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Effective Usage of Supra-Malleolar Orthosis Evades Surgery

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Abstract: ***A case of the polio-affected ankle with an equinovarus condition, with Leg Length Discrepancy having severe pain was treated by Supra-Malleolarorthosis (SMO) effectively. The SMO is designed to maintain a vertical or neutral heel while also supporting the three arches of the foot [(1)]. This orthosis affects the gait, instance phase by controlling ankle instability by application of the three-point pressure system. This helps in improving balance while standing and walking.***

Keywords: Supra malleolarorthosis (SMO), Equinovarus, Medial arch support

1. Introduction

Supra-Malleolar Orthosis (SMO)
SMO is the acronym for Supra-Malleolar Orthosis. The SMO, as with other orthoses, gets its name for the part of the body for which it encompasses. This orthosis supports the leg just above the ankle bones or malleoli. The SMO is considered the shortest of the Ankle Foot Orthoses or AFOs.

The SMO is designed to maintain a vertical or neutral heel, neutral Subtalar joint, while also supporting the three arches of the foot. This helps in improving balance while standing and walking (1).

Indications (2)
- Posterior Tibial Tendon Dysfunction
- Ankle Fracture
- Ankle Instability
- Stroke / Foot Drop / Mild Tone.
- FlatFeet

Basic Components
- Dorsalwrap
- Solid ankle design used to maximize medio lateral (ML) stability
- Often used in conjunction with facilitative modifications for tone reducing the effect.
- Polypropylene, being a thinner plasticmaterial, makes it more accommodative in theshoe.

Control Function
- Medial and Lateral Stability
- Subtalar Control
- Limits Ankle and Mid foot Motion
- Controls mild Foot Drop

Principles of Treatment Polio
Poliomyelitis or Polio is a viral infection affecting the anterior horn cells in the spinal cord and brainstem producing a flaccid motor paralysis (**3).** SMO is used for correction of deformity by either Non-operative or Operative methods. This is followed by maintenance of foot in the corrected position and continued until the foot, and its bones grow up to the skeletal maturity.

Treatment should start as early as possible. The goal is to achieve a functional, pain-free, planti-grade foot with good mobility and without calluses.

The effects of supra malleolar or-thoses on the gait
The supra malleolarorthosis affects the gait, instance phase of the gait cycle, by controlling ankle instability by application of the three-point pressure system. The two dorsal straps provide forces in the downward direction, whereas the base of the orthosis applies equal and opposite force. Also, six forces are applied in equal and opposite direction by the medial and lateral borders of the orthosis, thus maintaining mediolateral stability and tries to keep the Subtalarand ankle joint in neutral position.

2. Case Study

A 42-year-old woman was referred, having pain in the Right ankle since last one year. She has right side polio, affected from the foot to the knee joint. All other musculature above the right knee joint as well as the other side is normal in all aspects. She was prescribed painkiller tablets (Tab. Voveron, 2-3 times a day) depending upon the severity of pain. The condition was so worst that without taking painkiller tablets, she was not able to go to herworkplace.

On observation, she was also having a limping gait pattern, because of Polio affected Leg Length Discrepancy. On evaluation, the patient was having right side foot in equinovarus condition, with stiff musculature and fixed bony deformities.

As informed by the patient, she was hit by a cycle one year ago at talonavicular joint. Her consultant had suggested undergoing surgery to take the chance to relieve the pain. And correct the skeletal deformity. As the patient was not ready to go for surgery, hence, she was referred to the department of Prosthetics and Orthotics.
The sheet took shape of the mold. Then the SMO was cut

according to trim lines. Two dorsal straps were added. A trial was taken with 1cm compensation. During the trial session, minor adjustments were done according to the patient's comfort.

3. Methodology (Fig 1)

Considering patient's requirements, as she was supposed to go to the temple frequently, right side S. M. O. with high medial arch support with 1 cm compensation was prescribed. The cast of right side foot was taken with the help of Plaster of Paris bandages. Markings for weight bearing areas and weight relieving areas were done.

Then, the cast was filled with plaster of Paris powder and converted it into the positive mold. Modifications were done according to the normal anatomical structure. The pressure was applied on weight-bearing areas such as medial longitudinal arch, either side often do-achilles, and toes to give the effect of dorsiflexion. The pressure was relieved from the weight relieving areas such as malleoli. First of all the soft inner lining was made with the help of different soft materials. The support for medial arch was given and the Medial Longitudinal Arch was filled with the help of different cushioning materials so that biomechanically the foot will remain in vertical position. (Arches and Wedges were added according to the body contour, to maintain the foot in vertical position biomechanically).

The measurements were taken according to the size of the positive mold. The molding was done with the help of Polypropylene sheet, thickness 5mm, at 260˚C.

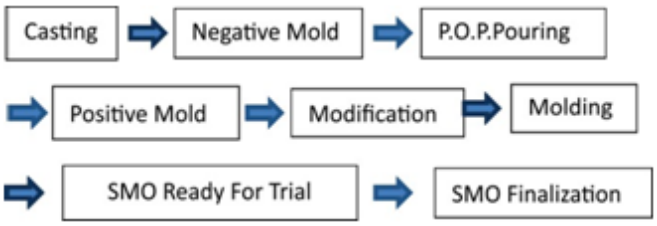

Figure 1: Fabrication Process.

Figure 2: Patient without Orthosis

Figure 3: Patient with Orthosis

4. Discussion

The radiographic details of the ankle joint were not exhibiting any kind of fracture after the injury. It was probably a muscular pain, which was too severe in intensity and hence, the patient was on painkillers on a daily basis. The right side was already affected by polio, hence, had one cm discrepancy, in which the injury on the talonavicular bone led to pain and further equinovarus foot conditions (**Fig 2).** The lateral wedge, under the lateral border of the SMO, was effective in positioning the foot, so that the weight could be transferred to the medial side.

High Medial arch support (3cm) with medial padding and internal compensations could bring the foot into near neutral position (**Fig 3).** This support was helpful for her healing of the injured musculature as well as the biomechanical positioning led to weight transfers, and hence the patient got relief. As per her information, she is now relieved from pain and is not taking any pain killers. She utilized the SMO for 45days religiously. With the pain reduction; she is currently having a better quality of life at her work place.

Source of support: Nil

Conflict of interest: None

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