TEMPLATE

RQ [##]: Is the long-term functional outcome following early amputation superior to that of delayed amputation after failed limb salvage ?

Section 1: Background (<300 words):

- Amputation following trauma is a significant life-changing event, especially in the working population, as it impacts physical function, quality of life, and socioeconomic stability. Consequently, the decision to amputate is often challenging, and considerable efforts are made to salvage the limb whenever feasible. Advances in vascular, plastic, and reconstructive surgery have increased the possibilities of limb salvage. However, limb salvage is associated with multiple challenges, such as soft tissue infection, multiple trips to the operating room (OR), the functionality of the limb post salvage, and the protracted time for rehab.
- In the more recent literature late amputation gives more clinical problems in the ipsilateral limb and prolonged hospital stay (nearly twice time than the early amputation)
- Mangled Extremity Severity Score, the Limb Salvage Index, and the Hannover Fracture Scale are good tools in decision, but the final choice should be individualized.

Section 2: Data extraction table

For each included study: Author/Year, Study Design, Sample Size, Population, Intervention/Comparator, Key Outcomes, Results, and Follow-up duration.

Example table template (can be edited as per the question)

S.no	Author, year of publication, Country	Study Design	Sample Size (add individually for each group if	Study population (Inclusion and	Division of timing	Groups compared	Results	limitation	Strength

			multiple groups compared)	exclusion criteria)					
1	Zachary F Williams et al, 2013, North Carolina	Retrospective review observational study, Level II trauma centre registry	30 followed up (Total - 43), short follow-up <2 years. 14 early group, 16 later group	Comparable, Mess score is higher in early group	**Early**- With-in 48 hrs of admission **late** (. 48 hrs) - median 7 days (2-53 days)	1- Ipsilateral wound complications- (Infection, breakdown, compartment syndrome 2- Other (respiratory, renal failure, DVT, pneumonia or death)	Early – shorter hospital stay, fewer complication of ipsilateral leg	Small sample size, Single institution, Shorter follow-up period about 1- 1.5 years	
2	Peter Ladlow et al. 2016, DMRC UK	Retrospective review, Independent group comparative, observational study. Military group	Total 100, 36 unilateral (11 immediated BKA, 15 delayed BKA, 10 immediate AKA) 43 bilateral and 21		Immediate < 5 days of Trauma; delayed- > 5 days to 3 months		1- Comparison between Unilateral immediate amputation Vs limb salvage show more severity of injury. 2- Length of rehabilitation: limb	Only measures in Military ,otherwise healthy, age 20-40. Provided with intense multidisciplinary rehabilitation protocol.	

			single limb salvages (13 BK)				salvage requires - shorter time 3- Functional outcomes: 6MWT- single BKA> Limb salvage> bilateral amputee. No difference in immediate or delayed amputee 4- Mental Health outcomes: No effect on depression or anxiety 5- DMRC mental health support and pain: No pain is twice higher in	Short follow-up time	

							amputee than salvage group		
3	Gabrielle Bui et al.	Retrospective comparative at Level I trauma centre	79 patients,	Early amputation (EA) < 6 wks – 41 patients. Late (LA) > 6 wks since injury – 38(patients	Median time of amputation: in EA – 3 days, in LA – 432 days	Early and late Group was compared : EA group more ICU days EA (, 6 wks) more likely for unplanned surgery Post-operative infection and post-operative unplanned admission was common in both groups Total hospital cost same in both group	Compare between early and late cases	Single centre, small study population,	Timing were taken (around 6 weeks) as per median duration between injury and amputation
4	Mustafa aydin et al, 2024, Turkiye	Retrospective, comparative, Firearm injury	35 patients, mean age 25 (range 20-45), All firearm injury	Early EA 16 and LA 19	(Time not specified) EA – operated at primary receiving centre (open III C)	Compared both group for **PLP** (phantom Limb pain) and **PTSD** (post traumatic stress disorder), minimal follow up – 2 years	PLP- EA- group- 1/16 LA- Group – 9/19 PTSD EA- group- 3/16 LA- Group – 10/19	Small study population, one centre, No idea about amputation protocol about in EA group. Delay > 10 days more	

					LA – Group A, B open injury			chances of PLP.	
5	Jinjoo kim , 2025, Republic of Korea	Retrospective review, level 1 trauma centre, comparative study	199 patients, avg age 53	Early (< 48 hrs) - 132 , Delayed (beyond > 48 hrs)- 67 patients Primary outcome- Predicted amputation level Secondary outcomes like Mortality , infection		Outcome: 1-proximal migration of amputation level 2-Trauma related complications 3-Deep surgical infection 4-30 days mortality	In early group- High MESS scores, injured by very high injury, high prevalence of severe limb ischemia and ischemia time >6 hrs. Delayed – after 48 hrs , mean time 11.9 +_ 7.3 days. Most significant cause of Delayed amputation- Infection and tissue necrosis (48/67). More proximal amputation level if delayed-(Odd value 2.95 Times) In Delayed group- More trauma related complication-	1Retrospective, 2-single centre, 3-short follow-up	Relative large number

							hospital LOS, ventilator days		
6	Aryan Rafieezadeh et al, US, 2026	Level III Retrospectively, comparative	1959 EA 2580 LA	Early(EA) < 48 hrs , late (LA) >48 hrs		Mortality – same in both group In EA group less complications and lower hospital stay		Retrospective national data analysis	

Section 3: Results summary write-up (up to 500 words)

The summary on this topic may be reflected on the article by Aryan Rafieezadeh of 2026 and the metaanalysis by Poutoglidou (2023) in which the conclusion is that the results are better with early amputation. But the individualization of the treatment should be done anytime.

There is no consensus on the best score available.

More emphasis should be placed on the surgeon's experience, extent of soft tissue damage, and patient factors and wishes.

Section 4: Discussion (<1000 words)

The treatment of mangled extremity, often in polytraumatized patients considers a multidisciplinary decision making.

The first problem is the classification of the injury, either because the scores are questionable, either because also in MESS > 7 the suggestion is always to consider other clinical, socioeconomic factors.

The ideal solution in decision making should consist of a score in which the surgeon can put the patient and the decision of early amputation or limb salvage could be facilitated.

In the reality the literature agreeds in defining these scores but not to trust only on them. The decision is made considering the possibility of reconstruction and the timing of the complete treatment of the patient.

The articles analysed and those articles added in the reference, suggest early amputation as the less complicated technique.

Section 5: Risk of bias of included studies

There is medium risk of bias in these studies because the groups are well analysed, but not comparable by description of the severity of the injury.

Section 5: Response/Recommendation (1-2 lines as a conclusion and recommendation statement for the question)

We recommend a complete study of the injury and the patient and a multidisciplinary decision making involving trauma surgeon, vascular surgeon, plastic surgeon and the patient with his family.

The results in the literature are better with early amputation.

Section 6: Level/ strength of Evidence:

The level of evidence is high because the amount of cases is very high

Reference

Sharrock M The mangled extremity: assessment, decision making and outcomes; Acta Ort Belg, 2021, 87: 755-760

Schechtman DW et al Utility of the mangled extremity score in predicting amputation inilitary lower level arterial injury, Ann Vasc Surg, 2021, Jan 70 95-100.

Poutoglidou F et al Amputation versus reconstruction in severe lower extremity injury: a systematic review and metaanalysis, Arch Bone Jt Surg, 2023, 11, 378-387.