The Complete Subtalar Release In CTEV Correction; Does It Address All Deformities?

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The Complete Subtalar Release In Ctev Correction; Does It Address All Deformities?

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Abstract

Background: Adequate surgical correction of congenital talipes equinovarus (CTEV) is a challenge to orthopedicians aiming to address all aspects of this complex foot deformity. Various exposures have been elucidated with varying results. This study discusses the Cincinnati approach advocated by McKay and whether it addresses the various aspects of clubfoot correction.

Methods: Complete subtalar release using the circumferential Cincinnati incision was done in 43 feet of 30 patients aged between 6 months to 3 years. The right side was involved in 11, the left in 6 and bilateral involvement present in 13 cases. All cases were found to be resistant to correction by the conservative method proposed by Ponseti.

Results: The patients were followed up for a minimum period of 2.4 years. Excellent results were seen in 18%, good in 46%, fair in 20% and poor in 14% cases. More than half of the cases had a preop talocalcaneal index of 21-30 percent which converted to 51-60 percent after surgery.

Conclusion: The Cincinnati approach is ideal to achieve pantalar reduction, is cosmetically more acceptable and gives a better range of motion.

Introduction

Congenital talipes equinovarus (CTEV) or clubfoot is one of the commonest foot deformities and its incidence is approximately one in every 1000 live births [1]. It is a complex deformity that is notoriously difficult to correct. Corrected, it has a tendency to recur until the age of six or seven years [2]. Manipulative treatment, though effective when instituted early, has also resulted in increased cavus deformity, rocker bottom deformity, longitudinal breech, flattening of the proximal surface of talus, lateral rotation of the ankle and increased stiffness of the ligaments and joints [3,4,5].

To avoid these distressing outcomes, early and primary operative treatment of clubfoot is advised [2]. In 1978, Turco introduced the one stage soft tissue posteromedial release [6]. The posteromedial release of Turco has been used for a long time with good results in most CTEV cases but it was always felt that this procedure did not address the deformities on the lateral aspect i.e. the peroneal tendons and retinaculum, sural nerve, calcaneofibular ligament, bifurcate ligament, lateral joint capsule, dorsal calcaneocuboid ligament, EDB origin etc. which remain unexposed. These structures must be released to reverse the tethering of the posterior calcaneus to the fibula and to allow calcaneocuboid relocation to correct the midfoot and forefoot adduction and varus as well as talar relocation into the medial column [7]. Carroll and Gross advocated a twin-incision approach using a posterolateral and a medial incision to improve access, especially on the lateral side but the cosmesis and correction were less desirable.

Douglas McKay introduced a circumferential release of the posterior, medial, lateral and plantar aspects of the foot which is now the preferred exposure at the Mayo Clinic as well [7]. The advantages with this approach are that it provides excellent exposure of the subtalar joint and is useful in patients with a severe internal rotation deformity of the calcaneus and allows increased visualization of the medial, lateral, plantar and posterior structures with simultaneous evaluation of the released structures in a sagittal, frontal and transverse fashion [7,8]. The lateral extension of the incision allows clear access to the lateral structures, thus avoiding the inability of the hockey stick incision to address the lateral deformities.

Materials & Methods

This study was conducted on 30 children (aged between 3 months to 3 years) and 43 feet and the results assessed 2-4 years postoperatively. The purpose was to assess the efficiency of the Cincinnati incision in providing surgical access to the main affectations and the success measured in functional terms 2 years after the procedure.

In our study, all children operated had idiopathic CTEV. Children with deformities secondary to neuromuscular deformities were excluded. For the purpose of this study, we chose the Harold and Walker classification [9]. For the purpose of avoiding bias at the time of compilation of results, we only took Grade 2 or 3
Results

The study was conducted on 30 patients and 43 feet. The age range of the study was between 6 months to 3 years with an average of 1 year and 3 months. The follow up was done for a period of 24-48 months with an average of 36 months. According to the Harold Walker classification 9 feet were of grade 2 deformity and 34 feet were of grade 3. The right side was involved in 11, the left in 6 and bilateral involvement present in 13 cases. Sex wise, 17 cases were males and 13 were females. All cases were found to be resistant to correction by the conservative method of Ponseti. The preoperative talocalcaneal index (TCI) was measured radiographically (Table 2). Maximum number of patients (23) had a TCI from 21-30 degrees i.e.53.49%. The surgery done on all the feet was the one advocated by Douglas McKay [8]. One case required a vertical extension of the incision, two required lateral column shortening out of which one required a medial skin graft. The post operative talocalcaneal index (TCI) in the operated feet was measured radiographically and recorded (Table 3).The commonest post op TCI was between 51-60 degrees i.e. 51%. No intraoperative complications were encountered in 36 feet. Difficulty in skin closure occurred in 5 feet. Difficulty in tendo Achilles lengthening and lateral ray reduction was encountered in one case each. The post operative complications that we encountered during the study are reproduced in table 4. Commonest seen were sloughing, wound infection and pin tract infection.

Discussion

Although clubfoot or congenital talipes equinovarus has been recognized since the time of Hippocrates, its etiology is still incompletely understood [1,2]. The condition is not simply an isolated foot deformity, rather it is a complex three dimensional deformity of the foot consisting of 4 components_ equinus, varus, adductus and cavus deformities [3,5]. Surgical treatment remains the only option for patients with failed conservative treatment assessed by positive telescopy, forefoot adductus, persistently tucked up heel. Attenborough was the first to describe the posterior release reporting a 63% success rate [12]. It is now generally accepted that the posterior release is insufficient to correct the deformity. The more extensile posteromedial release as popularized by Turco proved more successful with 15 year excellent or good results in 84% of patients [15].However, inability to address the tethering of the posterior calcaneus to the fibula due to the lateral structures did not allow complete calcaneocuboid relocation for correction of the midfoot and forefoot adduction and varus as well as talar relocation into the medial column[7]. McKay commented that the surgeons must rid themselves of a deep seated pessimism that surfaces in such statements as “that is a good looking foot for a clubfoot”. At the root of the cause of optimism is the understanding that it is the talocalcaneal joint that has abnormal rotation in three dimensions i.e. sagittal, coronal and horizontal [7].Operative exposure should be sufficient to allow access to the subtalar, ankle, talonavicular and calcaneocuboid joints. It must also allow exposure of the Achilles tendon for tendon lengthening [12]. Carroll and Gross proposed the two-incision approach through posterolateral and medial incisions. This allows good access but is not cosmetically ideal [13]. The more extensive release of McKay allows greater hindfoot correction and better range of motion [12]. The Cincinnati transverse
posterior skin crease incision given by Crawford provides a more cosmetic approach and allows access to the Achilles tendon and the peritalar structures [12]. There are many controversies regarding the treatment of clubfoot. In spite of the best treatment there is a high incidence of recurrence. There are not many long-term follow-ups also. The maintenance devices are also not unto the mark and so the desired results cannot be achieved. The deformity was unilateral in 17 patients and bilateral in 13 and male sex was preponderant which is in agreement with other studies[15,16]. Complete sub-talar release was done with Cincinnati incision. It gave excellent exposure even on the lateral side of the foot. The foot can be corrected fully on table and the important subtalal and talonavicular joints can be reduced under vision and fixed with Kirschner wires. We achieved excellent to good results in sixty five percent of cases. Thus CSTR is the best possible option for achieving a good correction in severe and recurrent cases. The oft repeated axiom is that the failure of clubfoot surgery rests more in the surgeon’s hand than in the child’s foot e.g. incomplete subtalar release does not allow the surgeon to correct the calcaneal rotation beneath the talus. The normalization of the talonavicular and calcaneocuboid joints requires a complete release of these joints[17]. Otherwise, the forefoot adduction will persist.

Conclusion

Full bony repositioning is possible only with the circumferential approach. In the cases of accurate pinning, the previous bony incongruity resolves because of the remodelling potential of bone and cartilage. Failures in bone fixation lead to overcorrection or undercorrection with secondary foot deformities. The circumferential Cincinnati incision provides the surgeon with the best exposure for soft tissue release and bony repositioning. However, it has to be kept in mind that every clubfoot is a personality in itself and same surgical procedure cannot be done in every case. So the surgeon has to decide on table the incision and the structures to be released or lengthened.

Table and Figure Legends

TABLE 1. Harold and Walker classification of clubfoot

TABLE 2. Preoperative talocalcaneal index (TCI)

TABLE 3. Postoperative talocalcaneal index (TCI) in operated feet

TABLE 4. Postoperative complications

TABLE 5. Assessment of results

FIG 1: Lateral release

FIG 2: Medial release

FIG 3: Corrected clubfoot

FIG 4: Preoperative AP and laterali radiographs

FIG 5: Postoperative AP and laterali radiographs

References

Clinical Orthopaedics and Related Research, 1989; 242.
Illustrations

Illustration 1

Lateral release

![Lateral release](image1)

Illustration 2

Medial release

![Medial release](image2)
Illustration 3

Corrected clubfoot

Illustration 4

Preoperative AP and lateral radiographs
Illustration 5

Postoperative AP and lateral radiographs
Illustration 6

Tables

Table 1: HAROLD AND WALKER CLASSIFICATION OF CLUBFOOT

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Foot correctable beyond neutral</td>
</tr>
<tr>
<td>II</td>
<td>Pushed to neutral, but with fixed equinus or heel varus &lt; 20°</td>
</tr>
<tr>
<td>III</td>
<td>Fixed equinus or heel varus &gt; 20°</td>
</tr>
</tbody>
</table>

Table 2: PREOPERATIVE TALOCALCANEAL INDEX (TCI):

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Preop TCI in degrees</th>
<th>Number of feet</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>10-20º</td>
<td>4</td>
<td>9.30</td>
</tr>
<tr>
<td>2.</td>
<td>21-30º</td>
<td>23</td>
<td>53.49</td>
</tr>
<tr>
<td>3.</td>
<td>31-40º</td>
<td>14</td>
<td>32.56</td>
</tr>
<tr>
<td>4.</td>
<td>41-50º</td>
<td>2</td>
<td>4.65</td>
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</tbody>
</table>

Table 3: POSTOPERATIVE TALOCALCANEAL INDEX (TCI) IN OPERATED FEET

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Postop TCI in degrees</th>
<th>Number of feet</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>40-50º</td>
<td>11</td>
<td>25.58</td>
</tr>
<tr>
<td>2.</td>
<td>51-60º</td>
<td>22</td>
<td>51.16</td>
</tr>
<tr>
<td>3.</td>
<td>61-70º</td>
<td>8</td>
<td>18.61</td>
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</tbody>
</table>
Table 4: POSTOPERATIVE COMPLICATIONS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Complication</th>
<th>Number of feet</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wound dehiscence</td>
<td>1</td>
<td>2.32</td>
</tr>
<tr>
<td>2.</td>
<td>Wound infection</td>
<td>2</td>
<td>4.65</td>
</tr>
<tr>
<td>3.</td>
<td>Swelling</td>
<td>1</td>
<td>2.32</td>
</tr>
<tr>
<td>4.</td>
<td>Pin tract infection</td>
<td>1</td>
<td>2.32</td>
</tr>
<tr>
<td>5.</td>
<td>Bronchitis</td>
<td>1</td>
<td>2.32</td>
</tr>
<tr>
<td>6.</td>
<td>Skin slough</td>
<td>3</td>
<td>6.97</td>
</tr>
</tbody>
</table>

Table 5: ASSESSMENT OF RESULTS

<table>
<thead>
<tr>
<th>Result</th>
<th>Number of feet</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Excellent</td>
<td>8</td>
<td>18.60</td>
</tr>
<tr>
<td>Good</td>
<td>20</td>
<td>46.51</td>
</tr>
<tr>
<td>Fair</td>
<td>9</td>
<td>20.93</td>
</tr>
<tr>
<td>Poor</td>
<td>6</td>
<td>13.96</td>
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</table>
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Reviews

Review 1

Review Title: THE PLACE OF SUBTALAR RELEASE IN CTEV

Posted by Dr. Shabir Dhar on 27 Mar 2011 05:16:43 PM GMT

<table>
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<tr>
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<th>Question</th>
<th>Rating</th>
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<tr>
<td>1</td>
<td>Is the subject of the article within the scope of the subject category?</td>
<td>Yes</td>
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<td>2</td>
<td>Are the interpretations / conclusions sound and justified by the data?</td>
<td>Partly</td>
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<tr>
<td>3</td>
<td>Is this a new and original contribution?</td>
<td>No</td>
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<td>4</td>
<td>Does this paper exemplify an awareness of other research on the topic?</td>
<td>Yes</td>
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<td>5</td>
<td>Are structure and length satisfactory?</td>
<td>Yes</td>
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<td>6</td>
<td>Can you suggest brief additions or amendments or an introductory statement that will increase the value of this paper for an international audience?</td>
<td>Yes</td>
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<tr>
<td>7</td>
<td>Can you suggest any reductions in the paper, or deletions of parts?</td>
<td>No</td>
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<tr>
<td>8</td>
<td>Is the quality of the diction satisfactory?</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>Are the illustrations and tables necessary and acceptable?</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>Are the references adequate and are they all necessary?</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Are the keywords and abstract or summary informative?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Rating: 6

Comment:

THE ARTICLE IS IMPORTANT IN VIEW OF THE FACT THAT THERE HAS BEEN A WHOLESALE TRANSFER TO THE PONSETTI METHODOLOGY OF LATE AND DIFFICULT CLUBFEET ARE NOT ADEQUATELY ADDRESSED ANYMORE.

HOWEVER I WOULD ADVISE THE AUTHORS TO MAKE SOME ALTERATIONS AND ADDITIONS TO THE ARTICLE TO MAKE IT MORE ATTRACTIVE.


2] IT WOULD BE BETTER TO AVOID PERCENTAGES IN TC INDEX AS IT IS A LITTLE CONFUSING.

3] LINE 1 OF PARA 2 IN THE INTRODUCTION IS TOO RADICAL IN THE PONSETTI ERA AND NEEDS TO BE TONED DOWN.

4] THE AUTHORS MENTION THAT THE FEET DID NOT RESPOND TO THE PONSETTI METHOD OF TREATMENT AND NONE OF THEM WAS SYNDROMIC. IT IS DIFFICULT TO GO ALONG THE FACT THAT ALL 43 FEET NEEDED A COMPLETE SUBTALAR RELEASE. THE CAUSE OF THE RESISTANCE AND THE NEED TO GO FOR COMPLETE SUBTALAR RELEASE IN ALL CASES NEEDS TO BE MENTIONED.

5] IT ALSO NEEDS TO BE MENTIONED WHETHER THE FEET WERE G2-3 AT THE OUTSET OR AFTER THE PONSETTI CORRECTION.

6] THE SCORING WOULD BE MORE ACCEPTABLE IF THE PIRANI SCORE WAS INCLUDED.

7] REFERENCES NEED TO BE UPDATED AND THE PAPER NEEDS A MESSAGE WHICH INCLUDES THE FAILURE OF THE PONSETTI METHOD.

Competing interests: NO

Invited by the author to make a review on this article? : No

Experience and credentials in the specific area of science:

1] I HAVE WORKED ON THE TURCO METHOD FOR OVER 3 YEARS.

2] I WAS INVOLVED IN ESTABLISHING THE PONSETTI METHOD IN KASHMIR.
Publications in the same or a related area of science: Yes

References: Transected Talus Inflicted during a Soft Tissue Release for Congenital Talipes Equino Varus: A 17 year follow up leave a comment ? by Manzoor Ahmed Halwai, MS1, Shabir Ahmed Dhar, MS2, Murtaza Fazal Ali, MS3, Mohammed Farooq Butt, MS4, Mohammed Ramzan Mir, MS5, Altaf Ahmed Kawoosa, MS6 The Foot & Ankle Journal 1 (10): 3

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