation Should Be Examined Closely After Penetrating Neck Injuries: Case Report

Penetran Boyun Yaralanmalarından Sonra Karotis Arter Psödoanevrizmalarının Gelişimi Yakından İncelenmelidir

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Geliş Tarihi/Received: 26.05.2009
Kabul Tarihi/Accepted: 19.07.2009

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ABSTRACT We report a case with a pseudoaneurysm of the internal carotid artery after a penetrating trauma treated by PTFE-covered stent graft. A 27-year-old male was admitted to our hospital with hemorrhagic shock state. Although we did not detect an injury to the left main carotid artery or its branches during the surgery, duplex ultrasound showed a 25x15mm pseudoaneurysm of the left internal carotid artery, located at the bifurcation ten days after the operation. PTFE-covered stent graft was preferred to the treatment of the lesion in order to avoid cerebral ischemia during clamping of the internal carotid artery. So that surgical findings can be misleading in some cases, pseudoaneurysm formation of carotid arteries should be monitored by noninvasive radiological methods in patients with penetrating neck injury at follow-up period.

Key Words: Carotid artery injuries; aneurysm, false; stents

ÖZET Bu makalede penetran travma sonrası PTFE kaplı stent greft ile tedavi edilen internal karotid arter psödoanevrizması olgusunu bildirmekteyiz. 27 yaşında bir erkek olgu hemorajik şok durumunda hastaneye kabul edildi. Ameliyat sırasında ana karotis arter ve dallarında bir yaralanma tespit edilmemesine rağmen, ameliyattan 10 gün sonra, duplex ultrasonda 25x15 mm'lik bifurkasyonda lokalize bir internal karotis arter psödoanevrizması gösterildi. Lezyonun tedavisinde, internal karotis arterin klempenmesi sırasında, serebral iskemiden kaçınmak için, PTFE kaplı stent greft tercih edildi. Bazı olgularda cerrahi bulgular yanıltıcı olduğu için penetran boyun yaralanmalarının izlem döneminde karotis arterlerde psödoanevrizma gelişimi noninvaziv radyolojik yöntemlerle takip edilmelidir.

Anahtar Kelimeler: Karotis arter yaralanmaları; anevrizma, yanlış; stentler

Türkiye Klinikleri J Cardiovasc Sci 2010;22(1):167-70

Carotid artery injuries constitute 5-10% of all arterial injuries. More than 90% of carotid injuries are penetrating traumas.¹ In order to define the localization of the injuries the neck is classified into three regions: Zone I, II and III. **Zone I:** Between the upper tip of the manubrium sterni and the cricoid cartilage, **Zone II:** Between cricoid cartilage and angulus mandibula, **Zone III:** upper region of angulus mandibula.² Injuries in Zone II are easier to localize; therefore exploration is often recommended for this type of injuries. There is limited information on endovascular method as a treatment procedure of Zone II injuries in the literature.^{3,4} In this case, we present our findings on the treatment of carotid artery

pseudoaneurysm, that was formed as a result of penetrating Zone II injury by PTFE-covered stent graft.

CASE REPORT

A 27-year-old male was admitted to hospital with a Zone II penetrating neck injury by a sharp object. The patient injured ago 30 minutes prior to admission to the hospital and was in a hemorrhagic shock state upon arrival. At the initial examination, the blood pressure could not be measured, his heart rate was 40 beat/minute and has irregular rhythm. The patient's preoperative status was E1, V2, M2 according to the Glasgow Coma Scale and without spontaneous respiration. The right sided hemiplegia and counterlateral involuntary contractions were seen.

Examination of the injury side revealed a 1cm wide wound due to penetration of a sharp object in the one-third mid region (Zone II) of the left sternocleidomastoid muscle and a wide, non-pulsatile hematoma. We did not observe acute bleeding in the penetration zone. At the operation, a 10 cm in length longitudinal incision made through the medial side of the left sternocleidomastoid muscle and during exploration, we did not detect any injury to the main carotid artery or its branches macroscopically; however, two lacerations with 1cm in length were in the medial and lateral sides

of internal jugular vein. The venous lacerations repaired primarily with 5-0 polypropylene stitches. Hemodynamic parameters of the patient were stable after the operation with E1, V2, M2 according to Glasgow Coma Scale. We detected wide hypodense areas on the left tempora-parietal area by cranial computerized tomography. We started a treatment regimen including antiedema, antiepileptic and low molecular weight heparin. Ten days after the admission, the left internal carotid artery was invisible due to a thrombosis in the periphery of the artery by carotid Doppler ultrasonography and that thought to be a pseudoaneurysm. In the selective carotid angiography, the lumen of the left carotid artery was patent; however, a pseudoaneurysm with 25x15 mm dimensions was determined in the proximal part (Figure 1). So as, right hemiplegia of the patient continued, in order to, avoid various complications such as cerebral ischemia during the surgery. PTFE covered stent graft (Fluency® Stent Graft, 8x40mm, Bard®, ABD) implantation was preferred to treat this lesion and no complications were seen related to this technique (Figure 2A-B). After this treatment, our case was E4, V4, M6 according to the Glasgow Coma Scale and aphasic. The right hemiplegy of the patient diminished to hemiparesia and he was able to walk without support by slightly dragging his right foot within first month after injury. In the sixth month and annual follow-ups by Doppler ultrasonography, the stent was patent. In the annual follow-up, the patient's speech and walking improved with only a slight contracture sequel detected in the right hand.

DISCUSSION

Trauma is the most common cause of carotid artery pseudoaneurysm. The physicians should always consider the possibility of pseudoaneurysm after penetrating neck injuries. These type of injuries are recommended to be followed by Doppler USG, computerized tomography, magnetic resonance imaging and conventional intraarterial angiography.⁵

The wide infarction in the left hemisphere of brain determined prior to the surgery that thought to be due to the high pressure applied to Zone II providing hemostasis. In the angiography, the left



FIGURE 1: Selective digital subtraction angiography of the left internal carotid artery pseudoaneurysm (25x15 mm) before endovascular therapy.

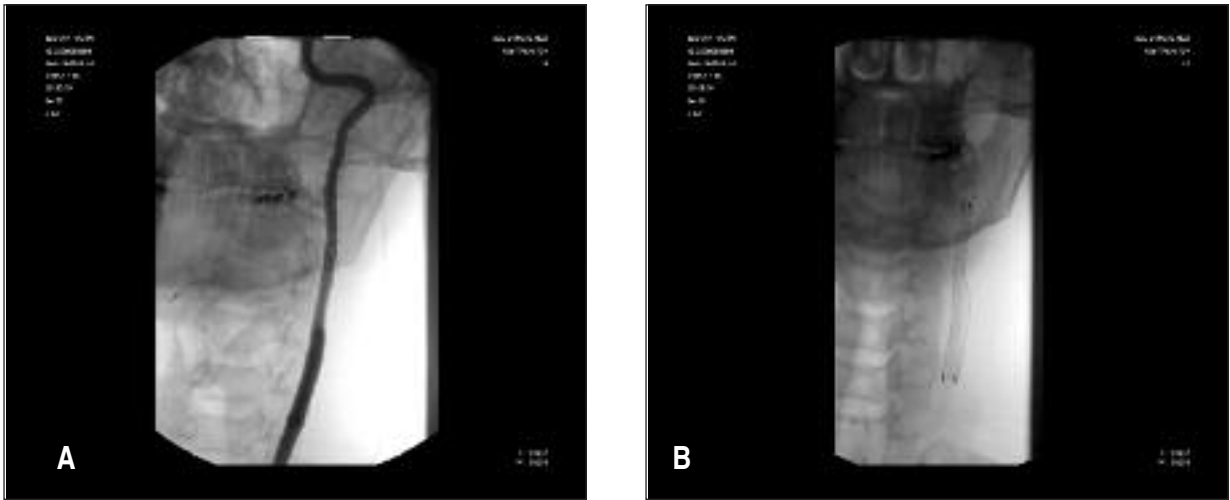


FIGURE 2A-B: Selective digital subtraction angiography of left internal carotid artery after endovascular therapy by using PTFE covered stent graft (Fluency® Stent Graft, 8x40 mm, Bard®, ABD).

internal carotid lumen was patent and there was no sign of dissection. The injury of carotid artery and its branches was not detected peroperatively; however, if the blood pressure is low, it is possible that the injury is undetectable with inspection only and pseudoaneurysm formation might be determined in course of time.⁶

Endovascular treatment of Zone II injuries are controversial because surgical exploration of this region is less complex compared to Zone I, Zone III.^{7,8} In recent years, by the improvement of the procedure, endovascular treatment has become more popular. According to McCready et al, the treatment of carotid pseudoaneurysm via stent or stent-graft combination needs to be overall studied before becoming a reliable method.⁹ It is an alternative method to surgical treatment for high risk patients,¹⁰ however the patency rates of PTFE covered stent grafts are not well documented. In this study, we pointed out that stent-graft combination treatment is a minimally invasive technique and

does not give rise to any complications. According to Şahin et al, endovascular treatment is an alternative method to surgery on traumatic vascular lesions.¹⁰ Since, hemodynamics of trauma patients are unstable, endovascular treatment is becoming a reliable method for their treatment. Closing of the orifis of external carotid artery by PTFE covered stent graft is a disadvantage.¹¹ In this case no morbidity was determined because of the closing of the orifis of external carotid artery. Uğurlucan et al, has presented two different patients with extracranial internal carotid artery aneurysms who underwent different treatment procedures. Their treatment choice was endovascular therapy at their high risk patient, likewise our patient high risk status.¹²

As a conclusion; So that surgical findings can be misleading in some cases, pseudoaneurysm formation of the carotid arteries should be monitored by noninvasive radiological methods in patients with penetrating neck injury at follow-up period.

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