

Extra-anatomic Left Carotico-Subclavian Artery Bypass Technique in a patient with Subclavian Steal Syndrome: Case report

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Abstract

Subclavian steal syndrome (SSS) is characterized by total occlusion of proximal part of subclavian artery resulting with retrograde flow of vertebral artery. The main risk factors in etiology are hypercholesterolemia and atherosclerosis. Congenital left subclavian artery stenosis and patent ductus arteriosus accompanying aortic coarctation, posttraumatic injuries, thromboembolism and arteritis are some of the rare factors causing SSS. SSS is usually an asymptomatic disease. However, the major symptoms are dizziness, claudication intermittent of upper extremity, headache and paresthesia in distal part of upper extremities. We are presenting a 57-year-old man presenting with a claudication intermittent on the left arm, paresthesia in fingers, dizziness and headache for a three year time. After applying a computerized tomographic angiography, we observed that the left subclavian artery was totally occluded at the origin point. There are several surgical approaches for the treatment of this syndrome. In this case, we preferred the carotico-subclavian bypass technique with supraclavicular approach due to its low rates of mortality and morbidity, and high rates of long term durability.

Key words: Graft, carotid artery, subclavian steal, supraclavicular

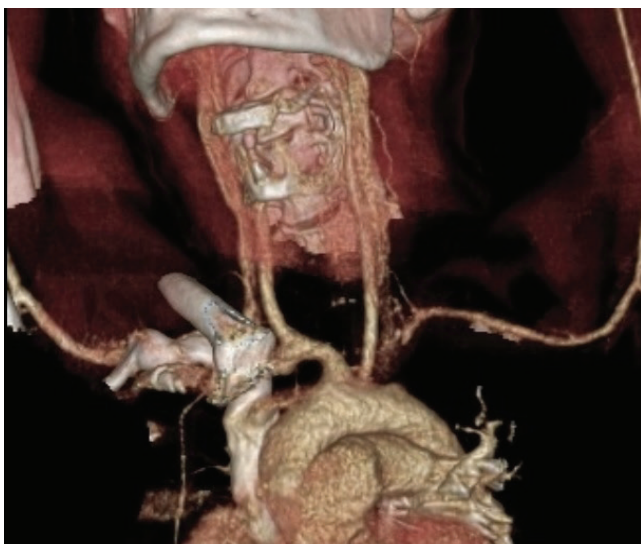
Demirdaş E., Atılğan K., Er Z. C., Çiçekçioğlu F. Extra-anatomic Left Carotico-Subclavian Artery Bypass Technique in a patient with Subclavian Steal Syndrome: Case report EJCM 2017; 05 (3): 54-57. Doi: 10.15511/ejcm.17.00354.

Introduction

Subclavian steal syndrome (SSS) is usually an asymptomatic disease characterized by total occlusion etiology of proximal part of subclavian artery.⁽¹⁾ SSS was first described in the early 20th century and many of researches have been made both in diagnosing and treating areas. It is well known that SSS is a consequence of retrograde flow of vertebral artery following the total occlusion of proximal part of subclavian artery.⁽²⁾ The main risk factors in etiology are hypercholesterolemia and atherosclerosis.⁽²⁻⁴⁾ It is also possible to observe SSS due to congenital left subclavian artery stenosis and patent ductus arteriosus accompanying aortic coarctation.^(5,6) Besides, posttraumatic injuries, thromboembolism and arteritis are some of the rare factors causing SSS.⁽¹⁻³⁾

SSS is usually an asymptomatic disease. However, the major symptoms are dizziness, claudication intermittent of upper extremity, headache and paresthesia in distal part of upper extremities. SSS is often diagnosed incidentally by means of observing the retrograde flow of vertebral artery in colored doppler ultrasonography of carotid and vertebrobasillary arteries getting applied to the patients having dizziness and observing a gradient in tension arterial (TA) pressures between two upper extremities.

Image 1. Preoperative Computerized Tomographic Angiography image



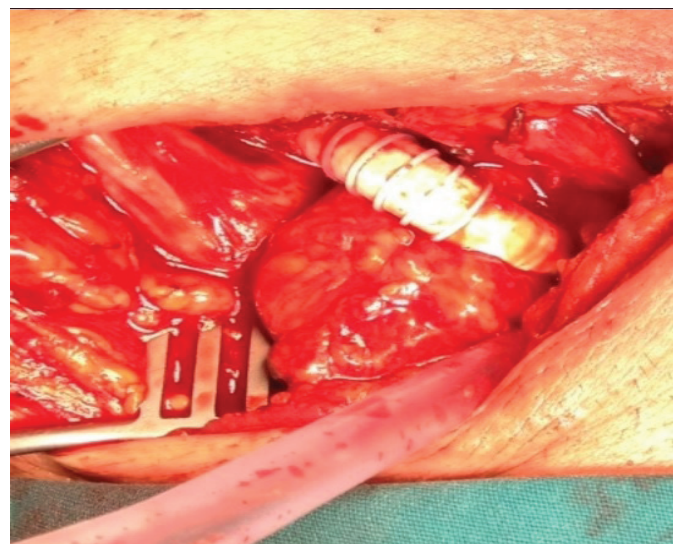
Case Report

A 57-year-old male with a history of claudication intermittent on left arm, paresthesia in dita, disseness and headache for three years applied to our department. Distal pulses were not palpable on the left upper extremity and TA was 130/80 mmHg on right arm and 60/30 mmHg on left arm. On the computerized tomographic angiography (CTA), we observed that the first 3 cm part of the subclavian artery beginning from the aortic arcus origin was totally occluded.**(Image 1)**

Operation Technique

Invasive arterial monitorization was applied from right upper extremity. The patient was positioned as the head in hyperextension and the face looking to the opposite side, left shoulder was elevated and the upper extremities were pulled down. An 8 cm left supraclavicular incision was applied, common carotid and subclavian arteries were dissected gently and the proximal and distal parts were fixed with tapes. After systemic heparinization common carotid artery was clamped. Following arteriotomy the proximal segment of an 8 mm PTFE graft was anastomosed to the artery. After declamping, subclavian artery was clamped and arteriotomy was applied. Distal segment of PTFE graft was anastomosed to the subclavian artery.**(Image 2)** After

Image 2. Intraoperative image of the graft



the operation on both sides of upper extremities distal pulses were palpable. The patient was discharged on the postoperative 6th day without any complication.

Discussion

Subclavian steal syndrome (SSS) is characterized by total occlusion of proximal part of subclavian artery resulting with retrograde flow of vertebral artery. The retrograde vertebral artery flow may cause variable symptoms like cerebellar ischaemia (dizziness, blumia), claudication intermittent and paresthaesia on the upper extremity.

There are different types of surgical techniques, almost all of which get a remarkable success in eliminating the symptoms, and surgery should be a treatment approach only in symptomatic patients. The first successful transthoracic intervention for a subclavian artery obstruction was achieved by De Bakey et al in 1958.⁽⁷⁾ In 1964 Parrot described the carotico-subclavian artery bypass procedure.⁽⁸⁾ Carotico-subclavian bypass, subclavio-subclavian bypass, axillo-subclavian bypass and subclavio-carotid transposition techniques are described as extra-anatomic procedures, and aorta-subclavian bypass and endarterectomy are descired as anatomic procedures. Transthoracic incision techniques are not preferred anymore due to high mortality and morbidity rates.⁽⁹⁾

Percutaneous transluminal angioplasty and stenting

(PTAS) are some of the treatment approaches as an alternative to surgery. Especially PTAS have become the first option in SSS cases occurring as a result of vasculitis or radiotherapy.⁽¹⁰⁾ However, the long term durability of surgery is superior to PTAS.⁽¹¹⁾

Carotico-subclavian artery bypass technique is an extra-anatomic bypass process and has a low morbidity and mortality rates. Vogt et al, reported the mortality rate of intrathoracic techniques as 15% and of extra-anatomic techniques as 0%, in 1982.⁽¹²⁾ Saphenous and artificial grafts can be used for bypassing. However, 5 year durability rates are reported as 95,2% for PTFE grafts, 83,9% for Dacron grafts and 64% for saphenous vein grafts.⁽¹³⁾ In our case we preferred an 8 mm PTFE graft.

In recent researches, carotico-subclavian artery bypass technique is described as a process having low mortality and morbidity, and long term survival rates.^(14,15) Normal carotid artery anatomy is a necessity for this technique, otherwise it is possible to cause a carotid artery steal syndrome.⁽¹⁶⁻¹⁸⁾

Conclusion

Extra-anatomic carotico-subclavian artery bypass technique is a relatively easy process in comparison to other techniques, and has better mortality and morbidity rates , because of that we prefer and recommend this technique as a first option for patients having SSS.

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Received: 09/02/2017

Accepted: 31/08/2017

Published: 15/09/2017

Disclosure and conflicts of interest:

The authors declare no conflict of interest.

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Demirdaş E., Atılgan K., Er Z. C., Çiçekçioğlu F. Extra-anatomic Left Carotico-Subclavian Artery Bypass Technique in a patient with Subclavian Steal Syndrome: Case report EJCM 2017; 05 (3): 54-57. Doi: 10.15511/ejcm.17.00354.