A Case of Picking Calcified Plaque In The Common Femoral Artery With A Long Needle: The “Calc-Pick Technique”

Yoshihiro Iwasaki (✉ o9o255642o4@yahoo.co.jp)  
Toho University Omori Medical Center: Toho Daigaku Iryo Center Omori Byoin

Shojiro Hirano  
Toho University Omori Medical Center: Toho Daigaku Iryo Center Omori Byoin

Atsushi Funatsu  
Kyoto Katsura Hospital: Kyoto Katsura Byoin

Tomoko Kobayashi  
Kyoto Katsura Hospital: Kyoto Katsura Byoin

Shigeru Nakamura  
Kyoto Katsura Hospital: Kyoto Katsura Byoin

Takanori Ikeda  
Toho University Omori Medical Center: Toho Daigaku Iryo Center Omori Byoin

Research Article

Keywords: long needle puncture, severe calcified common femoral lesion, endovascular therapy

DOI: https://doi.org/10.21203/rs.3.rs-653101/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.  
Read Full License
Abstract

An 88-year-old male had intermittent claudication of his right leg. Angiography revealed severely calcified plaque in the common femoral artery. Endovascular treatment was performed by contralateral approach. We attempted to penetrate the center of the calcified plaque and perform balloon dilatation. However, a 0.014-inch stiff guidewire could not enter center of the lesion. Thus, we used a inner cylinder of 15-cm 20G long needle directly through the retrograde femoral sheath and successfully introduce the guidewire into the calcified plaque. Crosser and balloon dilatation resulted 50% stenosis. To cross the center of calcified plaque is important to get sufficient lumen gain at the nonstenting zone.

Introduction

Surgical endarterectomy is a first-line treatment for common femoral artery (CFA) disease because CFA is a non-stenting zone. Recent advances in endovascular therapy (EVT) devices have reported effectiveness of EVT for CFA. Some reports have shown that balloon dilation enlarges the lumen by passing multiple wire routes within calcified plaques. However, it is not easy to pass guidewire through hard plaque. We hereby report a hard plaque penetration method using a 21G long needle.

Case Report

An 88-year-old male with diabetes mellitus presented with intermittent claudication (IC) of his right leg (Rutherford category II). His ankle brachial index (ABI) was 0.79 on the right side and 1.13 on the left side. Angiography showed severe calcified stenosis in the CFA involving the deep femoral artery (DFA) (Fig. 1-A). Elective EVT for this severely calcified CFA lesion was selected to relief symptoms.

A 6-French guiding sheath (Destination, Terumo Interventional System, Somerset, NJ, USA) was inserted via the contralateral approach. A 0.014-inch polymer jacket wire (Cruise, Asahi Intecc, Nagoya, Japan) was crossed into the DFA, and a tapered 45-g 0.014-inch wire (Jupiter Max, Boston Scientific, Natick, MA) was passed into the SFA using a double lumen catheter (Crusade; Kaneka, Osaka, Japan) (Fig. 1-B). A Crosser® catheter (FlowCardia Inc., Sunnyvale, CA) was passed 6 times into the direction of the SFA, and the lumen was expanded with a 3 × 40 mm scoring balloon at 10 atm (NSE PTA; Nipro, Osaka, Japan) (Fig. 1-C). Angiography showed insufficient lumen gain, and intravascular ultrasound (IVUS; Vision PV, Philips, Amsterdam, Holland) showed the wire route was at the edge of the vessel. Therefore, the Crosser and balloon dilatation procedures were not satisfactory (Fig. 1-D). We tried to cross the guidewire into the center of the calcified plaque antegrade with a tapered 40-g 0.014-inch wire (VASSALLO 40, Filmeck, Nagoya, Japan) but it was failed. Given the severe calcification, we decided to make a direct puncture into the plaque using a inner cylinder of a 15-cm 20G long needle (introducer needle, Medikit, Tokyo, Japan). A 6-French sheath (Terumo Interventional System, Somerset, NJ, USA) was inserted retrogradely into the proximal SFA. After the needle was inserted through the sheath, we confirmed the needle tip was facing toward the center of the calcified plaque from two directions (LAO30, RAO30) (Figs. 2-A and 2-B). We picked the calcified plaque with the needle to create a new route with
gentle rotation. Then, while checking the silhouette of calcification from multiple directions, we introduced a tapered 40-g 0.014-inch wire (VASSALLO 40, Filmek, Nagoya, Japan) through this needle. The wire crossed relatively easily. Subsequently, a pull-throw guidewire position was established. Crosser was performed from an antegrade sheath. After that, we confirmed that the guidewire had passed through the calcification by IVUS (Fig. 2-C1).

A kissing balloon dilatation was performed with a 10 × 40 mm scoring balloon (NSE PTA; Nipro, Osaka, Japan) on the SFA, and a 6 × 40 mm semi-compliant balloon (Sterling; Boston Scientific, Natick, MA) on the DFA (Fig. 2-D). The final angiogram showed that the stenosis still remained, but the blood flow was improved significantly, whereas IVUS showed a sufficient lumen area of 15.2 mm² (Fig. 2-E).

After the procedure, SFA sheath was removed. Hemostasis was applied by manual compression and a 6 × 40 mm semi-compliant balloon inflation at the puncture side.

IC was completely alleviated, and ABI was improved to 0.95 on the right side. At the 8-month follow-up, ABI remained nearly the same with 0.92 on the right side without any other symptoms.

Discussion

With the advancement of EVT devices and technique, EVT treatment is applied to severely calcified CFA lesions. For example, Jet stream/pathway atherectomy (Boston Scientific, Natick, MA, USA) to reduce calcified plaque has been proven to be effective against severely calcified CFA lesions.4

However, the Crosser is the only available device for reducing calcified plaque in Japan. The Crosser may help to create a hole in modify the calcified plaque when the tip is facing toward to it. Sometimes, it is impossible to cross the calcified plaque even with a 0.014-inch hard wires. In this case, we used the “calc-pick technique” to go through calcified plaque with the inner cylinder of a 20G long needle and cross the wire. The needle tip could not penetrate the calcified plaque by only 2 mm. However, the pushability of the wire was increased, and the wire could be passed through the new route into the calcified plaque.

To apply this “calc-pick technique,” there were some important points. First, we selected a short 13 cm sheath getting out the needle tip. However, the needle came out only 2 cm from the sheath (Fig. 3-A). Second, SFA puncture point is near to the CFA calcified lesion where the 15cm needle could reach.

Third, we need to avoid penetrating the sheath wall. If the needle stays straight, it will penetrate the sheath wall (Fig. 3-B 1). Therefore, a slight bend was made near the needle tip (Fig. 3-C). Furthermore, when introducing the needle to the artery, checking the fluoroguidance did not penetrate the sheath wall (Fig. 3- B 2). And the needle position was checked in two perpendicular directions by fluoroscopy to confirm that it is in the center of the calcified plaque.

Conclusion
Picking calcified plaque using a long needle (calc-pick technique) is a simple technique for EVT of severely calcified lesions in CFA. Thus the calc-pick technique is very useful in performing EVT safely and effectively.

**Declarations**

**Acknowledgement**

Not applicable

**Funding**

Not applicable.

**Author Information**

**Affiliations**

*Division of Cardiovascular Medicine, Department of Internal Medicine, Toho University, 5-21-16 Omorinishi, Ota-ku, Tokyo, 143-8540, Japan*

Yoshihiro Iwasaki

*Cardiovascular Center, Kyoto Katsura Hospital, Kyoto, Japan*

Atsushi Funatsu & Tomoko Kobayashi & Shigeru Nakamura

*Department of Cardiovascular Medicine, Toho University Faculty of Medicine Graduate School of Medicine, Tokyo, Ota-ku, Japan*

Shojiro Hirano & Takanori Ikeda

**Contributions**

AF performed the procedure. YI wrote the manuscript under the supervision of AF. AF and SN reviewed and corrected the case report. All authors read and approved the final manuscript.

**Corresponding author**

Correspondence to Yoshihiro Iwasaki

**Ethics approval and consent to participate**

For this type of study (retrospective study) formal consent is not required.
Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Competing interests

The authors declare that they have no conflict of interest.

Additional information

Publisher’s Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Availability of data and materials

Not applicable.

Critical review and revision: All authors
Final approval of the article: All authors
Accountability for all aspects of the work: All authors

References

1. Katsushi U, Yasuhiro N, Osamu N et al (2013) Endarterectomy for Femoral Arteries with Sclerotic Obstruction Shows Favorable Results. J Vasc Surg 22:955–960
2. Bonvini RF, Raatan A, Sixt S et al. Endovascular treatment of common femoral artery disease: Medium-term outcome of 360 consecutive procedures
3. Tan M, Urasawa K, Koshida R et al (2016) Evaluation for the efficacy and safety of the crosser catheter as a CTO crossing device and a flossing device. Cardiovasc Intervent Ther 33:77–83
4. Manish M, Yi Z, Pilip SK et al (2016) Percutaneous common femoral artery interventions using angioplasty, atherectomy, and stenting. J Vasc Surg 64:369–379
5. Mustapha JA, Diaz-Sandoval L, Karenko B et al (2013) Atherectomy and critical limb ischemia: a treatment approach for severely calcified vessels. Vasc Dis Manag 10:E198–E207

Figures
Figure 1

Angiography and intravascular ultrasound (IVUS) imaging. (A) Control angiography. (B) A 0.014-inch polymer jacket wire (Cruise, Asahi Intecc, Nagoya, Japan) was inserted into the deep femoral artery (DFA), and another tapered 45 g 0.014-inch wire (Jupitar Max, Boston Scientific, Natick, MA) was passed toward the SFA direction using a double lumen catheter (Crusade; Kaneka, Osaka, Japan). (C) A Crosser® catheter (FlowCardia Inc., Sunnyvale, CA) was passed 6 times toward the SFA direction, and the SFA was expanded with a 3 × 40 mm scoring balloon at 10 atm (NSE PTA; Nipro, Osaka, Japan). (D) Post-balloon angiography and intravascular ultrasound images.

Figure 2

Image not available with this version
Angiography and intravascular ultrasound (IVUS) imaging. A, B) Outer cylinder of 20G long needle (introducer needle, Medikit, Tokyo, Japan), the tip facing the center of the calcified plaque was checked by 2 perpendicular views in fluoroscopy. C) Crosser. C-) IVUS images showing the route created through the calcified plaque. D) A kissing balloon inflation was performed with a 10 × 40 mm scoring balloon (NSE PTA; Nipro, Osaka, Japan) for SFA and with a 6 × 40 mm semi-compliant balloon (Sterling; Boston Scientific, Natick, MA) for DFA. F) final angiography. F-) IVUS showing the lumen area gained.

Figure 3

Needles used in the “calc-pick technique.” A) Making a slight bend near the tip of needle at long axis side to improve tracking through the sheath; and B) inner cylinder of 20G 12cm long needle through the 6-French sheath.