

Complete recovery of acute carotid artery in-stent occlusion with surgery: the advantage of hybrid operating room

*Akut karotis arter stent içi tıkanıklığın cerrahi tedavi ile tamamen iyileşmesi:
Hibrid ameliyathane avantajı*

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Acute occlusion is a rare complication of carotid stent implantation. A 74-year-old female patient became unconscious presenting with impaired neurological status and dysarthria within the first hour of carotid artery stent implantation. The patient underwent emergent surgery with the diagnosis of acute stent occlusion in Doppler ultrasonography and angiography. Occluded stent was removed and carotid endarterectomy surgery was performed. The patient was extubated without any complication in the postoperative third hour and discharged after a four-day uneventful hospital stay.

Key words: Carotid artery; endarterectomy; occlusion; stent.

The risk of acute in-stent thrombosis can be avoided with the use of a regimen of anticoagulants and antiaggregants in the preoperative and perioperative period of the carotid stent implantation procedure. Although effective antithrombotic treatment for acute stent occlusion is possible, this complication is usually treated with medical, endovascular, or surgical procedures. Hybrid operating rooms have an advantage because surgical treatment to address such complications can be performed in a shorter period of time. Herein, we present a case of acute stent occlusion within the first hour of the procedure who completely recovered after urgent surgery.

CASE REPORT

A 74-year-old female patient was admitted to our department with dizziness and a one-month history of transient ischemic attack (TIA). Magnetic resonance

angiography revealed a total occlusion of the right internal carotid artery (ICA) and 80% calcified stenosis in the left ICA. After obtaining the patient's consent regarding the revascularization procedure, we decided to perform stent implantation on the left ICA.

Anahtar sözcükler: Karotis arter; endarterektomi; tıkanıklık; stent.

The patient was given clopidogrel (300 mg) before the procedure and unfractionated heparin (5000 IU) intra-arterially after vascular access was achieved. A self-expanding 8-6x30 mm tapering stent was implanted in the left ICA without the use of an emboli protection device. Furthermore, the procedure was accomplished without any additional implementation, and angiography revealed no residual stenosis (Figure 1a). Intravenous heparin infusion (1000 IU/h) was initiated following the stent implantation along with the oral administration of aspirin (100 mg). In addition, the activated clotting time (ACT) was kept at over 200 seconds during the procedure. Afterwards, however,



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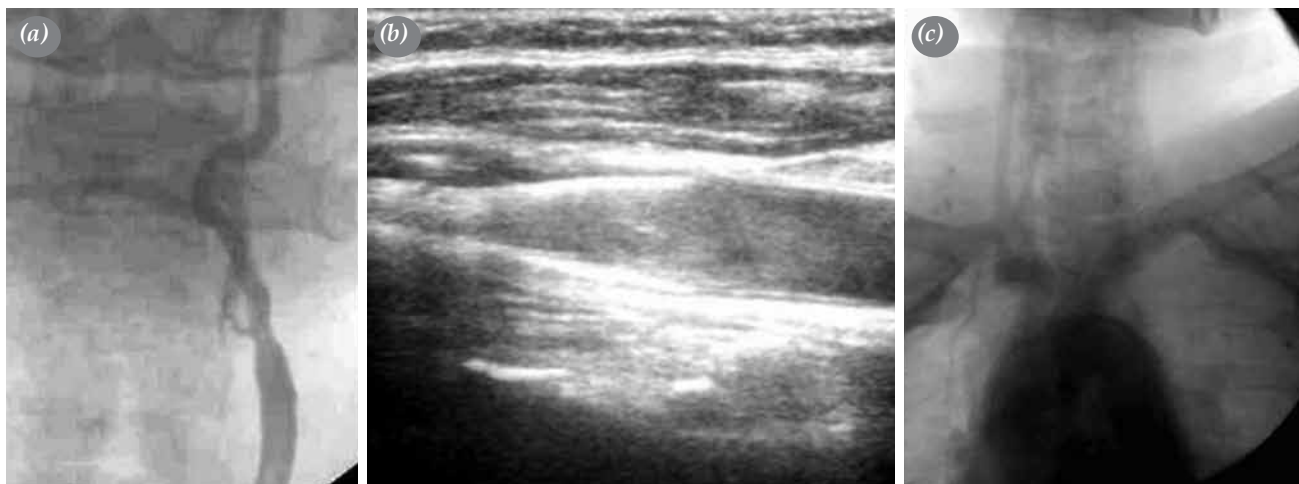


Figure 1. (a) Control angiography after stent implantation. (b) Acute in-stent occlusion as viewed on Doppler ultrasonography. (c) Occlusion of the left carotid artery as seen on angiography of the aortic arch.

the heparin dosage was increased to 1500 IU/h because the ACT was measured at 179 seconds. Dysarthria and right hemiparesis appeared 30 minutes after the procedure, and acute stent occlusion was revealed via a Doppler evaluation (Figure 1b). Following this, right hemiplegia occurred, and the patient lost consciousness. An urgent angiographic evaluation of the aortic arch was then performed in the hybrid operating room, and this supported the diagnosis of acute in-stent occlusion; therefore, the patient underwent an urgent operation (Figure 1c). A carotid endarterectomy and primary repair were also performed after the removal of the stent during the same procedure. We discovered that the stent was totally occluded with thrombus, but there was no fracture or kinking (Figure 2).

The patient was extubated uneventfully in the postoperative third hour. Her platelet counts (preoperative: 193,000/mm³, early postoperative: 161,000/mm³, postoperative day one: 163,000/mm³, and postoperative day four: 163,000/mm³) did not

markedly change in the follow-up period, so the heparin-induced thrombocytopenia was excluded. Additionally, there were no signs of neurological deficit after the surgery, and the patient was discharged on the fourth postoperative day without any complications.

DISCUSSION

According to the American Heart Association (AHA), the results of carotid artery stenting are comparable to carotid endarterectomies.^[1] Some authors have reported that stenting has a higher risk of causing not only perioperative stroke and death but long-term stroke and restenosis as well.^[2] In a study by Cohen et al.^[3] they determined that carotid artery stenting is associated with better health-related quality of life during the early recovery period. As a result, stenting for carotid stenosis is steadily increasing in popularity because it is minimally invasive and allows the patient to have a role in choosing the treatment strategy. However, according to a study

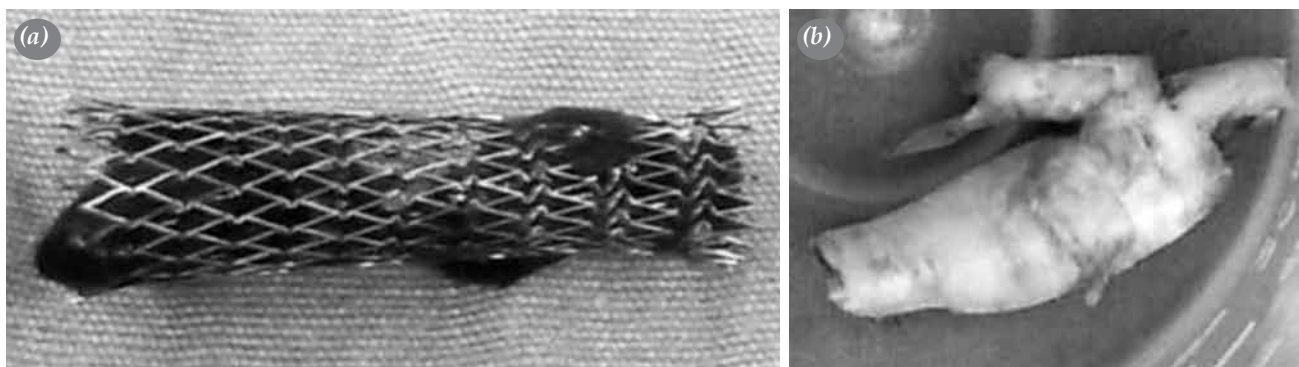


Figure 2. (a) The occluded stent along with (b) the endarterectomy material.

by Bosiers et al.,^[4] this procedure is not superior to endarterectomies in the long-term. A preoperative dose of clopidogrel along with heparin perfusion in the early postoperative period are important to avoid acute stent occlusion. However, even if patients receive an effective anticoagulant regimen, acute in-stent occlusion can still occur due to hypercoagulability, heparin resistance, dissection, plaque protrusion, or stent underexpansion or fracture.^[5,6] In our patient, acute stent occlusion developed in spite of the perioperative anticoagulant treatment and periprocedural heparin infusion. The platelet counts for our patient were normal in perioperative period, and the reason for the acute in-stent thrombosis was never determined. It might have been associated with the reduced function of the CYP2C19 allele, which could have diminished the clopidogrel response and increased the rate of composite outcome (myocardial infarction, stroke, death),^[7] but we were unable to assess whether this was true or not.

Adequate follow-up to assess the patients' postoperative neurological status in the intensive care unit (ICU) is necessary in order to be aware of acute changes that might need urgent treatment. When a stroke occurs during stent implantation, early diagnosis and treatment with fibrinolysis is crucial for recovery.^[8] In addition, surgical removal of the stent or a thrombectomy with aspiration can be performed for acute in-stent thrombosis, but this is only suitable for hybrid operating rooms because a Fogarty catheter cannot be used due to the risk of stent dislocation when the patient is undergoing a thrombectomy.^[9] Furthermore, endovascular procedures used to treat extracranial lesions and acute in-stent thrombosis might cause distal embolization. In addition, it is a very time-consuming procedure. Removing the stent after clamping the distal thrombosed part prevents embolic complications, which then allows for the safe removal of the this part of the stent. Alternative treatment strategies that might be employed include thrombolytic therapy for intracranial occlusions and surgery for extracranial lesions.^[9]

Performing carotid artery stenting in hybrid operating rooms allows for sufficient time for the surgery without complications, and there is a smaller chance that the stenting procedure will fail. Treatment for acute in-stent occlusion is similar to that for acute complications associated with endarterectomies since both decrease neurological morbidity.^[9] Furthermore, a carotid artery stent can be easily removed in the periprocedural period because there is no inflammation or fibrosis in the arterial wall.^[10]

In our facility, we carefully monitor patients who undergo carotid artery stenting in the ICU during the period of heparin infusion. In this case, by establishing an accurate diagnosis as soon as the symptoms occurred and performing an early reoperation, we probably saved the life of our patient. Acute stent occlusion can be identified and treated sooner in a hybrid operating room. Our patient was extubated without any complications and revealed no neurological morbidity.

Conclusion

Life-threatening complications associated with acute stent occlusion can occur with endovascular procedures. That is why we believe that they should be performed in hybrid operating rooms if at all possible to allow for the best possible outcome because they present the opportunity for early diagnosis, and urgent surgical treatment for acute complications can then be performed in a timely manner.

Declaration of conflicting interests

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