

Causes and Treatment of Delayed Pseudoaneurysm after Percutaneous Coronary Intervention via Femoral Artery Approach

Gao Dongxue¹, Liu Yanhua¹, Li Min², Cao Wancai¹

1. Ji'nan 250031 The Third Hospital of Shandong

2. Clinical Laboratory of people's Hospital of Yangxin County, Shandong

ARTICLE INFO

Article history:

Published online: 30th Nov., 2017

Key words:

Aneurysm

Pseudo

Thrombin

Diagnosis

Treatment

ABSTRACT

Objective: to investigate the causes and treatment of delayed pseudoaneurysm after percutaneous coronary intervention via the femoral artery approach. **Methods:** Make retrospective analysis of the clinical data of 13 patients with delayed pseudoaneurysm after percutaneous coronary intervention in 2036 patients with coronary heart disease. **Results:** 13 cases of delayed pseudoaneurysm were diagnosed which were caused severe atherosclerosis of femoral artery. Among them, there are 11 cases were successfully repaired by ultrasound guided compression; 1 case was unsuccessful in compression but successfully be repaired by thrombin injection under ultrasound guidance; 1 case suffered from spontaneous rupture of pseudoaneurysm and was repaired after surgery. **Conclusion:** Delayed pseudoaneurysm can be detected in time and has a favourable prognosis.

0 Introduction

Femoral artery pseudoaneurysm is a common complication after percutaneous coronary intervention via the femoral artery approach. It can be detected early and avoid serious complications. However, in our clinical work, we found that very few patients will

develop pseudoaneurysm at the puncture site within 24-72 hours after decompression which was temporarily called delayed pseudoaneurysm of the femoral artery. Such patients are easily neglected and missed by clinicians, and may have serious complications if can not be detected in time. Therefore, the author retrospectively analyzed the clinical data of

Corresponding author:

Liu Yanhua, Ji'nan 250031 The Third Hospital of Shandong, Email: sdyxliuyanhua@163.com

13 patients with delayed pseudoaneurysm after percutaneous coronary intervention through the femoral artery approach. The results are reported as follows.

1 Data and methods

1.1 General Information

There were 13 patients with delayed pseudoaneurysm after percutaneous coronary intervention treatment in 2036 patients with coronary heart disease from January 2001 to October 2014 in our hospital. Among them, there were 8 males and 5 females, aged 65-83 years (median age 76 years old) and were with coronary heart disease. Among them, 8 cases of hypertension, 4 cases of obesity, 5 cases of diabetes. Through routine blood test before operation, knew that their coagulation mechanism, liver and kidney function were normal. Make routine use of aspirin, clopidogrel, or clopidogrel before surgery and routine anticoagulation with unfractionated heparin in surgery. Heparin or platelet GP II b- III receptor antagonist was administered for 12-24 hours after surgery in patients with complex PCI or coronary thrombus burden. Before extubation, measuring partial thromboplastin for 40-60 seconds and then pulled out the femoral artery sheath by physicians with interventional experience. Local compression was for 15-30 minutes. Compression bandage and elastic bandage are for 12-24 hours. After 12-24 hours, removed the elastic bandage. Before going out of bed carefully, checked the local hematoma, oozing blood and lump, auscultation without murmur to exclude false aneurysm. For some patients with induration of the puncture site and light tenderness, performed the Doppler ultrasound examination immediately to exclude the early occurrence of pseudoaneurysm.

1.2 Diagnosis

12 patients of the group were found to have pain in the right groin region at 48-96 hours after surgery (24-72 hours after the removal of the bandage) and appeared lump. The mass had striking innervation, obvious tenderness and could be heard locally vascular murmur. It was diagnosed as False aneurysm by color Doppler ultrasound and among which 8 cases of pseudoaneurysm originated from superficial femoral artery, 5 cases originated from the femoral artery.

1.3 Treatment

Repeated unarmed compression for 30 minutes to 60 minutes under the guidance of ultrasound, and repaired the false aneurysm by pressure dressing of pressure bandages. If the effects are not good, or larger aneurysms they are, need to inject thrombin 250 U under the guidance of ultrasound and used compression bandaging method, otherwise using surgery to repair.

2 Results

Of the 13 patients, 12 were successfully underwent conservative treatment and 1 was underwent surgical repair. 5 cases of ultrasound-guided hand compression alone were successfully repaired which had taken 30~45 minutes. 4 patients were treated with compression bandaging after unarmed compression for 24 hours, but the vascular murmur did not disappear. Stopped the low molecular weight heparin and pressure dress by unarmed oppression again for 24 hours, repaired successfully. 1 case was that ultrasound confirmed pseudoaneurysm channel perpendiculars to the skin. Had used ultrasonic probe to position channel lateral side, after 30 minutes of angle compression successfully repaired; 1 case was found later. The tumor was large (3.5 x 6 cm) and 2 times of manual compression were not successful. Had used ultrasonic positioning compression for 45 minutes and pressure dressing for 48 hours to successfully repaired, but

appeared local skin necrosis which was given multiple medical prescription change. The other 1 patient was still failed to locate the pressure by many time's ultrasound probe, and was successfully repaired by thrombin injection under ultrasound guidance. Spontaneous rupture of pseudoaneurysm occurred in 1 patient and recovered after surgical repair. 13 patients followed up the outpatient regularly after discharge from hospital. The average follow-up period was 10 months. No complications such as limb ischemia and arterial embolism were found, and also no recurrence of delayed pseudoaneurysm.

3 Discussion

Femoral artery pseudoaneurysm of femoral artery is one of the complications of the femoral artery after percutaneous coronary intervention. Pseudoaneurysm is pulsatile hematoma attached to the outside of cystic artery wall. The tumor is through pedicle or directly communicate with the arterial lumen, but tumor cavity does not have all layers of the arterial wall. Most of them were fibrous tissue, only near the break point lined with extended endothelial cells from the arterial wall. The central part under the impact of high pressure flow was becoming cavity gradually, and eventually developed into the small mouth but a large cystic mass^[1]. The incidence rate was about 2.0%^[2], and generally could be found and dealt with in time.

However, pseudoaneurysm appeared gradually after compression in 24-72 hours was rarely reported^[3]. Domestic Fan Chuanmin reported that there were 5 cases of pseudoaneurysm in 48~72 hours after removal of the bandage while without the analyzed reason. In order to avoid the pseudoaneurysm caused in this period of time and leading to serious complications, we call it "delayed pseudoaneurysm" ^[4]. Delayed pseudoaneurysm is defined as it does not have fluctuation of mass and vascular murmur in the femoral artery puncture when relieving the oppression and in 24-72 hours, location of puncture appears mass,

a pulsation, obvious tenderness, local audible vascular murmur, compression of the artery proximal when mass narrowing and other clinical manifestations can be considered as this diagnosis. In the past, the diagnosis of this disease mainly relied on angiography, but with the rapid development of ultrasound technology, the qualitative diagnosis of false aneurysm by color Doppler ultrasound has reached 100%, so it is the first choice for examination^[5]. Color Doppler ultrasound can clearly show the anatomy and position between vascular rupture and pseudoaneurysm of each other and observe the tumor location, size, diameter of aneurysm rupture and mural thrombus is formed or not. Also CDFI can clearly detect blood flow of the rupture. Through the pulsed Doppler, characteristic "double period two-way" spectrum can be measured which did not appear in other arterial disease, once appear, can be diagnosed. Suspected delayed pseudo aneurysm can be further diagnosed by color Doppler ultrasonography.

The mechanism of delayed pseudoaneurysm of the femoral artery we thought 1. Relates to severe atherosclerosis of the femoral artery in the elderly. Because of poor elasticity of the femoral artery, its puncture site is only blocked by thrombus clotting blood clots. Patients with vascular ultrasound were found to have severe atherosclerosis in puncture site and surroundings. Among them, 3 cases of false aneurysm were still found damaged 1.0-1.5mm at the femoral artery puncture mouth after healing through vascular ultrasound, but the adventitia of artery rupture has formed dense connective tissue and peripheral tissue, and was considered as poor elasticity of vascular retraction lead by the serious vascular atherosclerosis. 2. At the same time, due to the large use of anticoagulant and antiplatelet drugs, thrombosis is slow and still has not formed dense fibrous connective tissue with surrounding tissues. 3. Doctors and patients' ignorance. After relieving the oppression, patients get out of bed or do sudden exertion, abdominal pressure increased transiently which leads to increased local pressure in puncture site. Blood

flows through the blood clot, then results in delayed pseudoaneurysms occurred. Most of the cases occurred in the early stage and were almost absent in the late stage because of the maturation of the coronary intervention technique and the application of the femoral artery occluder and the understanding of the postoperative anticoagulation. In this paper, 2 patients coughed with pseudoaneurysm after 72h which may be associated with severe atherosclerosis of the femoral artery and a large number of anticoagulant and antiplatelet agents slowing thrombosis. At that time, the femoral artery puncture site had not formed dense fibrous connective tissue with the surrounding tissue. When the cough or force occurs, the local blood flow suddenly accelerated and broke through the puncture port which resulted the formation of delayed pseudoaneurysm.

Delayed pseudoaneurysm usually can not be self-cure. It may appear compression, embolism or spontaneous rupture and other complications which is believed^[6] should be treated early. At present, the treatment of pseudoaneurysm is divided into surgical treatment and non-surgical treatment. Surgical treatment is the repair of vascular surgery and trauma is larger. Non operative treatment is divided into ultrasound guided compression^[7], ultrasound guided intratumoral thrombin injection and others^[8-9]. The clinical observation shows that the injection of thrombin into the tumor cavity under ultrasound guidance is more effective than the compression method, while the ultrasound guided unarmed compression method does not need special skills and is easy to grasp clinically, so the most commonly used method is still compression. The compression repair mechanism lies in closing up the drain and tumor neck, blocking of blood flow, forming thrombus in the local, and then through thrombosis, the forming fibrous tissue made the tumor closed^[10]. But for patients with stroke or unstable cardiovascular disease, acute tumor rupture, pseudoaneurysm which is twice as big doubles monitored by Doppler ultrasound and vascular damage,

the surgical treatment may be better^[11]. The author understands, as long as the proper use of techniques and the enough time patients takes to stay in bed, (1 case was successfully cured through repeated bandaging nearly 7 days), the effect of compression method curative is exact. But after PCI, a large number of anticoagulant drugs sometimes affect compression, so it should be promptly disable anticoagulant drugs, prolong the pressure package time, closely observe the skin color of the bandage and limb peripheral circulation, so as to avoid two injuries. 4 cases of this group were ineffective in the first manual compression under the guidance of ultrasound. Then stopped the low molecular heparin and compress again, repaired successfully. However, the reasons of failure should be analyzed in time when unarmed compression failed, and then inject thrombin drugs into the tumor cavity and do surgical repair treatment according to the condition of the disease under the guidance of ultrasound to improve the success rate of treatment.

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