

Long Radial Sheath for Angiography of Femoral Artery Large Sheath Access Site with Vascular Closure Devices

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

ABSTRACT

Radial access combined with hemodynamic support has the limitation of not allowing adequate angiography or delivery of peripheral balloons for managing the femoral access site after removal of the large femoral sheath. We present a case series with use of a novel long 6 French guiding sheath via left radial artery access for angiography of the femoral access site after removal of a large sheath for left ventricular assist device with vascular closure devices.

Keywords: Long radial sheath; angiography; femoral artery; ventricular assist device.

1. INTRODUCTION

Radial access has been found to lower serious vascular access site complications and mortality [1]. Percutaneous hemodynamic support has evolved from intra-aortic balloon pump to use of

transeptal assist devices, percutaneous left ventricular assist device (Impella®, Abiomed, Danvers MA) and extracorporeal membrane oxygenation (ECMO) [2] of which require large sheaths in the femoral artery. Combination of both hemodynamic support with left ventricular

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assist device via femoral access with radial access for percutaneous coronary intervention (PCI) has been described [3,4]. In order to image or deploy a balloon to prevent bleeding at the site where the large sheath was removed, the cross over technique using the contralateral femoral artery has been recommended [5]. Recently, a novel long 6 French Destination Slender™ (Terumo Medical Corporation, Somerset NJ) sheath was developed for peripheral angiography and interventions via the radial approach [6] (Fig. 1). We describe a case series with use of the Destination Slender™ sheath for angiography via the left radial approach after removal of percutaneous 14 French sheaths for Impella® left ventricular assist devices.

1.1 Case Series

Case 1: A 53 year old male with history of ischemic cardiomyopathy with ejection fraction 25% and known severe left main coronary artery disease whom cardiothoracic surgery felt high risk due to body mass index 53 kg/m² and was

referred for PCI. Angiography noted a 99% calcified narrowing of distal left main, 70% proximal left anterior descending artery (LAD) narrowing, 95% ostial circumflex artery narrowing (Fig. 2a) and proximal right coronary artery chronic total occlusion. After placement of an Impella® through the right femoral artery, PCI was completed with rotational atherectomy followed by bifurcation side branch crush stent technique (Fig. 2b). A Destination Slender™ guiding sheath was placed via 0.035 inch guide wire using a dilator. The sheath was advanced to the left subclavian artery and the dilator (which does not have a radio opaque marker) was retracted into the sheath to prevent vascular damage, using similar technique as placement of the sheathless guides [7]. The right femoral artery was visualized with fluoroscopy (Fig. 2c) and a 0.035inch wire was placed antegrade past the large bore 14 French sheath insertion site in the event a balloon is required to tamponade the femoral artery entry site. The large femoral sheath was removed with use of Manta® (Teleflex, Wayne, PA) 14 French vascular closure device with no complications.

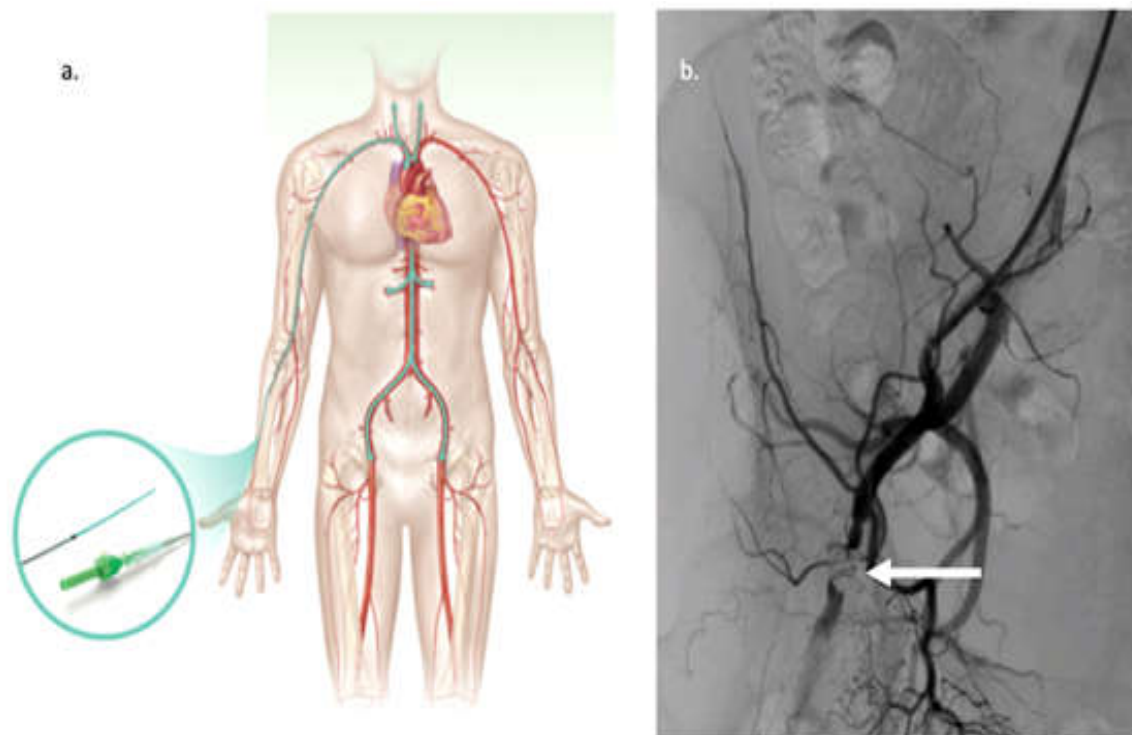


Fig. 1. a. Destination Slender™ sheath via right radial artery (Fig. from R2P™ and approved for use by Terumo Medical Corporation). b. Angiography via left radial with Destination Slender™ sheath at our institution with arrow indicating subtotal stenosis of femoral artery

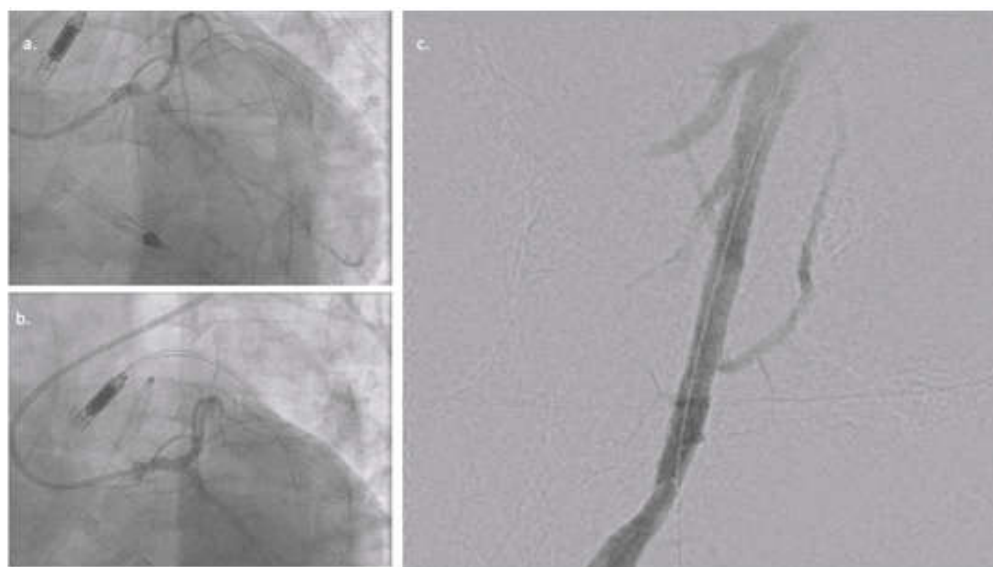


Fig. 2. a. Angiography via left radial of left main severe stenosis. b. Angiography post percutaneous intervention with Impella® support. c. Angiography of large sheath access site in right femoral artery post removal

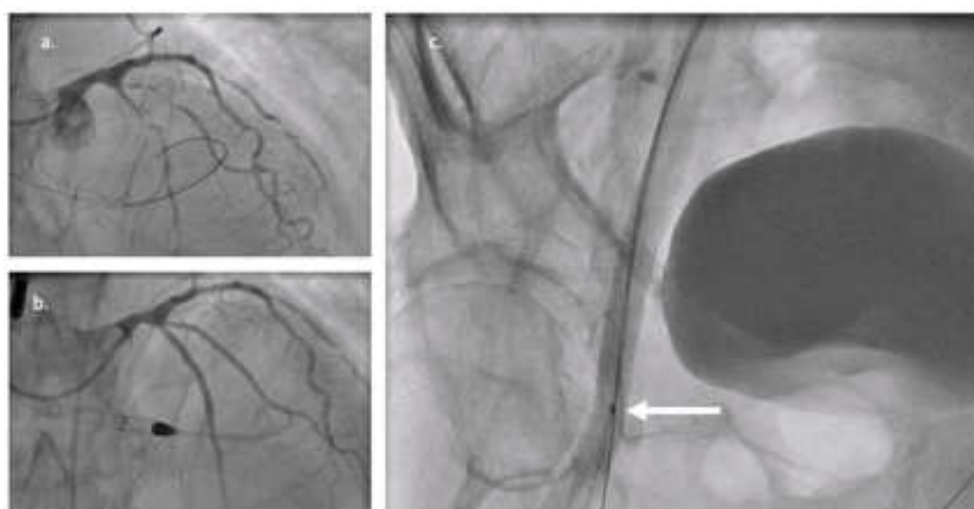


Fig. 3. a. Angiography via left radial of severe stenosis left anterior descending artery. b. Angiography post percutaneous coronary intervention with Impella® support. c. Angiography via Destination Slender™ via left radial of large sheath access site in right femoral artery post removal with arrow indicating site of Manta® vascular closure device

Case 2: A 59 year old male with history of ischemic cardiomyopathy with ejection fraction 25% with hypokinesia of anterior wall with hibernating myocardium and metastatic colon cancer admitted with heart failure and unstable angina. He was treated for heart failure and referred for angiography via the left radial artery which noted 90% narrowing of ostial to mid LAD artery and mild narrowing of Circumflex and right coronary arteries. LVEDP was 1mmHg and after discussion with the team and the patient,

proceeded with left ventricular device assisted PCI of LAD segment. A Perclose ProGlide™ device (Abbott Vascular, Santa Clara, CA) was deployed in the right femoral artery prior to 14 French sheath insertion, followed by Impella® placement in left ventricle after hydration. We proceeded with PCI to LAD followed by removal of Impella®. Destination Slender™ guiding sheath was delivered along with wire placed antegrade across femoral access site for angiography. The Perclose ProGlide™ suture

was tightened but continued bleeding was noted and 6F Angio-seal® (Terumo Medical Corporation, Somerset NJ) was also delivered to successfully close the access site.

Case 3: A 71 year old male with ischemic cardiomyopathy with ejection fraction 25% with a severely calcified and diffusely narrowed LAD (Fig. 3a). Cardiothoracic surgery felt target unacceptable for insertion of bypass graft and we proceeded with Impella® assisted PCI of LAD segment (Fig. 3b). Destination Slender™ sheath was delivered along with wire placed antegrade across femoral access site. The large femoral sheath was removed with use of Manta® vascular closure device with no complications confirmed by fluoroscopy via radial sheath (Fig. 3c).

2. DISCUSSION

Removal of large femoral sheaths for hemodynamic support can be complicated by bleeding or occlusion. Direct angiography is highly valued to guide therapy and has historically been via the contralateral femoral artery [5]. Disadvantages of long sheath via radial artery could be related vascular complications including spasm and entrapment [8]. Our case series describes use of left radial access with the Destination Slender™ sheath for angiography of the femoral artery access site with no radial artery complications noted. The advantages of transradial approach over transfemoral are reduced risk of bleeding and vascular complications as well as patient satisfaction [9]. A long sheath reaching to the iliac arteries has advantages to provide accurate angiography of vascular closure device delivery compared to traditional short radial sheaths, which is critical important in case of complications related to large-bore sheaths. The development of the Destination Slender™ guiding sheath of 154 centimeter (cm) in total length, 149cm in working length (with 4-6 cm additional working length if via left over right radial artery), allows radial access to be used for angiography of the iliac and femoral arteries. In addition, intervention in the femoral or iliac arteries has been described with development peripheral balloons such as Ultraverse™ (Bard Peripheral Vascular, Inc., Tempe, AZ) Metacross® and Crosstella® balloons (Terumo Medical Corporation, Summerset, NJ) with shafts up to 200cm in length and the Misago® (Terumo Medical Corporation, Summerset, NJ) self-expanding peripheral stent with shaft up to 200 cm as well [6,10].

3. CONCLUSION

We present three cases using the Destination Slender™ sheath to assist with closure of the femoral access site with the Impella® left ventricular assist device. This novel long sheath system and compatible devices now allow transradial approach in case of femoral access vascular complications with sheath removal, and can be applied to other large-bore access procedures such as transcatheter aortic valve intervention and ECMO cannulations.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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