

The Application of Echo-Guided Injection of Steroid and Botulinum Toxin Type A for Ankle Contracture in Traumatic Trans-Metatarsal Amputation: A Case Report

Tang SF*, Wang CY, Hsieh YT and He CS

Lodong pohai hospital, luoding, Yi-Lan

*Corresponding author:

Simon F Tang,
Lodong pohai hospital, luoding,
Yi-Lan, Tel: +886933586693,
E-mail: fttang1239@gmail.com

Received: 25 Nov 2020

Accepted: 11 Dec 2020

Published: 15 Dec 2020

Copyright:

©2020 Tang SF et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

Citation:

Tang SF, The Application of Echo-Guided Injection of Steroid and Botulinum Toxin Type A for Ankle Contracture in Traumatic Trans-Metatarsal Amputation: A Case Report. Clinics of Surgery. 2020; 4(3): 1-3.

Keywords:

Echo guide injection; traumatic foot amputation; botulinum toxin type A injection; Ankle contracture

1. Abstract

In this report we share a young man with traumatic trans metatarsal amputation treated with multiple operations after few weeks of surgery. Foot equinovarus deformity was noted which leads to walking disability and affects daily activities. Patient was referred to us from orthopedic doctor because he hesitated to have another operation for Achilles tendon lengthening. During the physical examination, equinovarus foot with hip contracture were observed which may be caused by muscle imbalance or nerve injury. Nerve conduction velocity and electromyography tests (NCV/EMG) was arranged for differentiating between neurogenic contraction and myogenic contracture.

After nerve conduction study and electromyography (NCV/EMG) exam, sonography was used for checking muscle lesion. And hip joint tapping with local injection of steroid was performed for hip flexion contracture. Then we calculated doses of botulinum toxin A and injected into tightness leg muscles under sonographic guide. With a few weeks of inpatient rehabilitation program, he could walk with walker. Then supra malleolar orthosis (SMO) was prescribed for him and a few weeks later he could use regular cane for ambulation.

In some traumatic amputations, it's not unusual for patient who underwent staging operation treatment with long term bed rest and then developed adjacent joint deformity. To have another operation is a huge pressure for the patient both mentally and physically.

So providing a conservative treatment for patient who is hesitated to operation is another choice.

2. Introduction

In foot amputation patient, there are two major causes which are traumatic and avascular amputation. Traumatic amputation is rarer than avascular amputation. However, the patient who is in the first group are relatively young, which makes postoperative rehabilitation and functional recovery very crucial when they are back to the society. Residual limbs usually undergo multiple debridement's and reconstructive operations, so long term bed rest and pain become the major causes of contracture and disability.

3. Case Presentation

The reported case was a 21-year-old man whose left foot was crushed by a solid concrete block during work. After several debridement's, toe amputation and flap transplantation by using left thigh skin (Figure 1a, b), the patient gradually developed foot deformation even under routine rehabilitation therapy and proper splint use. The development of hip contracture and the ankle joint inversion caused his gait deviation and he could not walk independently (Figure 2).

After discussing with orthopedics, the recommendation was to lengthening the Achilles tendon by Z-Plasty, but the patient wish to be treated with conservative method first since he had already undergone multiple operations.



Figure 1a: X-ray of Left ankle after amputation surgery



Figure 1b: Left equinovarus foot deformity after last operation and debridement



Figure 2: Toe walking pattern with walker assist before echo guide exam and treatment

Physical examination revealed left ankle with plantar flexion fixed at 30 degrees, the angle of ankle inversion fixed at 30 degrees and the left hip joint flexion is at 16 degrees while lying down. During Ambulation training he needed walker support with abnormal gait pattern (During the stance phase, there were impaired left heel strike, foot flat, midstance and push off). In addition, muscle skeletal ultrasound examination of left hip joint, a wide range of hypoechoic lesion at iliopsoas was found. And left ankle ultrasound exam revealed effusion over anterior recesses, thickness of retro-

calcaneal bursa and hypoechoic changed over tibialis posterior tendon.

Nerve conduction study and electromyography(NCV/EMG) study was arranged to exclude peroneal nerve injury which may cause ankle muscle imbalance and then lead to ankle equinovarus contracture. In NCV/EMG study, incomplete left tibial nerve branch to flexor digitorum brevis (FDB) muscle was the only nerve injury that we recorded, which means nerve injury may also have contributed to his ankle deformities.

4. Methods

Ultrasound-guided injection with betamethasone on the iliopsoas muscle. For left ankle contracture, transparent fluid was aspirated from the anterior recess of ankle. In addition to echo-guided injection with betamethasone into the retro calcaneal bursa and along the tibialis posterior tendon. Joint mobility was improved right after aspiration and injection, the plantar flexion angle was reduced from 30 degrees to 20 degrees, the ankle inversion angle was reduced from 30 degrees to 20 degrees, and the hip flexion angle was reduced from 16 degrees to 0 degree (Table 1).

Two days after steroid injection, botulinum toxin was injected into the left gastrocnemius lateral and medial head each for 100U, the soleus muscle 100U, the tibialis posterior muscle 50U, and the flexor hallucis longus 50U (Table 2).

Table 1

Betamethasone injection	Before	After
Plantar flexion	30	20
Ankle varus angle	30	20
Hip Flexion	15	0

Table 2

Unit of Botulinum toxin A injection	
Gastrocnemius lateral/medial Head	100/100
Soleus Muscle	100
Tibialis Posterior Muscle	50
Flexor hallucis longus	50

5. Results

After one week of rehabilitation program, plantar flexion could achieve 0 degree and the angle of ankle inversion became 5 degrees (Table 3). The supramalleolar orthosis are used for ambulation training (Figure 3). After 6 months follow up patient could be walking independently without weakness.

Table 3

Botulinum toxin A injection	Before	After
Plantar flexion	20	0
Angle of the inversion	20	5



Figure 3: 3 days after echo guide botulinum toxin type A injection therapy. Patient could use quad cane with orthopedic insole walking independently

6. Discussion

Equinovarus deformity can be divided into congenital such as cerebral palsy and acquired which usually caused by stroke [5], traumatic brain injury or trauma. After echo-guided botulinum injection and proper rehabilitation program, most patient has significant improvement. But current articles about foot deformity caused by traumatic amputation and corrected with botulinum toxin type A injection are relatively rare.

There are some mechanisms to cause acquired equinovarus deformity. The most common reasons are the calf muscle spasm, shortening of the calf Triceps-Achilles tendon and the weakness or imbalance of the dorsiflexors [1]. Early rehabilitation and neuromuscular electro stimulation after botulinum injection can help increase the effect of botulinum injection [2].

However, patients are not particularly response to conventional treatment in the cases which equinovarus was caused by shortening of the triceps surae-Achilles tendon complex, the dorsiflexor weakness and the tibialis anterior-peroneus longus muscle dysfunction [1]. They were usually corrected by surgery. But here we report the effects of selective echo-guided Botulinum toxins injection on the gastrocnemius lateral and medial head, tibialis posterior muscle soleus muscle and flexor hallucis longus for the treatment of flexion spasticity of ankle joint, with combined highly intensive daily rehabilitation program, patient can achieve great success.

At present, botulinum injection therapy has an empirical basis for the improvement of contracture, but there is no definite answer to whether the gait is improved [3]. Thanks to the increasing resolution of ultrasound, soft tissue damage can be defined more clearly, and ultrasound-guided injection therapy can be more precise.

Combined with the application of foot orthosis, the joint contracture, deformation, and even the gait can be effectively improved [4].

7. Conclusion

Ultrasound-guided injection therapy has a significant effect on improving the contracture after amputation. It can be used as an alternative treatment method before surgical intervention. When using muscle skeletal ultrasonography, muscle lesion and effusion could be detected and treat directly. Then further increased joint range of motion and decreased of pain. When combined with active rehabilitation therapy and proper use of assistive devices, it can increase the quality of life and help the patients to return to the society.

References

1. Deltombe T, Wautier D, Cloedt PD, Fostier M, Gustin T. Assessment and treatment of spastic equinovarus foot after stroke: Guidance from the Mont-Godinne interdisciplinary group. *Journal of Rehabilitation Medicine*. 2017.
2. Mills PB, Finlayson H, Sudol M, O'Connor R. Systematic review of adjunct therapies to improve outcomes following botulinum toxin injection for treatment of limb spasticity. *Clin Rehabil*. 2016; 30: 537-48.
3. Karakkattil P, Trudelle-Jackson E, Brown HH, Hammontree P, Okolo M. Outcomes of Botulinum Toxin Type A for equinovarus deformity in patients with CVA: A case series. *Physiother Theory Pract*. 2017; 33: 410-9.
4. Aktürk S, Büyükavcı R, Ersoy Y. Functional outcomes following ultrasound-guided botulinum toxin type A injections to reduce spastic equinovarus in adult post-stroke patients. *Toxicon*. 2018; 146: 95-98.
5. Picelli A, Battistuzzi E, Filippetti M, Modenese A, Gandolfi M, Munari D, Smania N. Diagnostic nerve block in prediction of outcome of botulinum toxin treatment for spastic equinovarus foot after stroke: A retrospective observational study. *J Rehabil Med*. 2020.