The PIERCE technique for recanalization of heavily calcified arteries in hemodialysis patients.

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Disclosure

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I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Heavy calcification is one of the most challenging lesion characteristics for EVT especially HD pats.

Difficulty in wire penetrating of calcified CTO. device crossing or dilating the lesions.
long time patency.

Guide wires, catheters
Bidirectional approach
Crossing devices
PIERCE technique
Drug solutions
We often experience these cases in HD patients.

Case: 63y.o. male:
DM, HT, 10 years history of hemodialysis
Intractable toe ulcers of both foot.
SPP = 25mmHg.

Some unfavorable dilatation due to calcification even though guidewire has passed.

Unable to dilate even in high pressure

PRE CTA

SHIDEN 2mmx20 25 atom

POST

No device passage

No device passage
In Japan, most of the debulking devices for calcified lesions are not available except Crosser.
We hit on the "PIERCE technique": (Percutaneous direct needle puncture of calcified plaque during recanalization of heavily calcified plaques)


Percutaneous cracking of heavily calcified plaques. Enables catheter passage or lesion dilatation.

Required Device: 21G to 16G needle

Merit:
Easy to perform.
Extremely inexpensive.

Simple and inexpensive procedure
1. Basic concept and technique of the PIERCE technique.

2. Tips and tricks which enhance the effects of the PIERCE technique.
Schema of the PIERCE technique

( Percutaneous direct needle puncture of calcified plaque during recanalization of heavily calcified plaques)


Though CTO wire has crossed, any balloon or microcatheter does not cross.

PIERCE is done.

Microcatheter or balloon can cross.
Representative PIERCE cases:

Case 1.

Case 1: 75 years old female
Lt. toe gangrene (Rutherford 5)
15 years of history of hemodialysis due to diabetic nephropathy
Case 1: 75 years old female  Lt. toe gangrene (Rutherford 5)

15 years of history of hemodialysis due to diabetic nephropathy

Unable to dilate due to circumferential calcification.

CTO with massive calcification

After the PIERCE, Dilated successfully

(4mmx40mm  27atm)
Representative PIERCE cases:

**Case 2.**

Case 2: 84 y.o. female

HD, DM, un-healing ulcer of her Rt. foot.
Iliac arterial stenting was done 2 weeks ago.
SPP was not improved. Additional PTA was planned.
Case 2: 84 y.o. female
HD, DM, unhealing ulcer of Rt. foot.

ATA was punctured. A 4F introducer was inserted.

Bidirectional wiring was done. Any device could not cross the calcification.

A 0.018 wire could cross.
The lesion was so hard that we put the needle on an syringe to achieve firm grip. After the PIERCE technique, device passage was obtained and stent was placed entire SFA.

A syringe enables firm grip and high destructive performance of the needle.
Case 3: 70 years old male patient.

10 years of history of hemodialysis due to diabetic nephropathy. Intractable ulcer in his right 3rd, 4th finger and heel (Rutherford 5). We intended to recanalize PTA because of the heel ulceration.
Case 3: 70 years old male patient.

Intractable ulcer in his right 3rd, 4th finger and heel (Rutherford 5). We intended to recanalize PTA because of the heel ulceration.

A guide wire has passed lateral plantar arch and made it pull-through.

Microcatheter could not cross the orifice of lateral planter artery.
The PIERCE was done.

After the PIERCE, a balloon could cross the lesion.

Final angiogram
Between May 2012 and December 2017, 14 cases, 16 legs were tried to recanalize by the PIERCE technique. Failed device passage was seen in 2 lesions. We experienced a case of severe hemorrhage of ATA who need embolization by gelatin sponge.

<table>
<thead>
<tr>
<th></th>
<th>No. of Cases</th>
<th>Success Cases</th>
</tr>
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<tbody>
<tr>
<td><strong>SFA</strong></td>
<td>2</td>
<td>2 (100%)</td>
</tr>
<tr>
<td><strong>BTK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATA</td>
<td>3</td>
<td>2 (66%)</td>
</tr>
<tr>
<td>PTA</td>
<td>1</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>Pero.</td>
<td>3</td>
<td>2 (66%)</td>
</tr>
<tr>
<td><strong>BTA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorsal Pedis</td>
<td>4</td>
<td>3 (75%)</td>
</tr>
<tr>
<td>Plantar</td>
<td>3</td>
<td>3 (100%)</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>16</td>
<td>13 (82%)</td>
</tr>
</tbody>
</table>
1. Basic concept and technique of the PIERCE technique.

2. Tips and tricks which enhance the effects of the PIERCE technique.
1. **Use adequate needles:**

Big needles such as 18G or more is needed for the good results. Small needles can penetrate the plaque but can not create the crack.

Tip of the poking needle is easy to become dull. Only one or two puncture would be available. Several needles should be used for one procedure.

- **Required device**
  - 18G needle
  - 16G inner needle of Venula

*Simple and inexpensive procedure*
2. Poke and rotate: crack
3. Fix the target artey:

The target lesion is often slippery.
Recanalization of heavily calcified arteries is still challenging. By dedicated guidewires and crossing catheters, success rate is improving even in conventional procedures.

PIERCÉ technique requires only commonly used needles and is extremely low cost compared to the crossing or debulking devices. To know some technical TIPS is highly required for successful procedure.

PIERCÉ technique still plays an important role during recanalization of heavily calcified arteries.
Thank you for your attention.

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