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CASE REPORT

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Carotid Stent Infection and Pseudoaneurysm Formation: A Case Report and Review of the Literature

Karotis Stent Enfeksiyonu ve Psödoanevrizma Oluşumu: Bir Olgu Sunumu ve Literatür Derlemesi

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ABSTRACT

Stent infections are exceedingly unlikely, particularly in the internal carotid artery (ICA). The treatment for these patients is still under debate, with a high mortality rate. In this article, we report a 47-year-old male patient who underwent stent implantation in the right ICA and presented with infection and pseudoaneurysm at the stent site 15 days later. The patient was managed with antibiotics and dual antiplatelet therapy. Early antibiotic treatment can control stent infection in cases where the pseudoaneurysm does not continue to grow.

Keywords: Carotid stentting, infection, pseudoaneurism

ÖZ

Stent enfeksiyonları, özellikle internal karotid arterde (ICA) son derece nadirdir. Bu hastaların tedavisi tartışma konusudur ve mortalite oranı yüksektir. Bu yazımızda, sağ ICA'ya stent implantasyonu yapılan ve 15 gün sonra stent bölgesinde enfeksiyon ve psödoanevrizma gelişen 47 yaşındaki bir erkek hastayı sunmaktayız. Hasta antibiyotik ve ikili antiplatelet tedavi ile takip edildi. Enfeksiyona bağlı gelişen psödoanevrizma vakaları yakından takip edilip pseudoanevrizmada büyümeye olmadığı durumlarda, erken başlanan antibiyotik tedavisi stent enfeksiyonunu kontrol altına alabilir.

Anahtar Kelimeler: Karotis stentleme, enfeksiyon, pseudoanevrizma

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INTRODUCTION

Carotid stent infection is a rare but potentially lethal complication. It may cause arterial wall destruction, thrombosis, septic embolism, pseudoaneurysm formation, arterial rupture, and haemorrhage.[1] There is no consensus on how the treatment process should be conducted. Surgical removal of the infected stent is usually recommended. In this report, we wanted to report our experience with a carotid stent infection that appeared 15 days after angioplasty.

CASE PRESENTATION

The 47-year-old male patient had presented to another hospital with sudden aphasia and right-sided weakness.Three days after the onset of symptoms, the patient was referred to our hospital. On arrival, the National Institutes of Health Stroke Scale (NIHSS) score was 15, and magnetic resonance imaging (MRI) of the brain revealed diffuse infarct areas in the left hemisphere, predominantly in watershed regions (Figure 1).

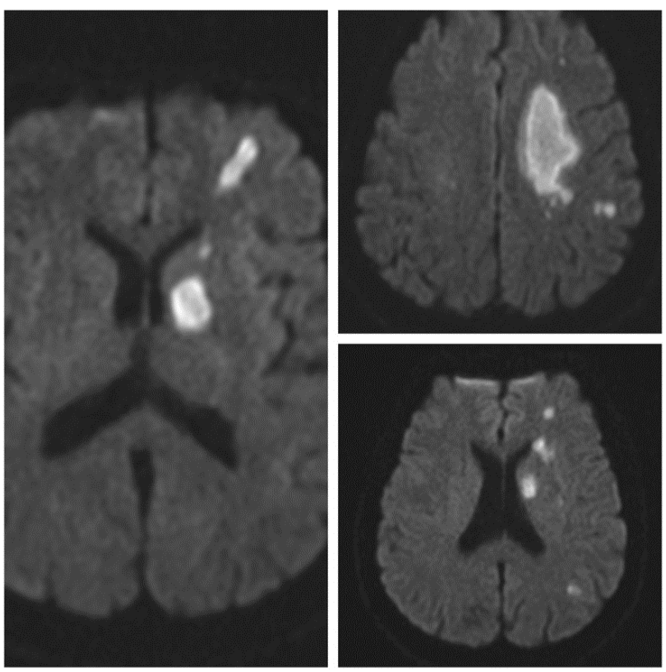

Figure 1. Brain magnetic resonance diffusion-weighted images obtained 3 days after symptom onset revealed multiple acute infarctions in the internal border zone area of the left hemisphere.

MAIN POINTS

- There is no clear consensus regarding treatment of carotid stent infection
- Treatment should be individualized according to patient characteristics, and close follow-up should be performed for complications of pseudoaneurysm.
- If pseudoaneurysm does not continue to grow, early antibiotic treatment can keep the stent infection under control.

CT angiography showed that total occlusion of the left ICA and severe stenosis of the right ICA in the proximal region. Digital subtraction angiography (DSA) revealed total occlusion of the left ICA and critical stenosis (asymptomatic) in the right ICA. Given that the patient was admitted on the third day after symptom onset, we performed balloon angioplasty and stenting [carotid wall stents (Boston Scientific, Fremont, California, USA)] in the right internal carotid artery (ICA) instead of the symptomatic artery (totally occluded left ICA) to increase cerebral perfusion (Figure2).

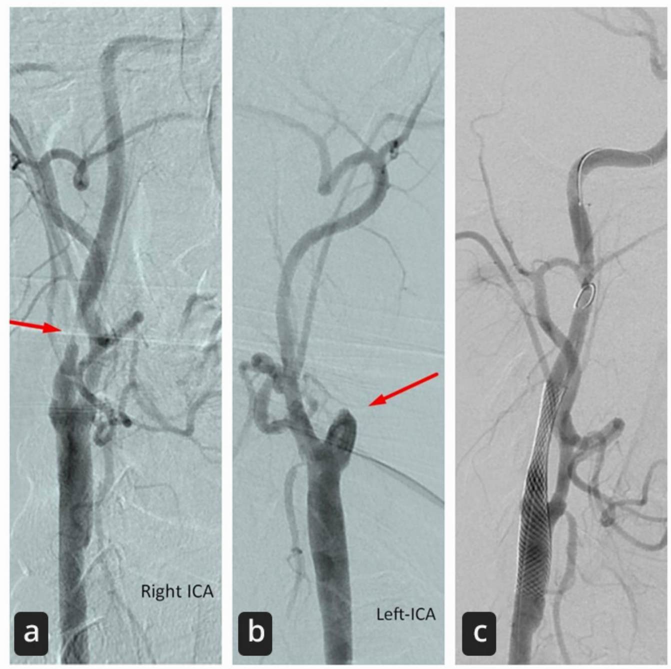

Figure 2. Initial DSA image (a) Right carotid artery. (b) Left carotid artery. (c) Right carotid angioplasty final result DSA: Digital subtraction angiography

The procedure was performed without complications, but in the following period, the patient developed a single day of fever, which was successfully treated with prophylactic antibiotics. On the fifth day after stenting, the patient was discharged home with MRS:4. However, two weeks later, the patient presented to our hospital with fever. The Infectious Diseases Department hospitalized the patient, and antibiotic treatment was initiated. Two days later, swelling and tenderness developed in the right neck area. Ultrasound revealed a 4x2 cm abscess. We attempted to drain the abscess, but only 1,5 cc could be discharged. S. aureus was identified in the blood and abscess. Consequently, the antibiotic treatment was modified. CT angiography revealed oedema surrounding the stent and contrast extravasation (Figure 3). During this period, the patient did not show any deterioration in neurological function, and no new lesions were detected on brain MRI. The patient improved following antibiotic treatment, and a control DSA was performed two weeks later. DSA revealed the presence of a pseudoaneurysm in the proximal segment of the stent (Figure 4). The possibility of the stent removal was evaluated, but it was concluded that surgical removal of the stent would not be appropriate due to the contralateral ICA already being occluded and the patient having a subacute stroke. Second stent placement was considered a treatment option for pseudoaneurysms to prevent cerebral embolization and pseudoaneurysm expansion.

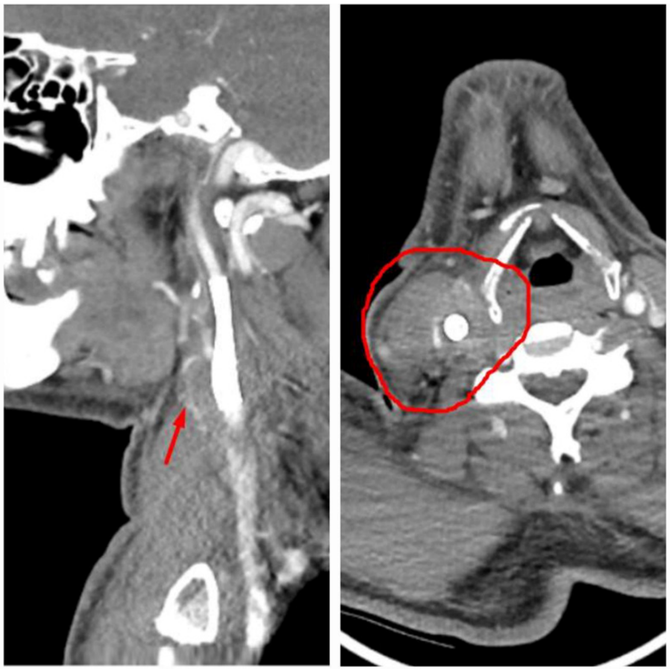

Figure 3. CT angiography image obtained 21 days after angioplasty. Note the extravasation of contrast.

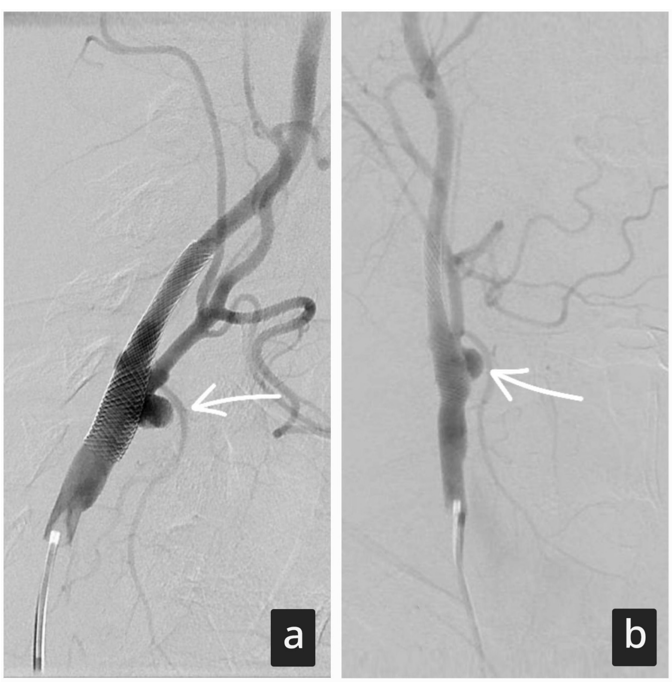

Figure 4. Second and third DSA (a) after one month. (b) After 12 months
DSA: Digital subtraction angiography

However, this option was ultimately rejected because the infectious diseases department argued that placing another stent in the infected stent would exacerbate the infection. Therefore, antibiotic treatment was continued. The control blood samples were negative for S. aureus. On control ultrasonography, no abscess was observed; only oedema and increased thickness were observed. The following antibiotics were administered: meropenem and moxifloxacin for the first six days, followed by ampicillin sulbactam and daptomycin once the culture results were available. The patient was discharged after three weeks, at which point oral fusidic acid and ciprofloxacin were prescribed for up to 30 days. The antibiotic treatment was subsequently terminated on day 50. The patient was followed for 12 months, with no new neurological symptoms and no recurrence of infection; fever, edema or swelling was observed at the control examination. However, on dual antiplatelet medication (coraspin 100 mg and clopidogrel 75 mg), the patient's pseudoaneurysm remained stable on DSA after 12 months (Figure 4). We subsequently discontinued clopidogrel, and the patient was followed with a single antiplatelet for the last 3 months without any new neurological symptoms. At the time of writing, the patient's MRS score was 2, with no new neurological symptoms after the first episode. We continue to monitor for pseudoaneurysm, which has been stable for 15 months.

DISCUSSION

Infections of carotid stents are extremely rare. Several factors increase the risk of infection during prolonged procedures, hematoma formation at the puncture site, inappropriate sterile techniques, inadequate hygiene in the angiography room, and multiple interventions.[1-2] Although the pathophysiology of stent infection is unclear, bacterial infection is known to cause arterial wall destruction and pseudoaneurysm formation.[1] There is no clear consensus on the treatment of this condition, which has a high mortality rate and removal of the infected stent and reconstruction of the pseudoaneurysm are recommended. Given the rarity of this condition, publications on this subject are mostly case reports. After excluding patients with malignancy or trauma, a total of six cases of carotid stent infection were reported between 1997 and 2017.[3] On the basis of the available evidence, four additional cases were reported after 2017. When the characteristics of the reported cases are compared with those of our case, our case was male, similar to the other cases, but younger than the others. Males are thought to be more prone to infection.[3] The interval varies from 2 days to 2 years between stent implantation and the onset of infection.In our case, infection was observed 2 weeks after stenting.

In this case, S. aureus, a frequently reported causative pathogen, was cultivated.[4] Since there was no clear consensus regarding the treatment in the reported cases, particular emphasis was placed on treatment modalities. In the case of Manzato et al., as on our own, the decision was not to perform stent resection because of occlusion of the contralateral ICA. However, a dual-layer stent was placed for the pseudoaneurysm, which was subsequently reduced on the control angiogram. Unfortunately, the patient died from sepsis.[5] In our case, we considered placing a second stent to treat pseudoaneurysm formation. However, after a thorough evaluation, the infectious disease department does not recommend this approach because of the risk of second stent infection and exacerbation of infection after placing the stent. The infected stent was removed, but the pseudoaneurysm continued to expand, and grafting was subsequently performed. Owing to the risk of reinfection associated with artificial material, polytetrafluoroethylene (PTFE) synthetic vascular grafts were considered more appropriate for pseudoaneurysm repair.[3] A recent report from a single center included two dialysis patients. In the first patient, the infected stent was removed, antibiotics were started, and no pseudoaneurysm developed. The patient recovered without sequelae. In the second case, the pseudoaneurysm was treated by vascular grafting. In this case, the patient recovered with left hemiparesis.[6] In Son S et al.'s case, the carotid artery ruptured due to pseudoaneurysm, the infected stent was removed via emergency surgery, and the pseudoaneurysm was repaired via vascular grafting. Their patients recovered without sequelae.[7] Since the contralateral ICA was occluded in our patient, we avoided stent resection and applied conservative treatment with antibiotics. In previous cases, grafting or stenting was performed to treat pseudoaneurysms. We did not treat the pseudoaneurysm due to the patient's clinical improvement following antibiotic treatment and the absence of neurological deterioration during subsequent follow-up. Subsequent control DSA performed one year later revealed no change in the pseudoaneurysm diameter. The patient was administered dual antiplatelet medication to prevent the risk of embolism over a period of one year. However, we also believe that the dual antiplatelet therapy administered may have prevented the pseudoaneurysm from shrinking.After controlling the DSA, we stopped clopidogrel and continued with only coraspin. The patient has been continuing with aspirin only for the last 3 months, and the neurological examination of the patient continues to be stable in the form of motor aphasic; we have not yet planned a control DSA after the discontinuation of clopidogrel. In the literature, no cases have been reported of pseudoaneurysm developing after carotid stenting. Nevertheless, to the best of our knowledge, in a single case of pseudoaneurysm formation arising from subclavian stent infection, medical treatment alone has been administered. In our patient, early treatment with antibiotics may have prevented the spread of the infection and the enlargement of the pseudoaneurysm.

In conclusion, there is no clear consensus on the treatment of stent infections developing after carotid stenting. Treatment should be personalized according to patient characteristics, and patients should be closely monitored, especially for potential pseudoaneurysm complications.In cases where the pseudoaneurysm does not continue to grow, early antibiotic treatment can keep the stent infection under control.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Author Contributions: Concept– M.K.; Design – M.K.; Supervision– Ö.K.; Resources– M.K.; Materials– M.K.; Data Collection and/or Processing– Ö.K.; Analysis and/or Interpretation– M.N.; Literature Search– M.K.; Writing Manuscript– M.K.; Critical Review– D.Ö.

Declaration of Interest: The authors have no conflicts of interest to declare.

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