

Physical Therapy in the Pre and Post the Transtibial Amputation

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Abstract

Patient, 62, male, suffered a fall in his residence and suffered a distal 1/3 intra-articular tibia fractures (type of tibial pilon fracture, Grade III), held a surgery for bone reconstruction with the need to use metallic synthesis, later came to develop osteomyelitis, achieve chronic and severe stage. He don't responded to antibiotics, it was decided to perform the amputation member. From the time when the first operation after fracture and to make the second transtibial amputation, intense physical therapy for 06 weeks was carried out, with positive results in a short period of time, it appears that the treatment of pre amputation accelerates the process of prosthesis, gait, balance and therefore the return of their activities of daily living.

Keywords: Fracture in pylon; Osteomyelitis; Amputation

Introduction

With aging, the postural and structural changes leading to increased risk of falling among elderly [1]. Among the many existing consequences of a fall, the fracture is considered the most severe [2], often leading to death this patient. In some cases the main treatment for the fracture is surgery, where this procedure may be subject to complications such as rejection, infectious processes, and within the infectious osteomyelitis is more concern that in chronic stages and more advanced, can lead to amputation of affected member [3]. Amputation is a traumatic procedure, when it affects the lower limbs leads to altered gait, balance and in their daily activities ADL. After the amputation the roles of physiotherapy is essential and of great importance to the rehabilitation and treatment of this patient [4], but the effects of physiotherapy performance in the pre amputation period have not yet been described. What justifies the importance of this first article correlating the pre and post the transtibial amputation.

Case Study

Patient RS 62, smoker, male, driver, sedentary, BMI 20:46, had a fall at his home about 02 meters high, landed on his feet. The fall caused a physeal fracture of the fibula and left tibia with intra-articular involvement, (fractures of the tibial pilon, type III) [5], which is a relatively uncommon fracture therefore affects only 1% of the fracture of the lower limbs [6,7]. Following the classic protocol of this type of fracture, surgery was indicated immediately with the need to metallic syntheses. After surgery, was referred to the physiotherapy treatment, with the passage of time, the patient developed an infection osteomyelitis, affecting mainly the tibiotalar region, reaching a chronic stage after an infection period and unmatched by 6 months [7].

As I had a bone changes due to a bad calcification and with a lateral rotation of 47 feet compared to the midline of the tibia and presenting an infection that only increased, it was then decided to limb amputation at the time of the proximal 1/3 the tibia. Being a particular system, there was a slowdown in the process to the amputation of

about 45 days, during this period involved an intense physical therapy work for 06 weeks.

Treatment

Patient assessment was conducted in 3 periods, at the beginning of treatment, on the last day of pre amputation physiotherapy and return after the amputation to analyze muscle strength. To analyze Berg-BSE [8], Balance Scale and Tegner Lysholm [9] questionnaire assessment of the patient's assessment also took place in three periods at the beginning of treatment, on the last day of pre amputation physiotherapy and end of the patient fitting. The process has commenced physiotherapy with weakness muscle strength in the lower limbs, with use of two auxiliary crutches, had 39 points on the scale of Berg-BSE balance and Tegner Lysholm with score 4, this Tegner Lysholm questionnaire was evaluated only the items that could be compared later amputation items were limping, support, climbing stairs and squatting.

According to the assessment made were made a gain of labor force and resistance in the lower limb in open kinetic chain (4 × 12 repetitions series with 4 pounds), strengthening of the active-assisted type, active-free and isometric quadriceps muscles of hamstrings, adductors, hip abductors and gluteus (4 × 16 with 2 pounds), seeking muscular balance. Were also carried out series of hip flexor stretch, quadriceps, hamstrings and gluteus (3 × 10 for 25 seconds) and performed gait training in parallel bar with obstacles. The exercises performed the proprioceptive type were carried out in dyne disc (5 minutes), trampoline (2 × 10 minutes) and work with the ball in the hip region, associated with weight bearing in his left leg, to prepare the member for the post gait training to amputation. The study lasted for 06 weeks up to 02 days before surgery to amputation where the second evaluation was made.

After 10 days you have performed the amputation of the proximal third of the left tibia, the patient has initiated rehabilitation and again was evaluated, kicked off with cryotherapy for 20 minutes on the stump for reduction of edema, laser using low power and helium neon (Ne) around the incision site with power of 5 Joules, seeking to improve healing, ultrasound still 1MHz for 3 minutes to reduce

inflammation, always passing instructions on proper positioning of the stump, the importance of using and way proper bandaging and giving birth to desensitization work stump. The prescription specifies the prosthesis and subsequently gait training that was conducted after 25 days of the start physical therapy.

Results

In the period from 06 weeks of treatment the results found with respect to an increase in this way muscle strength during treatment and a decrease does not return severe post amputation when compared to the start of treatment. In Table 1 we have the muscle strength ratio found at the beginning of treatment and during treatment.

Muscular force

With regard to balance the results showed an improvement in their framework (Table 2), where the analysis shows the initiation of treatment compared to the final stage.

Muscles	A	B	C
Quadriceps	3	5	5
Hamstring	3	5	5
Abducts Thigh	3	5	5
Adducts Thigh	3	5	5
Gluteus Medius	3+	5	4+
Gluteus Maximus	3+	5	4+

Table 1: A) Beginning of treatment. B) Last day of pre amputation physiotherapy. C) Return after amputation.

Reviews

Questionnaire	A	B	C
Berg-EEB	39	52	49
Tegner Lysholm	4	11	18

Table 2: A) Beginning of treatment. B) Last day of pre amputation physiotherapy. C) Finish the fitting.

Discussion

The benefits of having done physical therapy before amputation cam after the surgery, because we found a patient with muscle strength in the lower limbs ranging from grade 5 and grade 4+, different from the beginning of the treatment. Another great benefit was the high balance that had 49 points compared to the beginning with 39 points scale of Berg-BSE balance, these results showed an evolution of the initial state When compared to the end outcome. With aging the body changes are numerous, such as loss of muscle mass, biomechanics and postural changes, and increased balance deficit (increasing the risk of falling). Being considered the great fragility factor the fall can lead numerous sequels or even the death of the elderly directly or Indirectly way [1,2]. The factor related to loss can be determined by specific causes may be intrinsic nature (associated with the individual) or

extrinsic (which is related to the environment), thereby resulting in high risk fracture [2].

The tibial pilon name was Introduced in 1911 by the French radiologist Etienne Destot which to describe the distal metaphysis of the tibia, so he compared to the hand mortar used by pharmacists to grind small quantities, this instrument called by the French the "pilon" in 1950 Bonnin [10], focusing on the involvement of tibiotalar joint venture called this "ceiling" (ceiling), highlighting the seriousness of this type of tibial pilon fracture [11]. Where is caused by trauma of high kinetic energy, where the metaphyseal-epiphyseal fragments impacted are solid metaphyseal. He is also known as axial compression and usually caused by trauma falling from great heights or traffic accident [5,6]. It is usually associated with severe soft tissue injuries associated with foot and ankle edema great causing bleeding from blisters, predisposing to infection [12].

Treatment of fracture pylon type is immediate surgical and Indicated before the first six hours elapsed post trauma [8]. An aggravating the existing risk within the surgical procedure is the hematogenous osteomyelitis, which is a bone infection caused by pyogenic bacteria proliferate in the bone tissue after spread by movement sanguine. The degree of their involvement and successful treatment is defined According to the speed is detected the diagnostic. It's more chronic stages the disease can lead to amputation of the limb or even the affected death [9].

The most frequent causes of lower-limb amputations are vascular, traumatic, infectious and neoplastic [13,14]. Amputation has dramatic consequências in terms of functional abilities and quality of life because of its impact on a person's static and dynamic balance as well as confidence in his/her balance abilities [14]. To improve functional abilities in amputees, balance retraining during the rehabilitation process is crucial [14]. Current clinical practices in the rehabilitation of amputees aim to improve balance and gait. The purpose of rehabilitation interventions is to usually increase the strength of the healthy and the residual limb, the patient's flexibility, cardiovascular capacities, and balance [14]. However, few studies have demonstrated such benefits with different intervention methods [14].

The problem after amputation is edema and decreased muscle mass. The edema, supported by the shrinking program, will largely during the first two postoperative months subside, while muscle atrophy may keep for many months [15]. During the postoperative period of an amputation, the process is many limiting barriers such as phantom limb rehabilitation, balance disorders, muscle weakness and imbalance, and presence of neurona, stump deformities, bone spurs and ulceration at the end of stump [16,17]. Thus, the results showed Increased strength and balance, contributed to the post amputation rehabilitation. In addition, the treatment performed after amputation was extremely also important, the use of cryotherapy, laser, bandaging and desensitization of the stump, necessary for rehabilitation and prevention of deformities, and the maintenance of skeletal muscle functions altered [18-21]. During the rehabilitation period the goal of physical therapy is muscle strengthening, balance exercises, gait training, and functional training programs demonstrated small to large effect size gait performance improvements in people with lower limb amputation [22,23]. These objectives were found at the end of the treatment of this patient with analysis performed in this case study.

Conclusions

This article is the first to demonstrate that physical therapy in pre amputation period gives good results as muscle improves strength, balance, coordination, gait training and proprioceptive training. And after amputation period was observed a better balance, a preserved muscle mass, making the fitting and speed training with the prosthesis at an accelerated rate. So, but research is needed to prove the effectiveness of physiotherapy in the pre amputation period and prove our results.

References

1. Zheng J, Pan Y, Hua Y, Shen H, Wang X, et al. (2013) Strategic targeted exercise for preventing falls in elderly people. *J Int Med Res* 41: 418-426.
2. Fang X, Shi J, Song X, Mitnitski A, Tang Z, et al. (2012) Frailty in relation to the risk of falls, fractures, and mortality in older Chinese adults: results from the Beijing Longitudinal Study of Aging. *J Nutr Health Aging* 16: 903-907.
3. Ovaska MT, Mäkinen TJ, Madanat R, Huotari K, Vahlberg T, et al. (2013) Risk factors for deep surgical site infection following operative treatment of ankle fractures. *J Bone Joint Surg Am* 95: 348-353.
4. Rau B, Bonvin F, de Bie R (2007) Short-term effect of physiotherapy rehabilitation on functional performance of lower limb amputees. *Prosthet Orthot Int* 31: 258-270.
5. Kiene J, Herzog J, Jürgens C, Paech A (2012) Multifragmentary tibial pilon fractures: midterm results after osteosynthesis with external fixation and multiple lag screws. *Open Orthop J* 6: 419-423.
6. Mandi DM, Belin RP, Banks J, Barrett B (2012) Pilon fractures. *Clin Podiatr Med Surg* 29: 243-278.
7. Miyamoto ST, Lombardi Junior I, Berg KO, Ramos LR, Natour J (2004) Brazilian version of the Berg balance scale. *Braz J Med Biol Res* 37: 1411-1421.
8. Berg K, Wood-Dauphinée S and Williams JI (1989) Measuring balance in the elderly: preliminary development of an instrument. *Can J Public Health* 41: 304-311.
9. Tegner Y, Lysholm J (1985) Rating systems in the evaluation of knee ligament injuries. *Clin Orthop Relat Res* : 43-49.
10. Destot EAJ (1911) *Traumatismes du Pied et Rayons X: Malleoles, Astragale, Calcaneum, avant-Pied*. Paris, Ed. Masson, 1-10.
11. Bonnin JG (1950) *Injuries to the ankle*. William Heinemann Med Books Ltd., London, pp 248-260.
12. Rommens PM, Claes P, Broos PL (1996) Therapeutic strategy in pilon fractures type C2 and C3: soft tissue damage changes treatment protocol. *Acta Chir Belg* 96: 85-92.
13. Johannesson A, Larsson GU, Ramstrand N, Turkiewicz A, Wiréhn AB, et al. (2009) Incidence of lower-limb amputation in the diabetic and nondiabetic general population: a 10-year population-based cohort study of initial unilateral and contralateral amputations and reamputations. *Diabetes Care* 32: 275-280.
14. Tousignant (2015) Assessment of the Feasibility of the Nintendo Wii Balance Board as an Intervention Method For Balance Rehabilitation with Lower-limb Amputees. *J Nov Physiother* 5:1.
15. Tantua AT, Geertzen JH, van den Dungen JJ, Breek JK, Dijkstra PU (2014) Reduction of residual limb volume in people with transtibial amputation. *J Rehabil Res Dev* 51: 1119-1126.
16. Malizos KN, Gougoulias NE, Dailiana ZH, Varitimidis S, Bargiotas KA, et al. (2010) Ankle and foot osteomyelitis: treatment protocol and clinical results. *Injury* 41: 285-293.
17. Willian LM, Rodrigues de CP, Cristine KK, Romanovitch RDI (20011) Effect of isostretching on balance of amputees: a case study. *Fisioter mov* 24: 689-696.
18. DeLuccia, Nelson, *Reabilitação pós-amputação*. Angiologia e cirurgia vascular: guia ilustrado. Maceió: Uncisal/Ecmal & Lava (2003).
19. Pastre Carlos M, Salioni Juliana F, Oliveira Bruno A F, Micheletto Marcos and Netto Júnior Jayme (2005) *Fisioterapia e amputação transtibial*. *Arq Ciênc Saúde* 12: 120-124.
20. Hoffman M1 (2013) Bodies completed: on the physical rehabilitation of lower limb amputees. *Health (London)* 17: 229-245.
21. Dorta, Haron Silva (2014) *A Atuação da Hidroterapia na Lesão do Ligamento Cruzado Anterior (LCA)*. *Brazilian Journal of Health* 2.
22. Wong CK, Ehrlich JE, Ersing JC, Maroldi NJ, Stevenson CE, et al. (2014) Exercise programs to improve gait performance in people with lower limb amputation: A systematic review. *Prosthet Orthot Int* .
23. Dorta, Haron Silva et al. (2015) *A atuação da fisioterapia na luxação traumática de joelho*. *Revista Pesquisa em Fisioterapia* 4.