

Complications Following an Amputation

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KEYWORDS

- Upper limb amputation • Lower limb amputation • Diabetes • Vascular disease
- Trauma

KEY POINTS

- There are numerous complications of amputation that make comprehensive rehabilitation management of the patient with amputation a challenging task.
- Optimal management comes from a coordinated, multidisciplinary approach in which each specialty has a specific and indispensable role in improving acute issues and the prevention or improvement of long-term, adverse sequelae.
- In addition to improving functional mobility and independence, physical and occupational therapists are pivotal in the evaluation and management of phantom pain, residual limb pain, and secondary musculoskeletal complaints and overuse syndromes.
- Meanwhile psychology and recreational therapists can provide the patient with resources and strategies to manage the mood disorders that could otherwise negatively impact the patient's functional outcome.
- Recreational therapists, in conjunction with physical and occupational therapists, also play an important role in developing strategies for successful reintegration into society and life roles.

INTRODUCTION

In 2005 there were an estimated 1.6 million individuals in the United States living with limb loss. This number has been projected to more than double by 2050 to 3.6 million,¹ making an understanding of management of the individual with amputation essential for the physiatrist. In developed nations, disease is the leading cause for amputation, with the incidence of major amputation in patients with diabetes being approximately 10-fold that of nondiabetic dysvascular patients in certain populations.² As such, many of the complications after amputation may, in fact, be attributable to the underlying disease process and not dissimilar to issues that led to the initial amputation. Other complications are potential sequelae of amputations of nearly any cause.

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Treatment, therefore, may not vary significantly among different amputation populations. This article highlights common complications after amputation and discusses management strategies for each. As with many disease processes, the multidisciplinary approach with coordination of care among the physiatrist, therapists, nursing staff, psychologist, and other specialists proves to be most effective and rewarding in optimal management of patients with amputation.

MUSCULOSKELETAL COMPLICATIONS

It is estimated that 20% of people with amputation underwent amputation early in life,³ and therefore, may have to deal with the adverse sequelae of long-term altered postural and gait mechanics, relative inactivity, muscular imbalances, and surgical complications. These complications include joint contracture, early degenerative joint disease and overuse injury on the intact limb, back pain, osteopenia/osteoporosis, fracture, and disuse atrophy. Many of these complications can be avoided with diligent care and patient education, which should begin immediately in the postoperative period, and be carried over into the remainder of the patient's life.

Joint contracture is a common occurrence after lower limb amputation for multiple reasons, with many patients with transtibial amputation developing knee flexion contracture and/or hip flexion contracture, and those with transfemoral amputation developing hip flexion and abduction contracture. First, because patients are generally less active immediately after their amputations and spend most of their time resting in either a seated or a lying position, it is easy for hip and knee flexion contractures to develop because there are very few resting postures where these joints are positioned in anything other than the flexed position. Second, the muscle imbalance created by the amputation itself can predispose the involved joint to developing contracture. It has been found that cleaved muscles after transfemoral amputation can atrophy 40% to 60%, while intact muscle in the amputated limb can still atrophy up to 30%.⁴ Loss of hip adductor strength can predispose to hip abduction contracture, while avoiding fixation of the iliotibial tract in an attempt to prevent hip abduction contracture can predispose to hip flexion contracture as the hip extension torque of the gluteus maximus is decreased.

Both performing and instructing the patient in range-of-motion exercises is paramount in re-creating a natural and efficient gait pattern, and prevention of skin breakdown as well as pain in the prosthesis. For the patient with transtibial amputation, the prescription of a residual limb support allows the knee of the amputated limb to be positioned in extension while the patient is seated in his or her wheelchair. Immediate postoperative rigid dressings (IPORD), immediate postoperative prostheses (IPOP), as well as bi-valved casts can aid in prevention of joint contracture and have the added advantages of protecting the operative wound and controlling postoperative limb swelling. However, they require both skill and time to create, need to be remade as the limb reduces in size, and in the case of the IPORD and IPOP, do not allow for easy viewing of the surgical incision. Once contracture has already developed, serial casting may be used to stretch the joint, while those cases refractory to conservative measures may require surgical management.

Altered gait and postural patterns in the lower limb amputee can come from learned walking patterns to compensate for weakness, joint contracture, a sensation of instability, improper prosthetic fit, or from any combination of the above. Up to 23% difference in ground reaction force has been found between the intact and amputated limb, and persons with amputation also typically spend more time on their intact limb. With increased forces on the joints of the intact limb there is a greater prevalence of knee

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