ACUTE LIMB ISCHAEMIA

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ACUTE LIMB ISCHAEMIA

- *Sudden* interruption or cessation of blood flow in a major artery supplying a limb.

- Blood supply is inadequate to meet basal metabolic requirements.
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- **Acute**: varies but up to 2 weeks
- **Chronic**: > 2 weeks
- **Acute on Chronic**: Sudden and rapid deterioration in symptoms
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- **Traumatic**
  - Blunt
    - ± bone fracture
  - Penetrating
    - Stab wound
    - Gun Shot

- **Non-Traumatic**
  - Embolism
  - Thrombosis
    - Dissection of artery
    - Low flow states
  - Thrombophilia
  - Bypass graft occlusion
Management

- Diagnosis: History & Physical Examination

  - Is this ischaemia?
  - Is this an embolism or thrombosis?
  - Is this limb viable?
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Signs of Acute Ischaemia

- Pulseless
- Pallor
- Decrease Temperature
- Paresthesia
- Pain
- Paresis / Paralysis
- Skin colour: mottled / cyanosis
- Firm rigid musculature / woody
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Management

- Diagnosis: History & Physical Examination
  - Is this limb ischaemia?
  - Is this an embolism or thrombosis?
  - Is this limb viable?
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- **Embolus**: particulate matter circulating within the vascular system.

- **Thrombus**: mass derived from constituents of moving blood within the circulatory system.

- **Clot**: mass derived from constituents of stagnant blood / propagated thrombus.
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**Emboli**

- very sudden onset.
- identifiable source.
- less common to have claudication.
- few signs of PVD, contralateral pulses palpable.
- Arteriography: minimal atherosclerosis, sharp cutoff with minimal collaterals.
Sources of Emboli

- majority are from the heart ~ 80%
  - Atrial fibrillation
  - Myocardial infarction (usually 5 to 14 days later)
  - Valvular heart disease +/- infection
  - Ulcerated atheromatous plaques of aorta
  - Aneurysms
  - Unknown ~ 10%

Thrombosis

- no obvious source of embolus.
- less sudden onset.
- h/o claudication common.
- S/S of PVD and contralateral pulses are weak or not palpable.
- Arteriography: presence of atherosclerosis and collaterals.
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Initial Management

- Life threatening medical conditions
- Correct fluid & electrolyte imbalance
- Start anticoagulation (heparin)
  Bolus intravenous unfractionated heparin and infusion
- Analgesia--- Opiods / Cox-2 inhib. (avoid I/M)
- ECG (AF, recent AMI)
- Blood biochemistry
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Blood Biochemistry

- FBC
- Renal Profile
- Glucose
- ABG
- CPK (muscle necrosis)
- Urine myoglobin
- PT / APTT
- GXM
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The Role of Heparin Anticoagulation

- Unfractionated Heparin
- Intravenous infusion
- Dose adjusted to APTT(2-2.5X)
- Important especially if delay in definitive Mx.
- Initial bolus dose
- Standard Contraindications applies
- Not necessary if intervention planned soon(<90min)
- ?? LMWH??
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Management

- Diagnosis: History & Physical Examination
  - Is this limb ischaemia?
  - Is this an embolism or thrombosis?
  - Is this limb viable/threatened/non-viable?
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Grading of Ischaemia

- Management tool
  - Conservative vs revascularization vs amputation
  - AVOID REPERFUSION INJURY

- Documentation
  - Medico-legal
  - Audits, future research

- Referrals
# SYS/ISCYS Classification of Acute Extremity Ischemia

<table>
<thead>
<tr>
<th></th>
<th>Viable</th>
<th>Threatened</th>
<th>Nonviable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td>Mild</td>
<td>Severe</td>
<td>Variable</td>
</tr>
<tr>
<td><strong>Capillary refill</strong></td>
<td>Intact</td>
<td>Delayed</td>
<td>Absent</td>
</tr>
<tr>
<td><strong>Motor deficit</strong></td>
<td>None</td>
<td>Partial</td>
<td>Complete</td>
</tr>
<tr>
<td><strong>Sensory deficit</strong></td>
<td>None</td>
<td>Partial</td>
<td>Complete</td>
</tr>
<tr>
<td><strong>Arterial Doppler</strong></td>
<td>Audible</td>
<td>Inaudible</td>
<td>Inaudible</td>
</tr>
<tr>
<td><strong>Venous Doppler</strong></td>
<td>Audible</td>
<td>Audible</td>
<td>Inaudible</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Urgent work-up</td>
<td>Emergency surgery</td>
<td>Amputation</td>
</tr>
</tbody>
</table>

Severity of Ischaemia

- Grade 1 (Viable)
  - cooler and paler
  - sensation intact
  - motor intact
  - No rest pain/mild to moderate discomfort.
  - Doppler signal from pedal arteries
  - $\text{ABSI} \geq 0.3$
Severity of Ischaemia

- Grade II (Threatened)
  - Cold and pale
  - Decreased sensation
  - Decreased motor function
  - ABSI < 0.3
  - No pulsatile arterial Doppler signals but venous signals present
  - Skin colour changes
Severity of Ischaemia

- Grade III (Irreversible)
  - severe rest pain
  - anaesthesia
  - paralysis
  - No pedal Doppler signals (arterial / venous)
  - Muscle rigor
  - Muscle necrosis (biochemistry)
  - skin mottled. No blanching on pressure
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Remember, Gangrene Is Irreversible.
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Is There a Definite Cut-off Time to Determine Viability?
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Extent of Ischaemic Necrosis

- Collateral circulation
- Level of Occlusion
- Propagation of Clot
- Timing & Effectiveness of Treatment
- CVS status of patient
- Viscosity of Blood
- Oxygen Carrying Capacity of Blood

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HKL
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Is Arteriography Always Necessary?
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- In most obvious cases of embolus, not necessary unless early ischaemia and/or suspect underlying PAD.

- Useful in cases of thrombosis, but if ischaemia is advance or rapidly progressing then no.

- What about other Imaging modalities?

- Should Not Delay Management
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Definitive Management (Embolus)

- Conservative: anticoagulation only
- Balloon catheter embolectomy (Fogarty)
- Endovascular procedures
- Arterial Bypass / Reconstruction
- + / - Fasciotomy
- Amputation: minor / major
Definitive Management (Thrombosis)

- Conservative: anticoagulation only
- Thrombolytic therapy: streptokinase, urokinase, rTPA
- Arterial Reconstruction: Bypass
- Endovascular: angioplasty, stents, aspiration devices
- Combination of the above
- + / - Fasciotomy
- Amputation: minor / major
- Catheter thrombectomy
Conclusion

- ALI is a vascular emergency requiring early diagnosis and prompt management
- Grading of limb ischaemia is essential
- Deciding between embolus and thrombosis
- Early vascular referral when indicated
- Early anticoagulation with heparin
- Recognise and stabilise co-medical conditions
- Remember reperfusion injury
- Life before Limb
Thank You