

## AMPUTATION IN EMERGENCY SITUATIONS: INDICATIONS, TECHNIQUES

The decision to amputate is always difficult but becomes even harder in emergency situations, which usually present extra complicating factors. These include human factors (related to both the surgeon and the patient); poor or non-existent medical facilities, especially in war conditions or resource-poor countries; and cultural and religious considerations.

Amputations always generate a great deal of discussion within the medical team. Surgical volunteers need to be briefed on MSF's protocols and on the particulars of the country.

In developing countries and unstable situations, approximately 50% of open fractures lead to either osteitis or non-union. This is in agreement with earlier reports that found 43% infection and 42% non-union in Nigeria and a 38-55% complication rate in war surgery.

Deciding on the precise indications for amputation is always difficult, and context can add complications. The factors that most often complicate these decisions are: human; quality and availability of medical facilities, cultural and religious considerations.

- **Patient:** The patient's age is a consideration, given aging-related reduced healing and other factors, and has therefore been incorporated into standardized measurements such as the Mangled Extremities Severity Score. The frequent presence of additional medical pathologies and / or multiple traumas must also be considered.
- **Medical team:** As many as 15 to 20% of limbs may need amputation. Surgeons need to be adaptable in resource-deprived situations, grounded in protocols and able to step away from conventional practice
- **Cultural and religious:** Religion can be a strict barrier to amputation. According to Sharia law the human body belongs to Allah and man has a formal commitment to preserve his body integrity. (وَلَا تَقْتُلُوا أَنْفُسَكُمْ إِنَّ اللَّهَ كَانَ بِكُمْ رَحِيمًا [النساء: 29]). The interpretation of this law is very restrictive in some areas and can be a formal contraindication, or eventually a real danger for the surgeon. Cultural aspects of other religions can sometimes have a similar weight and impact.

It is crucial that medical teams of expatriates have sufficient on-the-ground experience and / or local staff or partners so they can incorporate all these factors into their decision-making and interactions with patients.

### Indication for amputation at MSF

While the decision to amputate is straightforward when it will save a patient's life — for example, in patients with early gangrene or uncontrolled bleeding — it is more difficult in cases of severe nerve damage. The core consideration for this decision is usually: *In my specific setting, with the facilities and care available, will my patient be able to walk on it within 12 months?* But the surgical working group recognised that more detailed guidelines would be useful, we recently introduced the Mangled Extremity Severity Score into our protocols. From now on this score will be recorded in all our operative reports and evaluated prospectively for its value in facilitating decisions. A MESS score of greater than or equal to 7 had a 100% predictive value for amputation.

## **Surgical technique**

Our protocol also specifies how amputations should be carried out. Guillotine amputation is forbidden. Only fish mouth flaps are to be performed, and flaps should be long enough to cover the soft tissues of the stump. The amputation must remove all dead, contaminated, contused tissues with delayed primary closure. The flaps need to be cut long, allowing them to retract; patient's muscle and fascia are left un-sutured. Secondary closure is performed 3-5 days later.

On the inferior limb we perform the 2 standards amputations: below knee; and above knee with a minimum of 5 cm on tibia shaft (ideally 12-14 cm) and 10 cm on femur (ideally 25-28 cm). The scar should be as far posterior as possible.

On the superior limb every centimetre counts, especially in situations where the patient is unlikely to get arm prosthesis.

Remember that post-operative care is most often the job of the surgeon, who typically also functions as a physiotherapist. The stump needs an appropriate firm bandaging to hasten conversion from a bulky cylinder to an appropriate cone, and pain (including phantom pain) must be managed.

MSF does not allow for multiple procedures on limbs with vascular or nerve injury in precarious, resource-poor settings, and we emphasise that our surgeons should never endanger life when an infection is present.

Any amputation cannot be performed without an appropriate consent of the patient and whenever possible of the family with a witness. The operative report must include the MESS, the technique used and post-operative care.

### Mangled Extremity Severity Score (MESS)

		Points
<b>Skeletal, soft tissue injury</b>	<b>Low energy</b> (simple fracture, civilian GSW)	1
	<b>Medium energy</b> (open or multiple fracture, dislocation)	2
	<b>High energy</b> (close-range shotgun, crush injury)	3
	<b>Very high energy</b> ( above +gross contamination, soft tissues avulsion)	4
<b>Limb ischemia</b>	<b>Pulse reduced or absent</b> ( but perfusion normal)	1*
	<b>Pulseless</b> (parenthesis diminish capillary refill)	2*
	<b>Cool, paralyzed, insensate, numb</b>	3*
<b>Shock</b>	<b>Systolic BP always &gt; 90 mm Hg</b>	0
	<b>Hypotensive transiently</b>	1
	<b>Persistent hypotension</b>	2
<b>Age</b>	<b>&lt; 30</b>	0
	<b>30-50</b>	1
	<b>&gt;50</b>	2
<p>* Score doubled for ischemia &gt; 6 hours.  A MESS score of greater than or equal to 7 had a 100% predictive value for amputation.</p>		