Evaluation of Ponseti method in the treatment of club foot

Arkab B. Hassan, Firas T. Ismaeel, Younis A. Al-Radhwany.
Dept. of Surgery- orthopedics unit, College of Medicine, Tikrit University

Abstract

Idiopathic clubfoot is the most common congenital deformity of the foot. Various nonoperative treatment regimens have been proposed. Ponseti method is the most recent nonoperative technique in club foot but the results of this method is widely variable in different studies. The aim of our study is to find out the success of Ponseti method in correction of club foot. Between February 2006 to July 2008, 42 patients with club foot were selected, with their age ranging from 1 week to 6 months, but eventually only 35 were included in the study because of poor patients or parents compliance of 7 cases. The study showed that Ponseti method was successful in 85.7% of the cases. The results were better if treatment started earlier. The experience factor plays a role in the success of treatment. The study recommends the use of Ponseti method in the treatment of club foot.

Key Word: dermatofibrosarcoma protuberans, abdominal wall.

Introduction

Idiopathic clubfoot is the most common congenital deformity of the foot. Its characteristic presentation of equinus, varus, adductus, and cavus deformities makes it easily recognizable (Figure 1). The incidence of clubfoot in Caucasian newborns worldwide is approximately one in 1000 births. The prevalence of the condition in the U.S. is one in 500 births. Clubfoot is less common in Japanese and more common in South African blacks and in Polynesians. The male: female ratio is 3:1, and 40% of the cases are bilateral.

The precise cause of idiopathic clubfoot is unknown, but clubfoot seems to be a developmental deformity that occurs during the second trimester of pregnancy. With prenatal ultrasonography, the earliest that clubfoot can be detected is at 12 weeks gestation.1,2

The goal when treating idiopathic clubfoot is to achieve a foot with appearance and function that is nearly normal. The majority of clinicians agree that initial treatment should be nonoperative.1 Various nonoperative treatment regimens have been proposed: manipulations and serial casting,3 lengthy manipulations by well-trained physiotherapists,4 stretching and strapping,5 and use of Denis Browne-type splints to maintain the correction obtained by manipulation and stretching.6 The reported success rate of standard nonoperative treatment ranges from 11% to 70%.3-15 Some authors state that as a rule non-operative treatment is effective only for mild or moderate deformities.3-6

Typically, the infant undergoes weekly serial casting for three to six months (figure 2). At that point, it has usually become obvious that nonoperative treatment is not going to succeed and so surgery is recommended. The most frequently used surgical approach is posteromedial release, which has many variations.7,12,15-22 However, long-term follow-up studies have shown that the results of surgical treatment are disappointing. Increasing foot pain, weakness, and stiffness often lead to premature arthritis and disability of the foot.8-10,23

Ignacio Ponseti, MD, has championed a nonoperative school of treatment for clubfoot. He reported a satisfactory functional result in 89% of feet.24 The Ponseti technique is effective because it takes advantage of the
kinematics of the subtalar joint. The subtalar joint is not a fixed axis but an axis that changes with foot structure and position. Therefore, subtalar joint movements (pronation/supination) around a moving axis generate complex, continuously altering positions (figure 3).25

In a study conducted by Morcuende et al,26 17 of 157 patients (10.8%) who had undergone Ponseti treatment experienced a recurrence of clubfoot. Of the 17 patients, 15 were noncompliant and two were compliant. A noncompliant patient was 17 times more likely to experience a recurrence than a compliant patient. Clinicians have found that the most challenging aspect of the Ponseti method is to maintain compliance with the bracing protocol (figure 4).27

During the past decade, doctors, parents, and patients have become increasingly interested in Ponseti’s method of treating idiopathic clubfoot.28 The technique has been refined over the years, and we have come to realize the necessity of hyperabduction of the foot in the last cast and long-term use of the foot abduction brace.29

The aim of this study is to evaluate the effectiveness of Ponseti method in the management of club foot.

Patients and Methods

The study was carried out in Tikrit teaching hospital during the period between February 2006 to July 2008. 42 patients with club foot were selected, with their age ranging from 1 week to 6 months, but eventually only 35 were included in the study because of poor patients or parents compliance of 7 cases. We have done a weekly manipulation and casting [according to Ponseti method: Ponseti uses the thumb as counterpressure on the head of the talus laterally, and gently abducts the foot around the talus. In the first cast, it is important to elevate the first ray (supination) while abducting the forefoot. As the foot is abducted, the heel and foot varus deformity spontaneously corrects to a valgus position without touching the calcaneus .

Grasping the calcaneus prevents it from abducting and causes iatrogenic deformation of the midtarsal bones and joints.]25 in the out patient unit, until correction of the foot occurred (around 6 weeks), then a heel cord tenotomy done for most of the cases in the theater, some patients under GA and some under local anaesthesia. Then cast is applied for 3 weeks, then it removed and a Denis Brown splint is applied for 3-4 months continuously and then only at night for another 2 years.

The data were analyzed statistically using X2 and P value to assess the statistical significance of our results.

Results

Thirty five cases were included in this study (23 males and 12 females), their distribution according to the age of starting treatment is shown in (table 1). Nine cases (26%) of them were bilateral (figure 5).

This study showed that with ponseti method the success rate was as high as (85.7%), while in 14.3% of the cases the treatment was failed (table 2).

Table 2 also reveals that the earlier the treatment is started the better outcome, therefore, in the group of patients started treatment with Ponseti method before 2 months of age they had 100% success rate, compared to those cases started the treatment after 4 months of age had successfully treated in only 50% of cases. From the five failure cases three cases were really recurrent cases.

This study was started initially with 42 patients, but 7 cases were excluded because of poor patients or parents compliance to the frequent casting or to the abduction brace (figure 6).
Figure 7 showing that in most of the cases the deformity was corrected after 5-6 castings (31.4% of the cases after 5 weeks and 37.2% after 6 weeks). Only 2 (5.7%) cases required more than 7 castings.

The present study reveals that most of the failure cases were in the first cases of starting this study, that’s to say that the experience factor is valuable in the success of treatment of club foot with Ponseti method.

**Discussion**

The present study reveals that about two third of the cases were male, and that about 26% of the cases were bilateral. This finding was statistically significant (P value <0.05) agreeing with previous studies by Bensahel and Porat.4,17 on the other hand the bilateral cases were as much as 40 % in other studies according to Bradley.30

The success rate of Ponseti method in this study was 85.7% and 14.3% failure rate. This finding is statistically significant (P value < 0.05). The success rate was noted to be significantly different in different studies ranging from 70% to 98% (Bradley and Jose).30,31 This difference in the success rate of treatment may be due to the difference in the surgeons experience with this method. This finding reinforce the result of this study revealing that most of the failure cases were in the first cases included in the study, augmenting the idea of the importance of the experience factor in the success of Ponseti method, and that the success rate increased by training.

This study clarified that the earlier the age of starting treatment, the better the outcome will be (table 2). We noticed that the success rate can be as high as 100% if treatment started before 2 months of age, nevertheless the success can be as low as 50% if treatment is delayed. These readings were statistically significant (P value <0.05). The reasoning of this finding is easily interpreted by the structural changes in the bone and soft tissues with the patients becoming older, the ligaments will be more tight, tough and shorter. Leading to more difficulty in treating club foot.31

In this study 83% of the patients (and their parents) were compliant and 17% were not. This was statistically significant (p value <0.05), and when compared to other studies24,30,31 done by Laaveg, Bradley and Jose the compliance was almost 100%. The patients and parents incompliance was mostly for bracing and in few cases for casting because of frequency of manipulation and casting, adding to the factors above low educational and socioeconomic level of most of the incompliant cases.

The frequency of casting until the achievement of full correction was found to be after 5-6 times of weekly changing the cast. This finding was statistically significant (p value <0.05). In previous study (by Jose) the full correction was achieved after 2-4 times of weekly changing the casting31.

The present study recommended the followings:- That Ponseti method is a successful in the management of club foot, we recommend to depend it as first choice regimen in our health institutes. Also, to develop a training program for Ponseti method in most of our hospitals. And, to elevate the health educational level and to focus on the importance of early treatment of club foot.

**References**

22. Simons GW. Complete subtalar release in club feet. Part II: comparison with less extensive


31. Jose A. Morcuende, MD, PhD, Lori A. Dolan, PhD(c), Frederick R. Dietz, MD and Ignacio V. Ponseti, MD. Radical Reduction in the Rate of Extensive Corrective Surgery for Clubfoot Using the Ponseti Method. PEDIATRICS Vol. 113 No. 2 February 2004, pp. 376-380

**Table (1)** Distribution of the patients according to the age of starting treatment with Ponseti method.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 months</td>
<td>9</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>2 – 4 months</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>4 – 6 months</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>12</td>
<td>35</td>
</tr>
</tbody>
</table>

**Table (2)** The relation between the age of starting treatment and the success rate.

<table>
<thead>
<tr>
<th>Age</th>
<th>Success</th>
<th>Failure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>&lt; 2 months</td>
<td>14</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>2 – 4 months</td>
<td>13</td>
<td>86.7</td>
<td>2</td>
</tr>
<tr>
<td>4 – months</td>
<td>3</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>85.7</td>
<td>5</td>
</tr>
</tbody>
</table>
Evaluation of Ponseti method in the treatment of club foot

**Figure (1)** the deformity of talapesequinovarus (club foot).

**Figure (2)** serial casting according to Ponseti method.

**Figure (3)** the manipulation of club foot according to Ponseti method.

**Figure (4)** the use of abduction brace.
Evaluation of Ponseti method in the treatment of club foot

Figure (5) the percentage of bilateral cases.

Figure (6) the patients and parents compliance to Ponseti method.

Figure (7) the frequency of casting until full correction of the deformity.