Therapeutic Strategy on Multilevel lower extremity arterial occlusions

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Disclosures

No
TASC

Type A lesions
- Unilateral or bilateral stenoses of CIA
- Unilateral or bilateral single short (≤3 cm) stenosis of EIA

Type B lesions:
- Short (≤3 cm) stenosis of infrarenal aorta
- Unilateral CIA occlusion
- Single or multiple stenosis totaling 3–10 cm involving the EIA not extending into the CFA
- Unilateral EIA occlusion not involving the origins of internal iliac or CFA

Type C lesions
- Bilateral CIA occlusions
- Bilateral CIA stenoses 3–10 cm long not extending into the CFA
- Unilateral EIA stenosis extending into the CFA
- Unilateral EIA occlusion that involves the origins of internal iliac and/or CFA
- Heavily calcified unilateral EIA occlusion with or without involvement of origins of internal iliac and/or CFA

Type D lesions
- Infra-renal aortic/iliac occlusion
- Diffuse disease involving the aorta and both iliac arteries requiring treatment
- Diffuse multiple stenoses involving the unilateral CIA, EIA, and CFA
- Bilateral occlusions of both CIA and EIA
- Bilateral occlusions of EIA
- Iliac stenoses in patients with AAA requiring treatment and not amenable to endograft placement or other lesions requiring open aortic or iliac surgery

Type A lesions
- Single stenosis ≤10 cm in length
- Single occlusion ≤5 cm in length

Type B lesions:
- Multiple lesions (stenoses or occlusions), each ≤5 cm
- Single stenosis or occlusion ≤15 cm not involving the infra-renal popliteal artery
- Single or multiple lesions in the absence of continuous tibial vessels to improve inflow for a distal bypass
- Heavily calcified occlusion ≤5 cm in length
- Single popliteal stenosis

Type C lesions
- Multiple stenoses or occlusions totaling >15 cm with or without heavy calcification
- Recurrent stenoses or occlusions that need treatment after two endovascular interventions

Type D lesions
- Chronic total occlusions of CFA or SFA (>20 cm, involving the popliteal artery)
- Chronic total occlusion of popliteal artery and proximal trifurcation vessels
Multilevel lower limb arterial occlusions

Aortoiliac combined with femoropopliteal occlusions

Femoropopliteal combined with infrapopliteal occlusions

Usually lead to severe limb ischemia
Strategies on Multilevel lower limb arterial occlusions

**Staged:**

Primary: Inflow reconstruction (Aortoiliac or femoropopliteal reconstruction)
Secondary: Outflow reconstruction (femoropopliteal, infrapopliteal reconstruction)

**Advantages:** reducing the operation time
**Disadvantages:** Symptom could not get greatly improved; runoff flow is not resolved, poor runoff flow could contribute to thrombosis in the inflow

**Synchronous:**

Simultaneously reconstruct the inflow and outflow occlusions,

**Advantages:** symptom could be improved greatly
**Disadvantages:** long operation time, increasing incidences of complications
Techniques on Multilevel lower limb arterial occlusions

Open:

Bypass: aortoiliac; femoropopliteal, infrapopliteal bypasses

Endarterectomy: iliac, femoral endarterectomy
• **Multilevel Open operations**

• From multilevel bypasses

• To one simple endarterectomy plus one bypass
  lesser magnitude

• Open operations: invasive, high incidence of complications
Case 1

- Male, male, 61 year old, intermittent claudication
- Hyperlipidemia
Techniques on Multilevel lower limb arterial occlusions

- **Endovascular:**
  - Minimally invasive, rapidly recover
  - Increase X ray dose intake for multilevel arterial occlusions
  - Difficulty in the lesions cross the joints
Case 2

- Female, 80-year-old, rest pain, right toe necrosis.
- CTA:
Techniques on Multilevel lower limb arterial occlusions

- **Hybrid:**
  - Combination of open surgical and endovascular techniques simultaneously.


Porter JM, Eidemiller LR, Dotter CT, Rösch J, Vetto RM:
Hybrid

Endovascular procedures:

long lesions

iliac reconstruction

Run off vessel reconstruction

Open procedures:

Usually non major open operations: for the lesion at joints

Common Femoral artery endarectomy reconstruction;

f-f; f-p; femoral-distal bypasses

excellent cumulative patency and limb salvage rates for the complex multilevel lower limb arterial occlusions
• Preprocedure planning: CTA, MRA, which segment for open, which segment for endovascular

• Usually under general anesthesia
Common Hybrid Procedures

1. Ipsilateral Iliac Artery Stenting and Common Femoral Endarterectomy
2. Ipsilateral Iliac Artery Stenting and Infrainguinal Bypass
3. Femoral Endarterectomy and Distal Catheter-Based Intervention
4. Iliac Artery Stenting and Crossover Femoral-to-Femoral-Artery Bypass
5. Superficial Femoral Artery Intervention and Distal Bypass
A review of the literature concludes that hybrid techniques for the treatment of severe lower extremity arterial disease provide less invasive, long lasting, and reliable therapeutic options tailored to the needs of high-risk patients and should be in the armamentarium of today's vascular surgeon.
Case 4

female, 74 years old, left lower limb rest pain, critical limb ischemia
Case 5

Male, 65-year-old, rest pain on the right limb
Experience with Multilevel lower limb arterial occlusions at Sun Yat-sen University hospital from 2011 to 2015

Table 1 Demographics, co-morbidities, levels of the lesions

<table>
<thead>
<tr>
<th>Demographics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>98</td>
</tr>
<tr>
<td>Male</td>
<td>65 (66.3)</td>
</tr>
<tr>
<td>Female</td>
<td>33 (33.6)</td>
</tr>
<tr>
<td>Average age</td>
<td>72.6 (48-90)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>59 (60.2)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>34 (34.7)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>5 (5.1)</td>
</tr>
<tr>
<td>Heart infarction</td>
<td>31 (31.6)</td>
</tr>
<tr>
<td>Stroke</td>
<td>13 (13.3)</td>
</tr>
<tr>
<td>Lesions</td>
<td></td>
</tr>
<tr>
<td>AI/FP/IP</td>
<td>23 (23.4)</td>
</tr>
<tr>
<td>AI/FP</td>
<td>27 (27.5)</td>
</tr>
<tr>
<td>FP+IP</td>
<td>48 (49.1)</td>
</tr>
</tbody>
</table>

AI: aortoiliac; FP:femoropopliteal; IP: infrapopliteal
### Experience at Sun Yat-sen University

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Cases(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endovascular</strong></td>
<td></td>
</tr>
<tr>
<td>Endovascular</td>
<td>85(86.7)</td>
</tr>
<tr>
<td>Aortoiliac+femoropopliteal+infrapopliteal</td>
<td>15(15.3)</td>
</tr>
<tr>
<td>Aortoiliac +femoropopliteal</td>
<td>22(22.4)</td>
</tr>
<tr>
<td>Femoropopliteal +infrapopliteal</td>
<td>48(48.97)</td>
</tr>
<tr>
<td><strong>Open</strong></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>3(3.1)</td>
</tr>
<tr>
<td>Aorta-femoral bypass+ femor-femor bypass</td>
<td></td>
</tr>
<tr>
<td><strong>Hybrid</strong></td>
<td></td>
</tr>
<tr>
<td>Hybrid</td>
<td></td>
</tr>
<tr>
<td>Iliac stent+common femoral endarectomy+ femoropopliteal stent</td>
<td>10(10.2)</td>
</tr>
</tbody>
</table>
Experience at Sun Yat-sen University

<table>
<thead>
<tr>
<th>Case</th>
<th>Cases (%)</th>
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</thead>
<tbody>
<tr>
<td>Technical success</td>
<td>96 (98.0)</td>
</tr>
<tr>
<td>Perioperation amputation</td>
<td>4 (4.1)</td>
</tr>
<tr>
<td>Perioperation complications</td>
<td>8 (8.2)</td>
</tr>
<tr>
<td>Heart infarction</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>Puncture complications</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>Acute stent thrombosis</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>Postoperation ABI</td>
<td>0.75 (0.2-1.01)</td>
</tr>
<tr>
<td>Follow up</td>
<td>14.4 (1-56)</td>
</tr>
<tr>
<td>follow up lost</td>
<td>18 (18.4)</td>
</tr>
<tr>
<td>Restenosis</td>
<td>22 (27.5)</td>
</tr>
<tr>
<td>Reintervention</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td>Amputation</td>
<td>9 (11.3)</td>
</tr>
<tr>
<td>Death</td>
<td>17 (21.25)</td>
</tr>
</tbody>
</table>
Summary

1. Femoropopliteal and infrapopliteal lesions are the most frequent multilevel lower limb arterial occlusions.

2. Most multilevel lower limb arterial occlusions can be fixed by endovascular interventions.

3. For the occluded common femoral artery, failed endovascular intervention, hybrid is an alternative choice.
Thank you for your attention
Therapeutic Strategy on Multilevel lower extremity arterial occlusions

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