Limb Salvage and Functional Limb Outcomes After Traumatic Acute Limb Ischemia

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Disclosures

• None

Background

• Traumatic Acute Limb Ischemia (ALI)
  – Uncommon - Demetriades et al.
    • 1.6% in large study of NTDB
    • 51% penetrating
  – Often managed by trauma surgeons at tertiary center
    • Change in training paradigm vascular surgery may be more involved

Bamparas et al. J.Pediatric Surg 45:1404-1412

Objective

Describe a contemporary series of patients with ALI secondary to trauma managed by vascular surgeons and identify factors associated with limb salvage and functional outcomes

Methods

• Retrospective Review at a single institution
• All patients with UE and LE ALI secondary to trauma requiring revascularization from 2013-2016
• Reviewed:
  – Demographics
  – Transfer timing
  – Injury Severity Score (ISS)
  – Preoperative Imaging
  – Level of occlusion
  – Procedural information
  – Limb Salvage
  – Functional limb outcomes

Results

• 68 patients with ALI
• Majority of patients with moderate ISS scores and Rutherford Class 2 ischemia
• 53% were transferred from an outside hospital
• 62% patients with blunt injury
• 38% suffered penetrating injuries
Mechanism of Injury

- MCC-7
- MVC-10
- Fall-19
- GSW-10
- Stab-5
- Crush-4
- Iatrogenic-3
- Misc-10

Results

<table>
<thead>
<tr>
<th>Level of Injury</th>
<th>Upper Extremity (n=32)</th>
<th>Lower Extremity (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortoiliac (%)</td>
<td>- 3</td>
<td></td>
</tr>
<tr>
<td>Femoropopliteal (%)</td>
<td>- 69</td>
<td></td>
</tr>
<tr>
<td>Tibial (%)</td>
<td>- 11</td>
<td></td>
</tr>
<tr>
<td>Aorto-subclavian</td>
<td>6 -</td>
<td></td>
</tr>
<tr>
<td>Axillary brachial</td>
<td>88 -</td>
<td></td>
</tr>
<tr>
<td>Multilevel</td>
<td>6 17</td>
<td></td>
</tr>
</tbody>
</table>

Results

- Operative Details
  - Open repair was the dominant treatment
  - Shunts utilized in 2 cases
  - Fasciotomies in 25% of UE and 58% of LE injuries
  - Fasciotomy details
    - 8 patients underwent fasciotomy during the 1st operation with dead muscle encountered in 3
    - 3 patients underwent delayed fasciotomy with dead muscle encountered in 1

Results

<table>
<thead>
<tr>
<th>Median number of operations performed (IQR)</th>
<th>Upper (n=32)</th>
<th>Lower (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rutherford 1</td>
<td>3 (2-4)</td>
<td>3 (3-5)</td>
</tr>
<tr>
<td>Rutherford 2a</td>
<td>2 (1-3)</td>
<td>3 (1-4)</td>
</tr>
<tr>
<td>Rutherford 2b</td>
<td>3 (2-4)</td>
<td>4 (3-6)</td>
</tr>
<tr>
<td>Rutherford 3</td>
<td>3 (1-7)</td>
<td>4 (3-8)</td>
</tr>
</tbody>
</table>

Results

- LS overall (%) 94 78
- LS for Rutherford 1 (%) 100 100
- LS for Rutherford 2a (%) 100 80
- LS for Rutherford 2b (%) 92 80
- LS for Rutherford 3 (%) 0 40
Results

- Amputation- 12 Patients (18%)
  - Primary amputation-1 patient (1.4%)
- Overall LS- 94% for UE and 78% for LE
- Predictors of amputation and functional limb
  - Rutherford Classification (p<0.05)
  - Number of Procedures (p<0.05)

Results

- LOS (median)- 11 days
- Discharged to SNF- 25%
- Follow up- 59%
- Functional deficits
  - None/minimal- UE-57% LE-68%
  - Major deficits- UE-33% LE-6%
  - Amputation- UE-10% LE-26%

Discussion

- Traumatic ALI is uncommon and outside of trauma institutions is rarely seen
- Vascular surgeons are well-equipped to deal with vascular trauma
- Majority of extremities can be salvaged
- Transfer time to a tertiary center may explain correlation with limb salvage and RC status
- Rehabilitation and follow up can be difficult in this patient population
  - 59% in our cohort, around 60-66% in the literature

Conclusion

- Traumatic ALI can be managed with high rates of limb salvage by vascular surgeons
- Limb salvage does not equate to functional outcomes, particularly in the UE
- Future-Patient-centered functional status/QOL questionnaires post-salvage