

Early Rehabilitation Training for Patients with Transfemoral Amputation before Wearing Prosthesis

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Abstract: Due to trauma and disease, the number of patients with transfemoral amputation is increasing year by year. Exploring early rehabilitation methods for transfemoral amputation is becoming more and more important. After finding the problems and consulting multiple documents, I found several methods for the problems. Early rehabilitation training can not only meet the appearance needs of patients with transfemoral amputations, but also provide preliminary preparations for patients before wearing prostheses. It can also prevent or reduce the occurrence of deformities, and reduce training obstacles and training time for patients when wearing prostheses.

1 INTRODUCTION

The number of amputations caused by trauma or disease is increasing year by year. The amputation will not only bring personal and physical trauma to the individual, but it will also deal a heavy blow to a family. Although early rehabilitation treatment and prosthetic adaptation can help amputees return to society early and resume activities of daily living as soon as possible. However, due to the limited medical level in some places, or the failure of family members to contact the rehabilitation team in time, many patients have deformities of the residual limbs due to various reasons after amputation, and also due to the need for physical mechanisms to compensate, which cause the uninfected side disease (Xu 2018). Therefore, in order to better fit the prosthesis and meet the needs of patients for appearance, it is necessary to prevent or reduce the deformity of the residual limb. It is hoped that early functional exercises can improve the convenience of patients to adapt to prostheses and reduce the occurrence of deformities. In this way, more amputees can get better prosthetic fit and appearance satisfaction in the future.

2 REHABILITATION AFTER TRANSFEMORAL AMPUTATION

The entire process of amputation should be accompanied by the full participation of the amputation rehabilitation team. The rehabilitation team includes the amputee himself, doctors, nurses, physiotherapists, occupational therapists, prosthetics, social workers, family members, psychological counselors, etc (Carroll 2006). In the entire process of amputation, each worker performs their own job function to help the amputee recover early, complete the fitting of the prosthesis, and finally return to society. In patients with a transfemoral amputation, due to different amputation planes, unbalanced muscle strength and poor posture, patients often cause flexion and abduction deformities, and the higher the amputation plane, the more obvious the deformity is, as is shown in figure 1. When the thigh stump has deformities, it will be difficult to make and fit the prosthesis in the later stage. Early rehabilitation training can avoid or reduce the formation of deformities, which can not only bring the greatest beautification of the appearance to the patient, but also reduce the pain of the patient in the later prosthetic fitting training.

Amputation is not only a destructive but also a reconstruction and repair operation, which creates a good residual value condition for the installation of a

prosthesis. Lower limb amputation requirements: the residual limb has good weight-bearing capacity, can walk after wearing a prosthesis, and the residual limb after the amputation must have power, which is a

functional residual limb. A prosthesis is an orthopedic device used outside the body that compensates for the loss of the function and appearance of the limb.

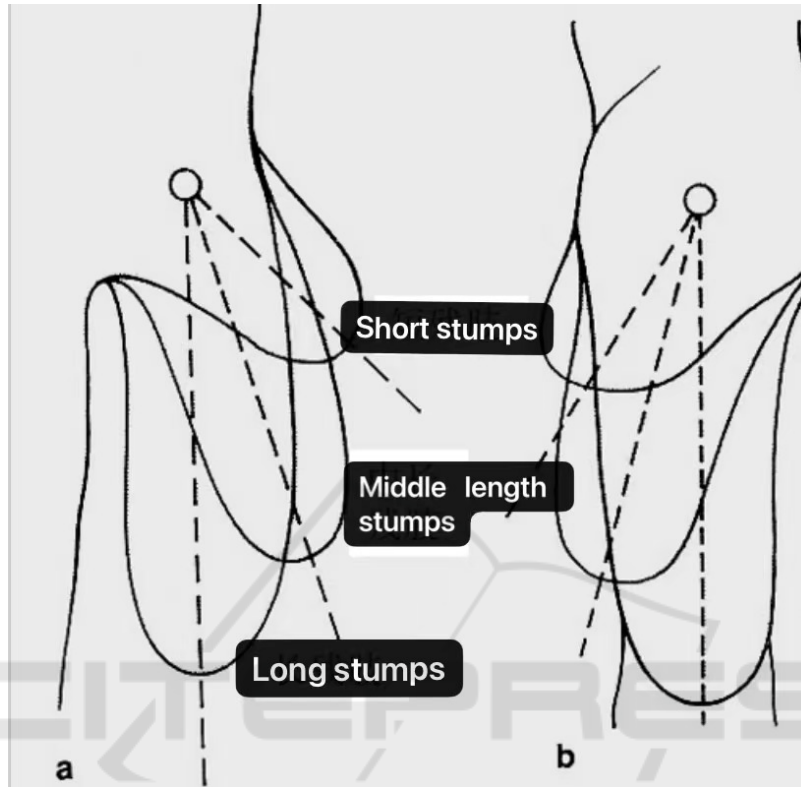


Figure 1: Above knee amputation deformity.

2.1 Stump Stereotype

The ideal residual limb plays a very important role in the late prosthetic fitting. The ideal residual limb should achieve: (1) Proper length; (2) The residual limb has normal joint movement, good muscle strength, and no contracture deformities; (3) The residual limb is covered with moderate soft tissue, without tenderness, bone spurs, or neuroma, (4) and the disabled no swelling of the limbs, good skin condition, moderate skin tension, no adhesions, no ulcers, no sinuses. After amputation or repair of the residual limb, the soft tissue of the residual limb undergoes greater trauma, and causes such as capillary rupture can lead to edema. With time passed, the edema can be slowly absorbed without complications such as infection. Wrap the elastic bandage in time after the operation to help reduce the swelling and shape of the residual limb. As is shown in Figure 2, use the eight-character winding method when winding, follow the principle of tightening

down and loosening up, 30-40 minutes each time, relax 2-4 times a day, and continue bandaging at night. After amputation, the patient's affected limb stump is wrapped and shaped with a medical elastic bandage, which can not only reduce the pain of the phantom limb, but also facilitate the shaping of the limb stump, shorten the time to install the prosthesis, and it is of great significance to improve the patient's quality of life (Deng 2012).

2.2 Functional Training before Assembly

Before the prosthesis is assembled, in order to achieve the ideal rehabilitation effect, the patient needs to undergo systematic rehabilitation training. Through training, patients can restore physical fitness, improve cardiopulmonary function, strengthen muscle strength, maintain or improve joint mobility, and make adequate preparations for wearing prostheses.

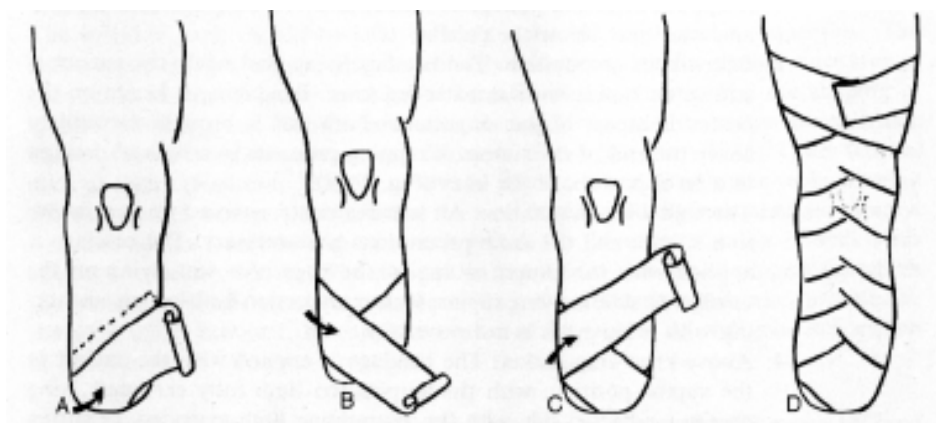


Figure 2: Horoscope bandage wrapping

2.2.1 Strength Training

In patients with thigh amputations, due to the different amputation planes, the reduction in the number of muscles that control a certain movement will be different, resulting in unbalanced muscle strength and deformity. The common deformity after thigh amputation is flexion and abduction. Therefore, in order to prevent the appearance of this deformity, muscle strength training should be added early after the amputation to strengthen the muscle strength on the side with insufficient muscle strength. For abduction deformities, the muscle strength of the adductors of the thigh should be increased; for flexion deformities, the muscle strength of the hip extensors should be increased. Muscle training can help patients improve muscle strength and better control the position of the residual limb (Xiao 2016). Early functional exercise can be combined with physical factor therapy, which can effectively relieve the patient's stump pain and enhance the patient's stump muscle strength (Dilinuer 2020).

2.2.2 Range of Motion Training

For hip joint function disuse syndrome and long-term immobilization, the joint deformity, contracture, etc. caused by the limitation of joint range of motion, the effective traction of the joints of the patient, and encourage the patient to actively move, in order to effectively improve joint function (Bao 2015).

2.2.3 Balance Training

Due to amputation, the body's center of gravity often changes, causing the body to compensate and appear unstable. Suspension training can strengthen the body's core muscles, thereby improving the stability of the patient's trunk and pelvis, strengthening the

core control ability, and enhancing the patient's walking stability and balance ability (Sun 2019). It can be prepared for the later adaptation of the prosthesis.

2.2.4 the Placement of Residual Limbs and the Prevention of Deformities

In addition to unbalanced muscle strength, patients with thigh amputation can also cause deformity due to abnormal posture. Therefore, after amputation, you should pay attention to the placement of the residual limb to avoid too high a residual limb for a long time, which increases the possibility of flexion deformity; or put something (such as a pillow, cushion, etc.) between the legs to increase the possibility of abduction deformity.

The correct posture of amputee patients which is shown in Figure 3 include: (1) In the supine position, lying on a hard board with the two legs tied together, and the pelvis should be kept in a horizontal position; (2) In the uninvolved side lying position, the affected limb should be up and healthy. Side down, keep the affected limb in a naturally straight posture; (3) In the prone position, keep the hips flat on the bed with your legs close together. It is best to sleep on your prone for 1 to 2 hours a day; (4) When sitting, the body stands upright, with the center of gravity between the legs, and the legs of the amputee patient are brought together.

In the daily rest process, you can use elastic bandages to tie the residual limb and the healthy side together. Pay attention to controlling the normal body posture, the size of the effective binding area, the length of the effective arm, the binding time and the amount of force applied. It can avoid other problems caused by the occurrence of control deformities.

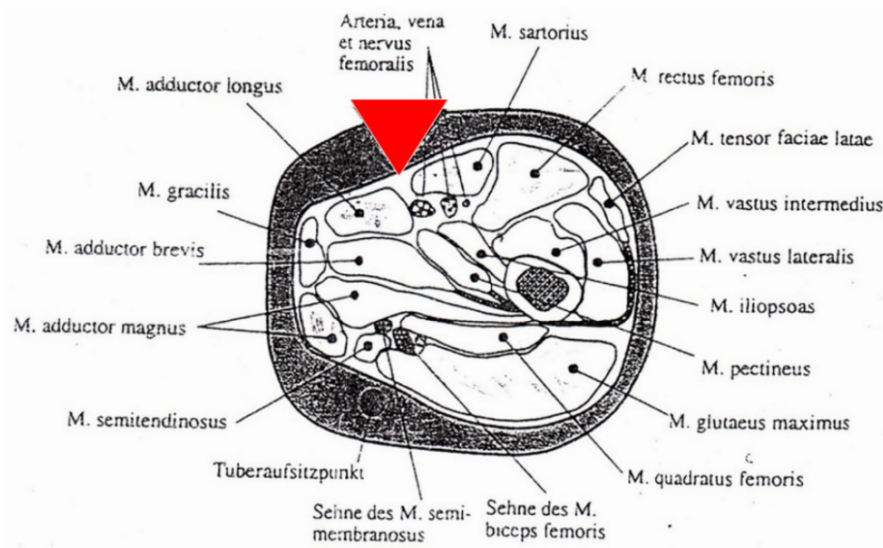


Figure 3: Schematic diagram of thigh muscles.

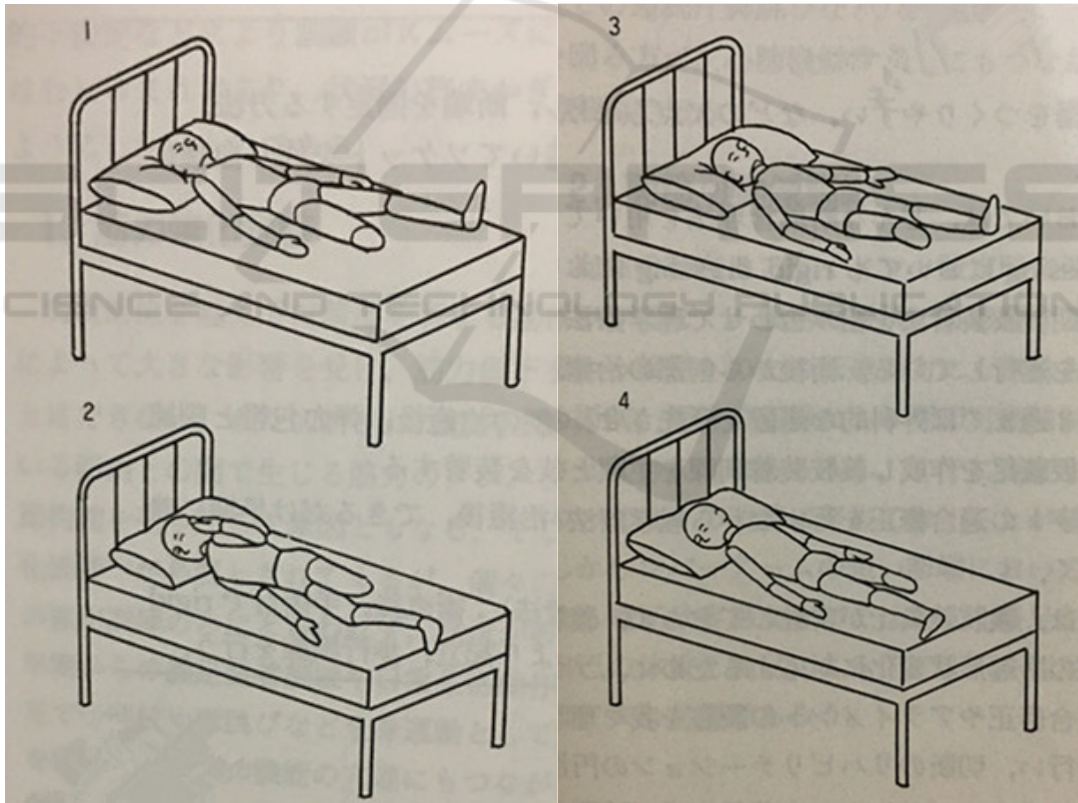


Figure 4: Good stump placement.

3 CONCLUSIONS

Due to the frequent occurrence of accidents and the impact of diseases, the number of patients with thigh

amputations is increasing year by year, but postoperative muscle atrophy, stump deformity, and stump pain are prone to occur, which affects the patient's prosthetic fit and quality of life.

At the same time, it effectively prevents and alleviates the occurrence of deformities, which not only provides aesthetics for patients, but also provides convenience for the production and wearing training of prostheses that are adapted in the later stage. Early rehabilitation training after amputation plays a very important role in shaping the residual limb, restoring function, and preventing deformity. It is worthy of promotion by clinical and rehabilitation teams.

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