

Case Report

Undesirable complication after transradial coronary angiography: A case report

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Abstract

Radial artery is one of the intervention sites for coronary angiography and has an increased tendency according to the successful results in the literature. However, some undesirable clinical situations may occur by using this route as with every invasive intervention. In this study, we presented a patient who had left upper limb ischemia following transradial angiography. An intimal flap with an approximate length of 15 cm was removed during embolectomy from the brachial artery. After multiple embolectomy procedures, axillo-brachial bypass was performed using the saphenous vein. However, ischemia in the forearm did not improve and limb loss occurred.

Keywords: Brachial artery, limb loss, transradial coronary angiography

INTRODUCTION

Evaluation of coronary arteries via radial approach is accepted as a safe method for coronary angiography interventions with a high success rate [1]. The European Society of Cardiology (ESC) guidelines suggest that radial entry should be chosen instead of femoral access if it is applied by an experienced radial artery practitioner for acute myocardial infarction with ST segment elevation (Class of recommendation IIa, level of evidence B). Complications such as arterial spasm, thromboembolism, bleeding, hematoma and pseudoaneurysm due to transradial angiography are known. In femoral intervention, there occur long-term hospitalization, difficulty in controlling bleeding after the intervention, problems in peripheral arterial patients, bleeding in obese patients and difficulty in vascular intervention [2,3]. Existence of peripheral artery disease is a poor prognostic factor for both survival and femoral access [4].

In this study, we presented a patient who had left upper limb ischemia following transradial angiography. An intimal flap with

an approximate length of 15 cm was removed during embolectomy from the brachial artery. After multiple embolectomy procedures, axillo-brachial bypass was performed using the saphenous vein. However, ischemia in the forearm did not improve and limb loss occurred.

CASE REPORT

A 64-year-old male patient was admitted to the emergency department with sudden onset chest pain. His past medical history revealed an ischemic stroke 3 years ago. The patient was diagnosed with an anterior myocardial infarction according to electrocardiography findings. Coronary angiography was applied with 5 F and 7 cm-sized sheath from the left radial artery in an external center and a stent was inserted to the left anterior descending artery (LAD). The patient was right-handed, so the procedure was performed from the left radial artery and took approximately 30 minutes. The patient had low-weight and received 5000 IU heparin during the percutaneous coronary intervention (PCI). Tight and loose elastic bandages were

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applied for 20 minutes and two hours, respectively. Complaints including pain, coldness and color change were observed in the same hand one day after the operation and the patient was referred to our center. On physical examination, brachial artery pulse was palpable but radial and ulnar artery pulses were not palpable. The hand was cold and pale but there was no necrosis presentation. Muscle strength (5/5) and neurologic examination were normal. There were no abnormalities in laboratory tests, including hemogram, liver and kidney functions and coagulation. Radial artery thrombosis was detected with arterial Doppler ultrasonography and operation was decided. Until surgery, a single dose of enoxaparine sodium 6000 IU/0.6 ml was administered in the emergency department.

Written informed consent was obtained before the operation. An incision was performed to the left brachial region after local anesthesia. The brachial artery was explored based on the radial and ulnar artery border. One cc heparin was administered to the patient before vascular clamping. 3 F Fogarty catheter was directed to the radial and ulnar artery. While a large amount of organized thrombus was extracted from the patient's radial artery, no thrombus material was detected in the ulnar artery. Sufficient backflow returned from the radial artery, but backflow was less from the ulnar artery. There was pulsatile flow in the brachial artery. All forearm pulses were palpable after the operation. Enoxaparin sodium 6000 IU/0.6 ml was started as an additional therapy to acetylsalicylic acid after the operation. As radial and ulnar pulses could not be taken in the postoperative third hour, reoperation was performed through the same location. Similar to the first operation, while fresh thrombus material was excised from the radial artery, no thrombus was observed in the ulnar artery. Insufficient backflow was observed in the radial and ulnar arteries. In spite of the blood flow in brachial artery, 3 F catheter was directed to the brachial artery for detection of any probable recurrent thrombus. A nearly 15 cm long intact intimal flap was removed without difficulty from the brachial artery (Figure 1). Forearm pulses were palpable postoperatively. As the pulses were impalpable after nearly 18 hours after the last operation, the patient underwent MR angiography (Figure 2). Because of the absence of blood flow from the axillary artery, the patient was re-operated. The section with best flow of the axillary artery was explored via the incision performed on the axillary artery trace and axillo-brachial bypass was performed using a 20 cm saphenous vein just before the brachial artery bifurcation. Forearm pulses were palpable by hand postoperatively, but pulses could not be taken nearly four hours later. Thrombectomy was performed through the graft. Although fresh thrombus was removed from the radial artery, retrograde flows of the ulnar and radial arteries were observed not to be sufficient. Despite treatment consisting of iloprost and antiaggregant, findings related to hand ischemia continued to worsen and amputation to proximal (1/3) part of the forearm was decided on postoperative 4th day after consultation with the orthopedic department.



Figure 1. Nearly 15 cm long intact intimal flap removed from left brachial artery



Figure 2. MR angiography image showing that there is no flow in axillary artery following embolectomy

DISCUSSION

There are studies stating that the transradial procedure is safer and has a lower complication rate compared to the transfemoral approach for cardiac catheterization [5,6]. According to Radial vs. Femoral Access for Coronary Access Study (RIVAL), lower mortality rates were present in the subgroup of patients with ST elevated myocardial infarction with the use of radial access instead of femoral access [2]. A relationship was detected between the advantage of radial access and operator experience in the same study; therefore, it was considered that the advantage of radial access over femoral access was related to the expertise of the operators in radial access [2].

Arterial dissection, spasm, failed radial access, hematoma, radial artery occlusion, pseudoaneurysm, arteriovenous fistula, carpal tunnel syndrome, and compartment syndrome have been reported in the literature as complications of transradial access [7,8]. Moreover, Ayan et al. [9] reported a hand ischemia resulting in amputation of right ring finger after coronary angiography with radial access in their study. It is stated that performing the Allen test before the procedure, using hydrophilic introducer sheaths and smaller sheath sizes, administering nitroglycerin, heparin, diltiazem or verapamil during the procedure, avoiding reused materials and careful patient selection can help minimize the complications of radial access [10].

In this case, it is unknown whether the complication was caused by atherosclerosis in the radial artery or the inexperience of the operator. However, the patient's history of stroke and the presence of newly developed coronary artery disease suggest that the patient had extensive atherosclerosis.

In order to prevent complications related to the procedure, measuring the vessel diameter with ultrasound and puncturing vessels of appropriate diameter under ultrasound guidance may be helpful. In addition, it is important to enter the real lumen during the first puncture, as subintimal entrances may cause dissection. For operators with little radial artery intervention experience and in patients with small artery diameters or high atherosclerosis burden, ultrasound-guided intervention may reduce the amount of complications.

As it is known, repeated embolectomy procedures can also cause intimal damage. In this case, embolectomy was primarily performed because Doppler US reported thrombus only in the radial artery and ischemia developed after coronary angiography. Because pulses could not be detected in the early period, the patient was taken into reoperation. Since the source of repeated embolism could be the brachial artery, a Fogarty catheter was sent to the brachial artery. However, as an undesirable situation, the intimal flap was excised. Bypass procedure could also be performed without performing a second embolectomy, but since this patient did not have a chronic artery disease, embolectomy was performed first. For medical treatment after embolectomy,

standard heparin infusion instead of enoxaparin could be considered. Since it is difficult to reach the effective dose range in the early period and aPTT monitoring is required, our preference was for enoxaparin instead of standard heparin.

According to the comparison of morbidity caused by vascular complications that may occur after transradial access and transfemoral access in quality of life, we think that the complications caused by the radial artery are more important. As every limb has a different role, it may not be rational to mention superiority among them. However, it should be kept in mind that limb loss may occur after transradial access as in this case. This is especially important in patients working in jobs in which fingers and fine hand skills are important. Surgical interventions resulting from femoral artery complications have pleasing results due to suitable artery diameter and arterial spasm causing negligible problems.

CONCLUSION

As a result, the radial and femoral access locations are alternatives for each other in coronary angiography. The radial artery has some disadvantages due to reasons such as thin diameter and tendency to spasm; therefore, the repair of the complications occurring due to the same causes may not be pleasant. Careful case selection and adequate radial access experience will reduce the development of complications. In addition to early intervention in developing ischemic complications, choosing an effective surgical procedure after appropriate imaging is also important.

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