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Short communication

Percutaneous transradial artery approach for femoro- popliteal artery intervention in the current era in Japan

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ABSTRACT

The percutaneous transradial artery approach for coronary angiography and intervention has been recognized as a safe and effective method, however, it is limited for endovascular therapy (EVT) for femoro-popliteal artery because of lack of devices with longer shaft. Herein, we report two EVT cases for superficial femoral artery disease treated with a long shaft balloon through the radial artery. Although femoro-popliteal artery intervention with this approach has several limits for available devices and technical issues, it is effective for particular patients who are impossible in EVT with femoral artery approach.

1. Introduction

The percutaneous transradial artery approach for coronary angiography and intervention has been recognized as a safe and effective method.[1–3] Radial artery (RA) approach is also one of the useful methods for endovascular therapy (EVT) procedure for subclavian, renal, or iliac artery disease,[4] however, it is limited for EVT for femoro-popliteal artery because of lack of devices with longer shaft. Recently, some peripheral percutaneous transluminal angioplasty (PTA) balloon with long shaft reached to the distal portion of superficial femoral artery (SFA) or popliteal artery are available in Japan. These devices enable us to treat the patients with peripheral artery disease (PAD) in these arteries via radial artery. Herein, we present our experience with RA approach for EVT procedure using long-shaft devices for femoro-popliteal artery disease.

2. Preliminary work

Initially, we measured the distance to the level of 1) the descending aortic bifurcation, 2) the distal epiphyseal line of the femur, 3) the mid portion of popliteal artery, and 4) the ostium of anterior tibial artery from the puncture site of the left RA using a 0.014-inch 300 cm-long Agosal XS wire (St. Jude Medical Japan CO., Ltd., Tokyo, Japan) in 54 patients (41 male, mean age 69.4 ± 10.3 years, mean height 164.7 ± 4.0 cm) with angina pectoris during the treatment by transradial coronary intervention (TRI). As shown in Fig. 1, we need devices with longer shaft more than 160 cm for EVT procedure in the distal lesion of SFA, and those more than 167 cm in the distal lesion of popliteal artery. To date, PTA stents reached to the distal portion of SFA are not available in the world, and only a few balloons with longer shaft are technically feasible by the RA approach. The measurement was conducted according to the principles expressed in the Declaration of Helsinki, and written informed consent was obtained from the patients.

1) Insertion of 6 Fr Glidesheath Slender® introducer sheath and 4 Fr peripheral guiding sheath

An insertion of the long guiding catheter or sheath is desirable in EVT procedure for femoro-popliteal artery with RA approach. It enables us to contrast the vessels during the procedure, and to improve the operability, stability or trackability of the devices such as the long-shaft balloons and long wires. To minimize the damage to RA during EVT procedure, a 6 Fr Glidesheath Slender® introducer sheath (Terumo CO., Ltd., Tokyo, Japan) is inserted into the left RA after successful left RA puncture as the initial step, and then we insert a 4 Fr sheathless PV® (large curve) 115 cm-long guiding sheath (Asahi Intec CO., Ltd., Nagoya, Japan) into the Glidesheath Slender® sheath (Terumo) (Fig. 2A).

Because the adequate inner size of the guiding catheter or sheath is 4 Fr size in transradial EVT without stent implantation, we usually select 4 Fr sheathless PV® sheath (large curve) 115 cm-long guiding sheath. This long sheath enables us potentially

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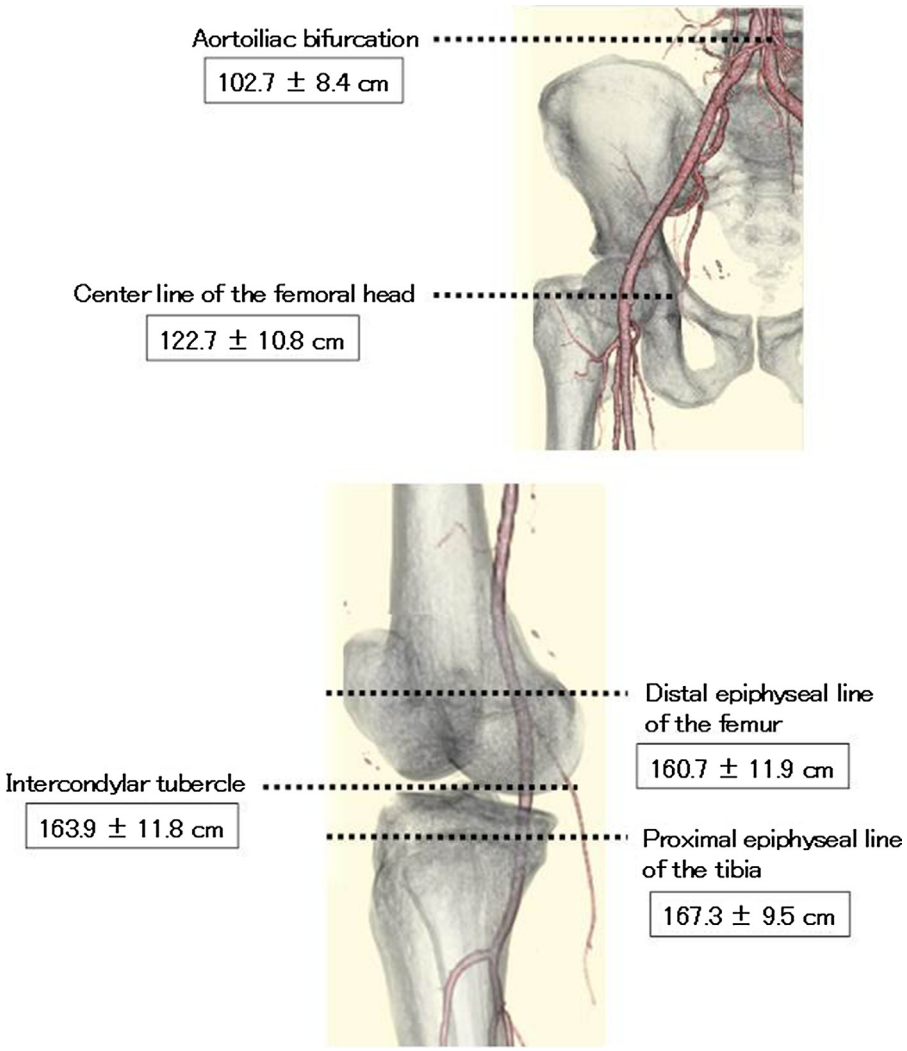

Fig. 1. Distance from puncture site of the left radial artery.

selection of right or left common iliac artery (Figs. 1, 2 B, C). Glidesheath Slender® sheath is a new style sheath only for RA approach and it has a thinner wall, with resulting the decrease of outer diameter. The outer size of 6 Fr Glidesheath Slender® sheath is compatible with that of a 5 Fr conventional sheath. Recently, the safety and feasibility of 6 Fr Glidesheath Slender® sheath are shown in TRI.[5]

2) Selection of long-shaft balloons and long wires

We need a PTA balloon with longer shaft length ≥ 160 cm to treat lesions in distal portion of SFA, and that ≥ 167 cm in length in popliteal artery. Several PTA balloon with longer shaft has been developed, and a PTA balloon with the longest shaft size available in Japan is Trytop Longbow® balloon (DVx CO., Ltd., Tokyo, Japan). The shaft length size of this balloon is 170 cm. A Trytop Longbow® balloon (DVx) is an over-the-wire type balloon and this necessitates a wire with longer size than conventional wire. That is, we need a long wire of at least two times length of the balloon shaft (≥340 cm in length) to exchange this balloon for other size balloon or device while keeping the wire position. A 400 cm-long wire such as a Plywire® wire (Optimed Global Care CO., Ltd., Ettlingen, Germany) [6] is not available in Japan. We connect the proximal end of a 235 cm-long wire such as a 0.018-inch Halberd® or Gaia® PV wire (Asahi Intec CO., Ltd., Nagoya, Japan) with a 165 cm-long Extension® wire (Asahi Intec CO., Ltd., Nagoya, Japan), and it can be used as suitable substitutes for a commercially available 400 cm-long wire.

3. Case 1

In November 2014, a 79 year-old woman (height: 160 cm; weight: 65 kg) with hypertension and diabetes mellitus was referred to our hospital for effort related chest squeezing for 3 months. She obtained prompt relief with sublingual tablets of nitroglycerin. Physical examination revealed no abnormalities. Roentgenogram findings of the chest showed within normal limits, and cardiothoracic ratio was 49%. An electrocardiogram showed no specific ST-T segment changes. Transthoracic echocardiography revealed mild hypokinesis in anteroseptal wall. She also had a one-year history of progressive lateral calf Rutherford-Becker class 3 intermittent claudication (IC) despite medication optimization. The patient's maximum walking distance was about 200 m, and the ankle-brachial index (ABI) at rest was 0.52 for the right leg with the monophasic wave form. Computed tomography (CT) angiogram of the coronary arteries and leg arteries was performed at the outpatient department and revealed severe stenosis of the left anterior descending artery (LAD) and the total occlusion of the distal SFA. We made a diagnosis of effort angina pectoris and PAD from clinical course, clinical examination, and CT angiogram.

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