

Mangled extremity management

Juozas Petruskevicius

Traume & Rekonstruktion

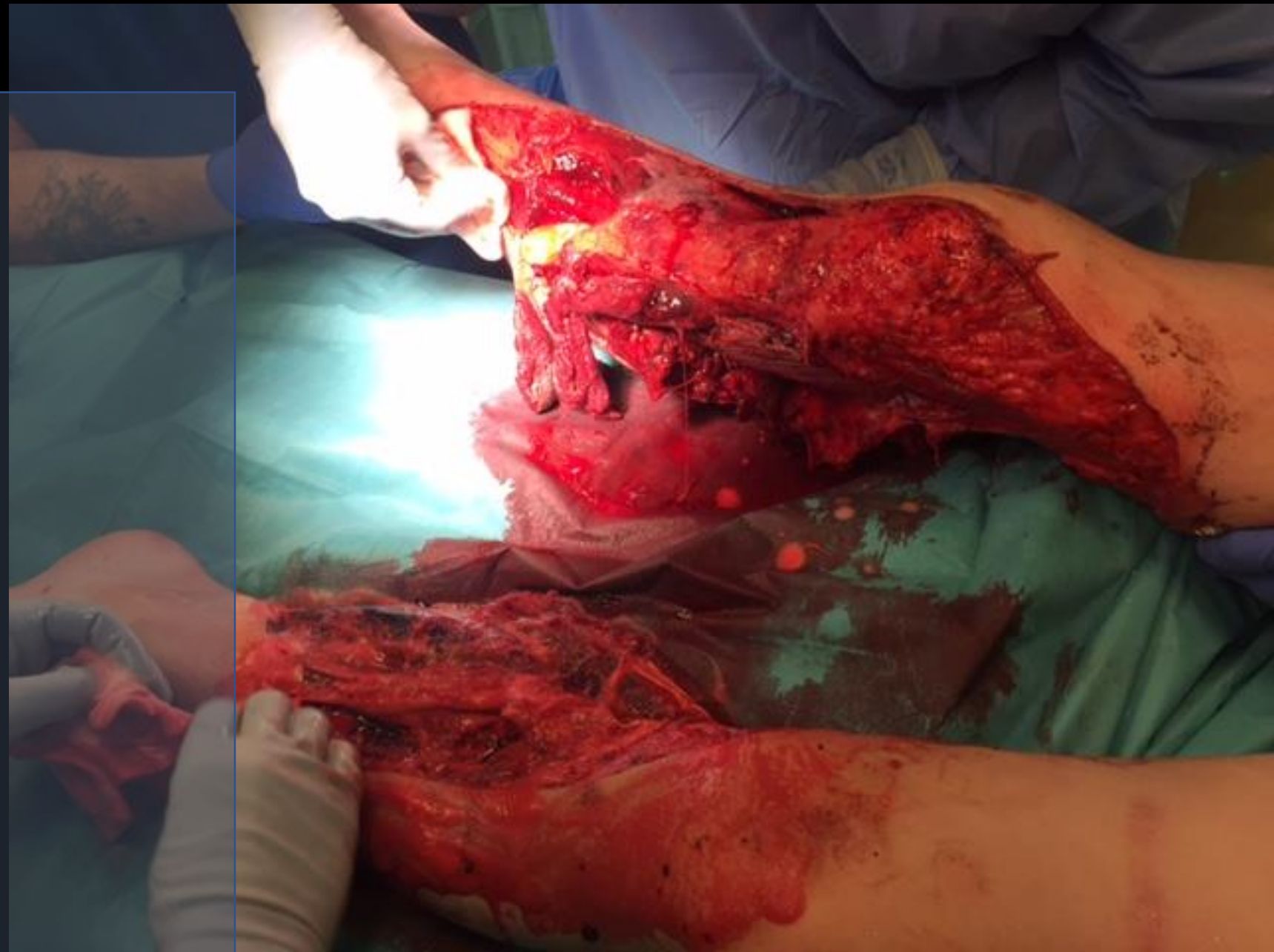
Aarhus Universitetshospital

AO-Trama Advanced, 28-April-2022

Limb salvage

or

Amputation?



Primary amputation or limb salvage ?

- How to decide ?
- Any tools to support the decision ?
- What's the evidence ?



First – save the patient

- ATLS/ABCDE
- Resuscitation
- Stop the bleeding
- Shock management



Second – vascular perfusion

No vascularity =
amputation



Patients with a perfused and reconstructible extremity

- Multifactorial assessment of the patient's clinical picture
- Pre-injury functionality
- Patient preferences

Whenever possible- transfer the patient to specialist centre

Decision making – multidisciplinary approach

- Is outcome better after amputation or reconstruction?
- Is there a limb salvage score to help for decision?
- Clinical, economical, social, cultural factors?
- What are the (financial) costs?

Evidence

No definitive recommendations in regard to limb salvage vs amputation

Poor outcome with significant disability at long term, regardless of whether amputation or limb salvage is performed

Scoring systems - do they help?

- Mangled Extremity Severity Score (MESS)
- Predictive Salvage Index (PSI)
- Limb Salvage Index (LSI)
- Nerve Injury, Ischemia, Soft Tissue Injury, Skeletal Injury, Shock, and Age of Patient (NISSSA) Score
- Hannover Fracture Scale-97 (HFS-97)

the Lower Extremity Assessment Project (LEAP study)

Unable to validate the clinical utility of any of the scores

No scores might be used as the sole criterion for the decision to amputate

LEAP-study

Relative strong indications for amputation:

- near-total amputation,
- non-reconstructible vascular injury,
- ischemia of longer than 6 hours' duration,
- non-reconstructible soft-tissue loss,
- life-threatening hemorrhage (2)

LEAP-study. Not a randomized study!

- Primary outcome: Sickness impact profile (SIP > 10, severe disability)
- Secondary outcome: major complication

- No difference in SIP score between the amputation and reconstruction groups (2 and 7 years)

- Higher rates of hospitalization and complications in limb-salvage group
 - nonunion (31%),
 - wound infection (23%),
 - osteomyelitis (9%)

LEAP-study outcomes (7 years)

- SIP scores ≥ 10 in 50% of the patients in both groups
- Only 58% back in work (with limitations)
- Worse results in limb salvage vs amputation in mangled foot&ankle injuries
- Worst SIP and the slowest walking speeds in patients with through-knee amputations

A meta-analysis

- Primary outcome: SF-36 or SIP
- Better psychological outcomes for patients whose limbs were salvaged (P = 0.008 [SF-36] and 0.05 [SIP]). Level of evidence: I.
- No statistical differences regarding physical outcomes

Key factors vs Patient desires

- Clinical

- Age
- co-morbidities (DM)
- polytrauma

- Limb specific

- ischaemia time
- crush element
- neurological damage
- heel / foot involvement
- bone loss
- joint involvement

- Social

- family
- education
- social network

- Economical

- working and living conditions
- insurance

- Cultural

- religious belief

LEAP

- Risk factors in all patients for worse outcomes at 2 years:
 - re-hospitalization for major complication
 - lower than high –school education
 - low-income (federal poverty level)
 - non-white
 - no insurance
 - a poor social-support network
 - low level of self-efficacy
 - smoking
 - involving the legal system for injury compensation



Costs

Projected lifetime healthcare costs:

<i>Limb Salvage:</i>	<i>\$ 163 000</i>
<i>Amputations:</i>	<i>\$ 509 000</i>

...independent of varied ongoing prosthetic needs, discount rate, and patient age at presentation

Conclusions

- Patient and limb factors are important
- a (sensate) good shaped foot is critical
- scores are of limited use and not sensitive
- reconstruction is much slower and complex
- amputation is a good option
- no difference in self-reported outcomes

....don't decide alone



Summary

- A multidisciplinary team approach is required to the management of these severe injuries
- No treatment option is without potential complications, cost or challenges
- The choice of management should be made in consultation with the patient, family and the surgical team

References

- 1 Bosse MJ, MacKenzie EJ, Kellam JF, et al: A prospective evaluation of the clinical utility of the lower-extremity injury-severity scores. *J Bone Joint Surg Am* 2001;83-A(1):3-14.
- 2 Bosse MJ, McCarthy ML, Jones AL, et al; Lower Extremity Assessment Project (LEAP) Study Group: The insensate foot following severe lower extremity trauma: An indication for amputation? *J Bone Joint Surg Am* 2005;87(12):2601-2608.
- 3 Bosse MJ, MacKenzie EJ, Kellam JF, et al: An analysis of outcomes of reconstruction or amputation after leg-threatening injuries. *N Engl J Med* 2002;347(24):1924-1931.
- 4 Doukas WC, Hayda RA, Frisch HM, et al: The Military Extremity Trauma Amputation/Limb Salvage (METALS) study: Outcomes of amputation versus limb salvage following major lower-extremity trauma. *J Bone Joint Surg Am* 2013;95(2):138-145.
- 5 Akula M, Gella S, Shaw CJ, McShane P, Mohsen AM: A meta-analysis of amputation versus limb salvage in mangled lower limb injuries—the patient perspective. *Injury* 2011;42(11):1194-1197
- 6 MacKenzie EJ, Bosse MJ, Pollak AN, et al: Long-term persistence of disability following severe lower-limb trauma: Results of a seven year follow-up. *J Bone Joint Surg Am* 2005;87(8):1801-1809.
- 7 MacKenzie EJ, Jones AS, Bosse MJ, et al: Health-care costs associated with amputation or reconstruction of a limb-threatening injury. *J Bone Joint Surg Am* 2007;89(8):1685-1692.