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Vascular, Nerve, and Tendon Injuries of the Extremities in Disaster and Earthquake Treatment

Servet Yekta Aydın, Anıl Demiröz

Department of Plastic, Reconstructive and Aesthethic Surgery, İstanbul University-Cerrahpaşa Cerrahpaşa Faculty of Medicine, Istanbul, Turkey

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Abstract

Extremities are prone to trauma because they are projections of the body. In closed injuries, there is usually no need for an immediate final surgery. The exception is the presence of a circulatory disorder that will cause the loss of a limb. If there is bleeding, the priority in treatment should be to stop it. Compression should be applied to stop bleeding, and the affected extremity should be elevated above the level of the heart. While copious irrigation, primary closure, and splint can be applied, if primary closure is not possible, it would be appropriate to apply a splint after sterile dressing with moist absorbent gauze. In case of amputations, it is appropriate to wrap the amputate in a gauze moistened with saline, which is important in the transfer of the amputate, and then put it in a waterproof bag and place it in another bag in ice water in the ice bag.

Keywords: Earthquake injuries, nerve injury, replantation, tendon injury, vascular trauma

Introduction

Since the extremities are rather far from the trunk of the body, they are prone to traumas. While we experience loss of dexterity in upper extremity traumas, we encounter mobility restriction in lower extremity traumas. An accurate assessment of the damage caused by trauma is very important in the first stage. Emergency treatment appropriate to the damage and preparation for the final treatments should be our aim in the first response.[1,2]

First Evaluation

In the evaluation of trauma, open penetrating wounds refer to wounds in which skin integrity is lost, while closed blunt injuries refer to wounds in which skin integrity is preserved. Open injuries are almost always candidates for immediate, final surgery. Exceptions to these can be listed as dirty injuries, infected injuries, injuries caused by crushing, and situations where there is no suitable surgical ground, and delayed surgical repair will not result in functional loss.

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Our basic examination methods consist of circulatory examination, motor examination, and sensory examination. The simplest examination method we use most frequently in circulatory examination is the capillary refill method, and the normal time should be about 2 seconds. A cold temperature in an extremity, a depleted turgor and tone, a bruised or mottled appearance, and a prolonged capillary refill time indicate arterial insufficiency.[3,4] Primary or secondary amputation should be considered in conditions where revascularization cannot be performed.

Finding motor loss on a motor examination may indicate tendon and muscle injuries. Failure to perform an emergency surgical repair may be acceptable; however, urgent intervention should be made within the first 14 days. After this period, the escaping tendon ends may not come together. An abnormal stance may be observed in the posture of the hand on inspection. In the dynamic examination, it is beneficial to open and close the fingers one by one or to ask the patient to make a fist and open his hand, which is the simplest test. One can present with motor and additional sensory loss in cases of nerve injuries. Failure to perform emergency surgical repairs of the nerves is acceptable as in tendons, but they also need to be done within the first 14 days. After this period, the escaping ends may not come together, and nerve grafts or other advanced techniques may be required. If motor loss is suspected, a movement examination of the relevant muscle group can be performed, and to detect sensory loss, it would be appropriate to simply perform a rough touch examination of the relevant area. Closed nerve injuries can occur due to stretching or pressure, even if there is no open wound. Therefore, it is important to perform a nerve examination.

Urgent Care

The priority in the treatment should be to stop the bleeding if there is one. Compression should be applied to stop bleeding, and the involved extremity should be elevated above heart level. If control cannot be achieved despite these, a tourniquet can be applied; however, care must be taken not to exceed 2 hours for the tourniquet. In the presence of vascular damage, if it threatens the circulation of the limb, it is urgent surgical revascularization; however, if there is damage to a vessel that does not impair the circulation of the limb, the vessel can be ligated and repaired later. While abundant irrigation, primary closure, and splint can be applied, if primary closure is not possible, it will be appropriate to apply a splint after sterile dressing with moist absorbent gauze after this

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Corresponding author: Anıl Demiröz, Department of Plastic, Reconstructive and Aesthetic Surgery, İstanbul University-Cerrahpaşa Cerrahpaşa Faculty of Medicine, Istanbul, Turkey
e-mail: anil.demiroz@iuc.edu.tr
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ligation. Referral to a competent surgical team is appropriate for post-closure repair.

Transfer of the Amputate for Replantation

When faced with an amputated limb,[1,2,5] replantation requires competent teamwork. Correct storage and timely delivery of the amputee are important for success. Muscle tissue is the primary determinant of the time limits for successful replantation. This tissue generally resists up to 6-8 hours of ischemia, thus determining the time limit of major replantation, such as arm or thigh level. Applying appropriate cold and transfer conditions can enlighten the process for up to 24 hours. These hours may extend up to 68 hours in the distal extremity with fewer muscle groups. Success is possible up to 24 hours, especially in the replantation of limbs that do not contain muscle, such as fingers; however, it should be known that the chance of success decreases as the delay increases. In the presence of other life-threatening conditions, replantation may not be performed. It is appropriate for the amputate, which is important in the transfer of the amputated part, to be wrapped in a gauze cloth moistened with saline, then placed in a waterproof bag and placed in another bag with ice water in the ice bag. It is important that the amputated part does not come into contact with ice or water and does not dry out during the transfer.

Surgical Approach

After the initial evaluation, patients with complex traumas, such as earthquake victims, require a step-by-step surgical approach. This approach nearly always starts with adequate surgical debridement of all the necrotic tissues. Some tissues, such as muscle tissue, are known to be prone to delayed necrosis after a prolonged period of ischemia. So, the patients may require serial debridement.

Although there are various scores and criteria for primary amputation of the limb versus salvage, it must always be kept in mind that a primary amputation decision should only be made after a detailed inspection of the amputated limb in the operation room, unless a life-threatening situation is present.

After the initial surgery, wound management process starts. This period includes serial debridement, the utilization of various wound healing products, and vacuum-assisted closure. Final reconstructive surgery may require skin grafts, local flaps, or free flaps, as conventionally described in the reconstructive ladder but may require different approaches depending on the situation and need for coverage.

Conclusion

Except for conditions of vascular compromise or amputation, surgical repair in the subacute period is sufficient for vascular, nerve, and tendon injuries of the extremity once the bleeding is under control. However, the appropriate closure of the extremity and immobilization before the final repair are procedures that will increase the success rate. Circulatory collapse or amputated limbs require immediate surgical intervention by a competent surgical team.

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