Reconstruction of skin and soft tissue defects of middle third of the leg

Essay with Case Presentation Submitted in Partial Fulfillment of Master Degree in

General Surgery

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Abstract

This study was in the form of essay with case presentation. It aimed to mention and discuss heavily and precisely the various available options that may be used in reconstruction of the middle third of the leg. This discussion included skin grafts, local flaps, distant flaps, and free flaps. It also included discussion of the various anatomical aspect of flaps; skin flaps, muscle flaps, fascial and fasciocutaneous flaps, and osseous flaps. Each method mentioned was discussed form the historical use to the recent issues raised about it. At the end of the study, case presentation was done for cases with defects of the middle third of the leg.

Key words

Middle-third leg reconstruction

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Introduction

Reconstruction of different body defects has been one of the real tests for the plastic surgeon ***(Cobbet, 1976)***.

The leg is a complex district with functions of weight-bearing support, stability, and motility. The osseous structure of the lower leg is composed of the tibia and the fibula. The tibia is most responsible for lower leg functions, while the fibula is a fairly expendable bone ***(Cierny,etal 2003)***.

The primary goals of reconstructive surgery are preservation of life with limb safety and restoration of its form and function. Composite defect reconstruction may restore form and function in all body regions with subsequent enhancement of quality of life ***(Mathes and Nahai, 1997)***.

The leg has several characteristics that make it susceptible to unique problems. The human is a bipedal animal, thus full weight bearing in the erect position is on the two lower extremities. The full force of the weight of the body is transposed through the legs. The muscles of the leg provide predominantly ankle function with plantar flexion, dorsiflexion, eversion, and inversion. Additional leg muscle functions include toe flexion and both knee flexion and extension. If the ankle was fused the functional needs of the leg muscles would be greatly unnecessary and generally tolerated. Therefore, a significant functional muscle loss of the leg can be tolerated and bipedal ambulation will be maintained. Consequently, muscle loss of the leg is not a contraindication to reconstruction and salvage.

The lower extremity is more liable to develop edema, venous stasis, deep venous thrombosis, and is much more commonly to be affected by atherosclerosis than the upper limb. These vascular properties of the lower

extremity must be considered in the reconstructive procedures for the lower extremity.

The management of lower extremity defects has evolved over the last two decades to the point that many extremities that would have required amputation are now routinely salvaged. The treatment requires a team approach with the orthopedic, vascular, and plastic surgeons as part of the team. Soft tissue management includes micro-vascular free tissue transfers, local muscle flaps, and a better understanding of the role of local fascio-cutaneous flaps and skin grafts for treatment of defects ***(Armen and Nolan, 2007)***.

Before development of the antibiotics, a conservative approach was generally taken to wound closure because of the risk of infection and the potential for tissue loss at the wound edges. Wound debridement was therefore limited to removal of well-demarcated non-viable tissue to avoid enlarging of the wound. Local wound care promoted healing through wound contraction. The resultant scar was frequently associated with contracture and skin instability. With the advent of antibiotics following the development of sulphonamides and penicillin in the mid-twentieth century, control of local wound infection permitted a more aggressive approach to wound closure. The initial use of pinch graft and later split-thickness skin grafts allowed successful closure of large wounds. However, more complex wounds with circulatory impairment, chronic infection, and composite defects were unsuitable for skin graft coverage. These wounds could not be adequately managed until flaps were developed. It soon become apparent that flaps could be transferred using normal tissue with intact circulation from an area of non-injury (donor site) o cover complex wounds (***Mathes and Nahai, 1997)***.

Primary reconstruction of the lower limb defects may be done either immediately or early coverage (within 1 week), these include debridement bony stabilization, revascularization, followed by soft tissue coverage. The first choice for reconstruction of the middle third of the leg is the soleus flap covered with a skin graft, alternates or adjuncts include gastrocnemius, tibialis anterior, and flexor digitorum longus muscle flap. Larger defects may need free flaps ***(Steven, 2004)***.

According to the indication; coverage of the defect may be done using skin grafts of flaps. Flaps may include skin and subcutaneous tissue, local muscle (muscle or musculo-cutaneous flap), fascia (fascial or fascio-cutaneous), or bone with or without muscle, fascia, and skin. Interest in various forms of flaps is steadily increasing among surgeons and if it is correctly chosen, it gives an excellent solution for many challenging soft tissue defects ***(Tolhurst, 1984)***. The ideal flap for coverage has to provide matched ski with good sufficient padding, sensibility and resistance to share forces. Success was defined as ability to transpose flaps to cover defects without tension ***(Wong and Tan, 2007).***

In general, all these techniques aim at restoring the functional and cosmetic limb. The etiology, extent of injury, age of the patient, and the patient's occupation dictate the ideal flap to be used in reconstruction. Each of the available flaps has its advantages and disadvantages ***(Chase, 1998)***.

Aim of the work

The aim of this study is to discuss the applied anatomy, functions of the leg, and the various etiologies for soft tissue defects in the middle third of the leg. Review of the literature including the recent text-books and scientific papers will be done to discuss the traditional and the alternative options used for reconstruction of the middle third of the leg. A scientific evaluation of the different methods will be done with case presentations.

Review of literature

ANATOMY OF THE LEG