The Efficacy of Using Reversed Ponseti Technique for Treatment of Congenital Vertical Talus in Restoring the Normal Radiographic Measurement of the Foot

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Abstract

Introduction: Congenital vertical talus is a congenital anomaly of the foot with characteristic rocker foot deformity. On radiographic examination, the talus is vertically displaced in line with the tibia.

Patients and Methods: 46 feet (30 patients) with congenital vertical talus were treated with reversed ponseti method and were evaluated radiologically using standard anteroposterior and lateral talocalcaneal and talofirst metatarsal angles. The angles were measured preoperatively, postoperatively and at a 4 year follow-up.

Results: All the angles were significantly improved reaching the normal radiographic measurement after treatment with reversed ponseti method. The results were statistically significant.

Conclusion: Reversed ponseti technique is an effective method in restoring the normal radiographic measurements in congenital vertical talus feet.

Key Words: Reversed ponseti technique – Congenital vertical talus.

Introduction

CONGENITAL vertical talus is a congenital foot deformity characterized by vertical position of the talus with the navicular articulating with the dorsal aspect of the neck of the talus [1].

The condition was first described by Henken in 1914 and was known as congenital convex pes valgus. It is incidence is estimated to be one tenth of clubfoot deformities (1:100000 births) [2,3,4].

Diagnosis of vertical talus is made by clinical and radiological examination. On clinical examination, the foot has a convex plantar surface and concave dorsal surface with forefoot abduction and equinus deformity [5,6].

The roentgenographic appearance of CVT is so characteristic. On lateral radiograph, the talus is vertical; in the line of the leg making with the tibia an angle of about 180 degrees. The navicular articulates only with the superior portion of the neck of the talus. On the anteroposterior roentgenogram the talus is deviated inward, with subluxation of the navicular and the cuboid outward [2,7,8].

Radiologic evaluation of the foot in congenital vertical talus is made by measuring the talocalcaneal and talofirst metatarsal angles in the anteroposterior and lateral views. The normal talocalcaneal angle is between 20-40 degrees & the normal talofirst metatarsal angle is from 7-10 degrees [9,10,11].

In our series, we evaluated these angles before and after treatment in congenital vertical talus foot with reversed ponseti technique of manipulation and serial casting followed by minimally invasive open talonavicular reduction as described by Dobbs [5,6,12].

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Fig. (1): Roentgenogram of a foot showing the talus in the vertical Position [2].
Patients and Methods

The purpose of this prospective study is to evaluate the efficacy of using reversed Ponseti technique with manipulation and serial casting in restoring the normal radiographic measurement of the foot with congenital vertical talus.

The study was done at the National Institute of Neuromotor system in Cairo, Egypt between 2010 till 2015.

Thirty patients (46 feet) were included in our study. Twenty two patients were males and 8 patients were female. Sixteen patients have bilateral CVT, 14 have unilateral CVT.

The angles were measured using software with measurement tools, Traumaccd.

Results

Patients were evaluated at fixed time intervals; during the first year, they were evaluated every three months then they were evaluated every six months.

The talocalcaneal angles were measured in both AP and lateral views. The angle was measured between the two axis of the talus and calcaneus.

Table (1): Radiological evaluation of the CVT angles.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Preoperative (average)</th>
<th>Postoperative (average)</th>
<th>2 Y follow-up (average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP Talocalcaneal angle</td>
<td>26</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>Lateral</td>
<td>48</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>Talocalcaneal angle</td>
<td>87</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Lateral talofirst metatarsal angle</td>
<td>37</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The average preoperative talocalcaneal angle was 26 (range 18-34) in the AP view and 48 (range 36-61) in the lateral view.

The angles in the anteroposterior and lateral views showed significant improvement postoperatively. The average postoperative talocalcaneal angle was 35 (range 27-42) in the AP view and 31 (range 25-41) in the lateral view.

At the last follow-up, the average talocalcaneal angles were 32 (26-38) and 30 (23-37) in the AP and lateral views respectively.

Regarding the lateral talo-first metatarsal angle, the average measurement was 87 (range 70-90) preoperative and 5 (range 2-9) postoperative which was statistically significant ($p<0.0001$).

At the last follow-up the average lateral talo-first metatarsal angle was maintained at 5 (0-8).
Discussion

A lot of papers have discussed the new method of treatment of congenital vertical talus using reversed ponseti technique of manipulation and casting followed minimal surgical intervention. None of them have described the changes of the foot measurement angles during treatment. The foot angles are an effective method for evaluating the treatment efficacy during management of congenital vertical talus.

The treatment methods was first described by Dobbs who treated 11 patients with manipulation of the of the foot and serial casting to stretch the dorsal and lateral ligamentous structures of the foot in order to reduce the vertically positioned talus. Following casting, a minimal invasive procedure for open talonavicular reduction and percutaneous tenotomy was performed.

Dobbs rely on clinical evaluation of the deformity to monitor the treatment progression without using any angle measurement. In our study, we used the standard angle measurement of the foot to evaluate the treatment outcome.

On the anteroposterior view, we measure the talocalcaneal and talofirst metatarsal angles. The talocalcaneal angle is decreased before treatment because of the conversion of the talus & calcaneus which move gradually to the normal divergent relation with treatment. The talofirst metatarsal angle is increased above normal in the anteroposterior view because of the vertically positioned talus and the abducted foot.

On the lateral view, talocalcaneal and talofirst metatarsal angles are also measured. The talocalcaneal angle measurements are increased on the lateral view before treatment which gradually decreases to the normal value with treatment. The talocalcaneal angle is significantly high in the lateral view because of the vertically displaced talus which gradually restored to its normal values with treatment.

We found the stretching the ligamentous structures in a vertical talus foot of a child before the age of three is capable of restoring the normal anatomic relationship of the bones of the foot with consequently restoring the normal foot angles measurements.

Conclusion:

Treatment of congenital vertical talus using manipulation and serial casting with the principle of reversed ponseti is an effective method of treating the deformity and restoring the normal anatomic bone relations of the foot and consequently restoring the normal radiographic measurements of the foot angles especially the lateral talofirst metatarsal angle.
References


