

Practice Point

Preservation and Transport of the Amputated Part for Replantation: Principles, Practice, and Pitfalls

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Traumatic amputation remains one of the most dramatic emergencies in reconstructive surgery, where the fate of the amputated part is determined not only in the operating theatre but, crucially, at the scene of injury and during transport. The interval between injury and definitive microsurgical repair represents a vulnerable window during which inappropriate handling can irreversibly compromise tissue viability. Accordingly, the preservation and transport of the amputated part are cornerstones of successful replantation, directly influencing survival rates, functional recovery, and long-term outcomes. However, unfortunately, the majority of patients who suffer traumatic amputations do not present properly. Dissemination of awareness and education to referring facilities may improve outcomes for patients who experience a traumatic amputation of an extremity or digit.

The fundamental objective of preservation is to minimise ischemic injury while preventing additional damage. Following amputation, tissues are deprived of perfusion, leading to progressive cellular hypoxia, depletion of adenosine triphosphate, accumulation of metabolic byproducts, and eventual irreversible necrosis. The rate of deterioration is highly temperature dependent; hence, controlled hypothermia forms the basis of modern preservation protocols.

Principles and Technique of Preservation

The technical aspects of preservation and transport are governed by well-established principles and protocols that must be meticulously followed:

Initial Handling

- The amputated part should be retrieved promptly and handled gently, avoiding crushing or excessive manipulation.
- Gross contamination should be addressed by gentle irrigation with normal saline or clean water.
- Vigorous scrubbing and the use of antiseptic solutions should be avoided due to the risk of additional tissue injury.

Preparation and Wrapping

- The amputated part should be wrapped in sterile gauze moistened with normal saline.

Packaging

- The wrapped part should be placed in a clean plastic bag and sealed securely.
- This bag should then be placed within a second container containing an ice–water slurry.
- Multiple amputated parts should be wrapped and packaged separately.
- Direct contact with ice or water must be strictly avoided to prevent frostbite injury.

Temperature Control and Ischemia

- Optimal preservation is achieved at approximately 4°C, which significantly reduces metabolic demand.

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- Cooling prolongs tissue viability by delaying ischemic injury.
- Muscle tissue is particularly sensitive to ischemia and requires rapid revascularisation.
- Tolerance to ischemia varies:
 - o Digits (minimal muscle):
 - § Warm ischemia: 6–12 hours
 - § Cold ischemia: 12–24 hours
 - o Major limb segments (muscle-rich):
 - § Warm ischemia: 4–6 hours
 - § Cold ischemia: 6–8 hours

Transportation

- Rapid transfer to a centre with microsurgical expertise is essential.
- The patient and the amputated part should ideally be transported together.
- Time of injury and mechanism of trauma must be clearly documented.
- The receiving centre should be notified in advance of the patient's arrival to facilitate timely preparation, including the arrangement of appropriate manpower, surgical instrumentation, and operative logistics.

Common Pitfalls

- Direct placement on ice leads to cold-induced injury.
- Immersion in water or saline solutions causes tissue oedema.
- Use of antiseptic agents results in cytotoxicity.

Special Considerations

- The amputation site should be dressed properly to avoid excessive bleeding.
- Resuscitation (including IV fluids) should continue during transportation, along with proper analgesia.
- Crush or avulsion injuries should still be preserved appropriately, as replantation decisions are made later by the operating surgeon.
- In partial amputations (needing revascularisation), the limb should be anatomically aligned, immobilised, and protected to maintain residual circulation.

Bottomline

The success of replantation is intimately linked to the

quality of prehospital and early hospital care. Equally important is the education of first responders, emergency personnel, and peripheral healthcare providers. Standardised protocols and widespread awareness can significantly reduce preventable errors and improve the overall success rates of replantation procedures. As such, the preservation and transport of amputated parts represent a critical determinant of replantation success. As reconstructive surgery continues to evolve, optimising these early steps remains fundamental to achieving the best possible functional outcomes.

