



# Rehabilitation for Traumatic Amputation

Plymouth Hospitals **NHS**  
NHS Trust

## Injury Guideline

Action:	GS Consultants GS Middle Grades T&O Consultants T&O Middle Grades Plastics Consultants Plastics Middle Grades Vascular Consultants Vascular Middle Grades MTCCs T&O, GS, Vascular and Plastics Therapy teams				
Info:	Rehabilitation Team				
Related documents:	Major Trauma Standards, Quality Indicators				
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This document relates to severe traumatic limb injuries, where amputation is considered in the acute phase.

It is paramount to identify those patients who might require amputation as soon as possible and involve the Rehabilitation Medicine Consultant from the Plymouth Prosthetic Rehabilitation service as early as practically possible.

### Reception and Resuscitation

Patients with traumatic amputations either partial or complete should be managed in the standard <C> ABC manor. There should be early consideration of the use of a pneumatic tourniquet as primary haemorrhage control or to replace the pre-hospital windlass type tourniquet (the CAT for example). The residual stump and any complete amputated limbs should undergo XR as part of their resuscitation. Multi-disciplinary decision making is the norm for this patient group with T&O, B&P and Vascular Consultants involved from the outset.

### Definitive Treatment

#### Pre-amputation

The Rehabilitation Medicine Consultant will provide advice on level of amputation as a tailored decision for each individual taking into account other co-trauma and co-morbidities.

The Major Trauma Centre Coordinators (MTCC) will facilitate liaison between the Rehabilitation medicine Consultant and the Event surgeon who will be performing the amputation. The MTCCs are available at the Orthopaedic trauma board Round or on 01752 438350 (38350). In the situation where the Rehabilitation Medicine Consultant is unavailable for this discussion then the Major Trauma Centre Coordinators will facilitate liaison with the Senior Prosthetist in the Plymouth Prosthetics Rehabilitation Service.

In critically unstable patients, review by the Rehabilitation Medicine Consultant should not delay emergency amputation.

A post debridement XR of the stump is encouraged as an aid to prosthetic planning.

The Rehabilitation Medicine Consultant will evaluate rehabilitation potential and prognosis for recovery; define rehabilitation needs and through the Rehabilitation Prescription will direct the pathway for rehabilitation.

Guidance on surgical techniques is included in **Appendix 1**.

## **Post-amputation**

Following amputation the patient should be referred to their local Prosthetic Rehabilitation Service for long term rehabilitation input:

For patients from Cornwall, Isles of Scilly, Plymouth and Southwest Devon, this will be the Plymouth Prosthetics Rehabilitation Service at the Thornberry Centre.

For patients from North, East and South Devon, this will be the Exeter Mobility Centre.

All patients should be given the relevant PIRPAG exercises by the ward physiotherapy team. This should include advice and demonstration on how to do the exercises, alongside provision of the PIRPAG leaflet.

Patients must have appropriate pain assessment and relief pre-, peri- and post-amputation. **See Appendix 2.**

Patients and their families should be offered a referral to the Derriford Clinical Psychology service.

All patients should be provided with a wheelchair with stump support for mobility as soon as they are assessed to be safe to transfer and mobilise in a wheelchair. This will reduce the risk of falls, reduce stump oedema and prevent knee flexion contractures.

Patients should not be provided with crutches or a frame to mobilise due to the high risk of falls, increased demand on remaining limb, shearing forces on remaining foot and dependent stump oedema.

Rehabilitation goals will be documented on the Rehabilitation Prescription.

Early post amputation goals should include wheelchair independence, independent transfers and independence with personal care. It may be necessary for some patients to be transferred for in-patient rehabilitation to achieve these goals. Others will be able to be discharged home or to an interim placement if the home environment does not support wheelchair independence.

It is important to be aware that all patients will require rehabilitation input following limb loss. However, not all amputees will be suitable for rehabilitation with a prosthetic limb.

## **Elective amputation after trauma**

For patients who may require amputation at a later stage after traumatic limb injury a referral to the Plymouth Prosthetics Rehabilitation Service should be made for a Pre-amputation consultation with the Rehabilitation Medicine Consultant and multidisciplinary team.

## **Referral processes to local Prosthetic Services**

Referral to the Plymouth Prosthetic Service through completion of a referral form, which should be emailed or posted:

[PCHCIC.PlymouthProsthetics@nhs.net](mailto:PCHCIC.PlymouthProsthetics@nhs.net),

Prosthetics Rehabilitation Service  
The Thornberry Centre  
1 Brest Way  
Derriford  
Plymouth  
PL6 5XW

Tel: 01752 434200

Referral to Exeter Mobility Centre through letter or referral form:

Exeter Mobility Centre  
Lister Close  
Off Wonford Road  
Exeter  
EX2 4DU

Tel: 01392 403649/8

Fax: 01392 403667

### Guidance to amputation levels

The exact level of amputation will vary from patient to patient and this guide should not replace advice provided by a Rehabilitation Medicine Consultant or Senior Prosthetist from the Plymouth Prosthetic Rehabilitation Service on an individual patient basis.

The general principle for upper and lower limbs is that the amputation should be performed at the most distal level that will heal and allow goals to be achieved with modern prosthetic hardware.

The following guidance is specific for lower limb amputations at the Transtibial, Through knee/Knee disarticulation and Transfemoral levels.

Appropriate amputation level i.e. level at which the bone is transected should take into account the following factors:

- 1) Achieving a long residual limb lever with sufficient space for the required prosthetic components:
  - a. Transtibial: space for myoplasty, socket, pylon and foot between the end of the stump and the floor as dictated by the contralateral leg.
  - b. Transfemoral: space for myoplasty, socket and knee unit between the end of the stump and the knee axis (approximately 15cm clearance is required)
- 2) Availability of adequate soft tissue envelope, with myodesis or myoplasty
- 3) Fracture sites within residual limb
- 4) Height and body habitus of patient

Bilateral lower limb amputees have different requirements and need to be considered on an individual patient basis. Bilateral amputees benefit from having longer residual limbs and the constraints of the length of the sound limb are reduced.

Specific guidance:

#### Transtibial

1. Metric: 12 – 15 cm tibial length from joint line (although 12 cm is considered short and a tibia of 15 – 18cm is preferred)
2. Old school : 1 inch per foot of height for tibia (generally leads to a tibial length of 15 - 18cm)

#### Transfemoral

1. Metric: 15cm above joint line or 25-30 cm from the tip of the greater trochanter
2. Old school: 2/3<sup>rds</sup> 1/3<sup>rd</sup> rule; cut femur at point between proximal 2/3<sup>rds</sup> and distal 1/3<sup>rd</sup>

#### Through knee/Knee disarticulation

The amputation is performed through the joint and the distal femoral condyles should not be excised. The Gritti-Stokes technique of attaching the decorticated patella to the distal condyles should not be performed. The patella should be removed.

Do not create a bulky myoplasty or soft tissue pad as this complicates prosthetic fit.

Use of the surgeon's hands breadth to determine amputation level can be misleading unless the surgeon knows the exact measurements of their hand and can therefore apply the above guidance.

### **Analgesic guidelines for traumatic amputation**

Regular assessment of pain is essential (using the none, mild, moderate, severe scale). Assessment of stump pain, phantom sensation and phantom pain should also be carried out with other observations.

Involve the ACT early for expert assessment of requirement for atypical analgesics. Involve the Rehabilitation Medicine Consultant in the management of phantom pain.

#### **Initial management:**

Intravenous strong opioid titrate to effect as per trust guidelines. Intravenous ketamine as an alternative in ED. These patients may be anaesthetised at initial resuscitation prior to transfer to theatre.

#### **Ongoing analgesia:**

Continue simple analgesia (paracetamol and NSAID if no contraindication) throughout. Morphine PCA (oxycodone or fentanyl if  $eGFR \leq 30$ ) to continue post operatively. Switch to oral medication as soon as possible. This may be delayed due to repeated surgeries. Consider regular tramadol 100mg qds (avoid in the elderly). Modified release strong opioids may be needed if multiple injuries and ongoing pain / repeated surgeries.

#### **Regional anaesthesia:**

To be instituted early. Realistically this will be at time of first surgery.

Upper limb: Supraclavicular or interscalene blocks – ideally catheter techniques for ongoing nerve infusion 3 days as a minimum, up to 7 days.

Lower limb: Above knee – femoral nerve catheter. Below knee – saphenous nerve block and popliteal sciatic nerve catheter.

#### **Atypical analgesics:**

The evidence in support of gabapentinoid drugs, iv lidocaine or magnesium is weak for acute nociceptive pain relief. However, ketamine infusion may reduce the incidence of severe phantom limb pain. Vitamin C 500mg PO for 40 days following traumatic injury may reduce the incidence of complex regional pain syndrome, but there is no evidence to support its use after amputation.

Consider iv bolus of ketamine at surgery (0.3mg/kg) followed by subcutaneous ketamine infusion (0.1-0.2mg.kg/hr) as per trust policy.

#### **Phantom pain:**

Start regular oral gabapentin (titrate up slowly to 600mg tds if tolerated) or pregabalin (titrate slowly up to 300mg bd). Lower doses will be required in the elderly and caution required in renal impairment. Discuss dosing regime with ACT consultant. Advise patients of specific potential side effects of dizziness, feeling 'muzzy-headed' and visual disturbance. These side effects should ease within a few days of starting at a low dose and dose should not be increased until these symptoms have eased. Amitriptyline is an alternative for phantom pain in patients <75years old (10mg at 20:00 titrate up to 50mg if tolerated).