Original Article

Results of posteromedial release operation for clubfoot at Soba University Hospital

Asim A Mohamed, MBBS, MD Orth*, Adam Fadhlallah, MBBS, FRCS(late)**, Samir Shaheen, MBBS, MD Orth, JMHP**
Assistant Professor, Department of Orthopaedic, Faculty of Medicine, University of Khartoum
Associate Professor, Department of Orthopaedic, Faculty of Medicine, University of Khartoum*

Tel: +249-912383728
Email(s): asimamm@hotmail.com

Asim Abdelmoneim Mohamed
Corresponding author

Abstract

Background

Clubfoot or Congenital Talipes Equinovarus (CTEV) is one of the most common congenital limb deformity in paediatric orthopaedic clinics. Treatment is generally non-operative except for resistant, relapsed or late presented cases.

We evaluated the short and mid-term results of posteromedial release (PMR) using Turco incision for correction of resistant and neglected clubfeet at the paediatric orthopaedic unit in Soba University Hospital.

Methods

This is a retrospective study where twelve years patients’ records and follow-up data at the Paediatric Orthopaedic unit - Soba University Hospital (SUH) were reviewed. Patients of club feet managed by Turco procedure at Soba hospital done between 1989 and 2001 and came for follow-up in the period from August 2001 to June 2002 were evaluated clinically and functionally according to the criteria stated by Turco and included in the study.

Results

CTEV patients constituted about 15% (115 of 730) of all patients seen in Paediatric Orthopaedic unit at (SUH) during the period between 1989 and 2002. These 115 patients
had 189 clubfeet, 84 patients underwent different surgical procedures for clubfoot treatment. We were able to evaluate 21 patients with 29 feet underwent one stage Turco posteromedial release in the study period. Their ages ranged between 27 months - 8.5 years. The mean age at surgery was 23.1 months, 21 feet (75.8%) operated at age of 1 to 2 years. Eight operations (27.5%) had wound breakdown and wound infection in two feet (7 %). Twenty-three feet (79.3%) showed excellent and good outcome and failure in 5 feet (17.2%). 91% of the excellent and good results were operated at an age between 1 to 2 years.

Conclusion
Turco’s procedure gives good results for resistant and late presenting clubfeet if done early at the age of 1-2 years.

Keywords: Clubfoot, CTEV, Turco, posteromedial release

Introduction
Clubfoot is one of the most common congenital problems presenting to Paediatric Orthopaedic surgeon. It is a disabling condition which has its physical psychological impacts on the patient and the family\(^{(1)}\). In general clubfoot management has prolonged treatment course and follow-up program in addition to its economic burden on the community\(^{(2,3,4,5)}\).

The treatment should start early (from the first day after birth if possible) and follow-up should continue until the child reach skeletal maturity\(^{(3,6,7,8,9)}\).

Objectives of treatment of congenital talipes equino varus (CTEV) is to obtain and maintain functional, pain-free, plantigrade foot, with good mobility, without callosities and without the need for modified shoes throughout growth and adult life\(^{(3,6,10)}\).

Before the introduction of Ponseti method in our unit many postero-medial soft tissue release (PMR) operations were used widely for the treatment of such deformities\(^{(2)}\).

Many surgeons believed that no treatment gives a completely normal foot and especially surgical treatment, as most feet will have one or more residual problems which include, calf atrophy, asymmetry of foot size, limitation in the sub-talar mobility, pes-planus, metatarsus adducts and in-toeing gait\(^{(3,6,11)}\).

Failure to correct all elements of the deformity conservatively requires operative intervention. However, there are many soft tissues release procedures described for treatment of resistant CTEV cases to achieve desired results, nevertheless, Turco PMR is one of the earliest and successful procedures and is still used widely\(^{(9,10,11,12,13,14)}\).

This paper presents the outcome of one stage posteromedial soft tissue release operations using Turco’s procedure in clubfoot patients at Soba University hospital.

Patients and Methods
All the records of children with CTEV deformity seen and admitted for surgery in the Paediatric Orthopaedic department at SUH in the period between 1989 and 2001 were studied. Only children with idiopathic clubfeet operated on by one-stage PMR (Turco procedure) and who came back for reassessment by direct interview in the referred outpatient clinic during the period from August 2001 to June 2002 were included in the study. Patients who had previous surgery to correct the deformity before coming to Soba hospital and those who were followed-up for periods less than 6 months after surgery were excluded. Those who fulfilled the selection criteria were evaluated clinically and functionally according to the criteria stated by Turco 1979\(^{(11)}\). Radiographic assessment was not part of the evaluation.

According to the criteria set by Turco, post-operative results are graded from excellent to poor. An excellent result means, that the foot is plantigrade with ranges of movement not less than 90% of normal ranges, has full correction of all components of the deformity and is cosmetically acceptable.
A good result is when the foot is plantigrade with complete correction of all components of the deformity and cosmetically acceptable, but with residual limitation of range of movement, metatarsus adductus or pes planus. A fair result means that the foot is plantigrade, but one or more of the components of the deformity are either over corrected or not corrected and should not necessitate another surgical procedure. A failed result is characterized by loss of the initial correction that necessitates another surgical procedure. Cosmetically unacceptable planovalgus deformity in overcorrected foot is included in this group\(^\text{11}\).

Before the surgery most of the patients had serial casting to start with as recommended by most studies\(^\text{3,6,7,8,9}\).

Turco surgical technique involves release all contracted soft tissues in the posteromedial aspect of the foot, reduction of talonavicular and subtalar joints which should be held by Kirschner wires. Following application of a pneumatic tourniquet, a medial incision, eight to nine centimeters in length, is begun at the base of the first metatarsal and continued posteriorly to the tendo achillis curving slightly under the medial malleolus\(^\text{4,6}\). The procedure involves Z-plasty lengthening of the achilles tendon and all the flexor tendons as well as posterior capsulotomy for ankle and subtalar joints. Also the posterior talofibular, calcaneofibular as well as the posterior portion of the deltoid ligaments are divided. After skin closure, the corrected foot and the ankle are immobilized in a plaster for six weeks followed by an ankle foot orthosis (AFO) for six months\(^\text{6,7,8,9,11}\).

Soba University Hospital authorities were informed about this study in writing and a written permission to access patients’ records was obtained. Parents of patients who presented for follow-up were also informed and consented.

**Results**

We had 115 patients with 189 idiopathic clubfeet were seen and/or admitted in the Paediatric Orthopaedic unit at SUH during the period between 1989 and 2002. Of these, 82 (71.3\%) patients were males, 33 (28.7\%) were females with male to female ratio of 2.5:1. The deformity was bilateral in 71 (61.7\%) patients and unilateral in 44 (38.2\%) patients. One-hundred twenty-one feet underwent different surgical procedures and from those there was 95 feet (for 72 patients) underwent one-stage PMR.

Twenty-one patients with 29 clubfeet were available for assessment in the referred clinic in the period from August 2001 to June 2002, 15 of the 21 were males (71.4\%) and 6 (28.6\%) females. There were 15 right feet and 14 left feet, the condition was bilateral in eight patients and unilateral in 13 patients. The patients ages ranged between 27 months to 8.5 years mean age was 4.2 years (Table 1).

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of patients</th>
<th>Males</th>
<th>Females</th>
<th>Left</th>
<th>Right</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 2 years</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3 – 4 years</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5 - 6 years</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>More than 6</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>15</td>
<td>6</td>
<td>14</td>
<td>15</td>
<td>8</td>
</tr>
</tbody>
</table>

Before surgery, 27 feet in 19 patients (93\%) had serial castings. Patients’ ages at the time of surgery ranged from 10 months to 7 years average (23.1 months) and 75.8\% of the operations done at an age between 1 to 2 years (Table 2).
Table 2: Age at the time of the operation (n:21 patients 29 operations)

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>1</td>
</tr>
<tr>
<td>1 – 2 years</td>
<td>21</td>
</tr>
<tr>
<td>3 – 6 years</td>
<td>6</td>
</tr>
<tr>
<td>&gt; 6 years</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
</tr>
</tbody>
</table>

Regarding follow-up period, 16 feet had followed-up for more than 18 month postoperatively. Our minimum limit was 6 months. Out of the 16 feet who had a follow-up more than 18 months 15 (93.7%) showed excellent and good results. One patient’s result graded as failure.

Of the 29 feet, excellent and good outcome was attained in 23 (79.3%), while a fair result was attained in one patient (6.5%), and failure was observed in 5 feet (17.2%).

Relating the outcome to age of the patient at surgery, 91% of the excellent and good results were operated at an age between one to two years and no excellent or good results in those operated above 6 years. Out of 22 feet operated below two years of age, 8 (37%) had excellent outcome, 13 (59%) had good result and one patient’s outcome was rated as failure. From the 7 feet who were operated more than 2 years age, none had excellent results, 2 (29%) were good, 1 (14.5%) was fair and 4 were rated as failure.

In 19 operated feet (65.5%) there was no reported postoperative complications, however, in 10 feet (34.5%), which showed complications; 8 feet (27.5%) had wound breakdowns and two (7%) had wound infections. All the infected wounds healed nicely by secondary intention.

Seventeen (89%) out of 19 feet with no postoperative complications had good and excellent outcome, 5 feet out of 8 who had wound break down showed good and excellent outcomes, 2 failures and one fair while in those with infection (2 feet) there was 1 good and 1 failure.

Twenty cases out of 25 who had good compliance with postoperative management showed good and excellent results. While in those who had poor compliance (4 cases) there were 3 good and 1 failure.

The 5 failures in this study were due to loss of correction (complete relapse) in 2 feet and severe residual deformities that had required a 2nd corrective bony procedure in the other 3 feet. Out of these 5 feet 3 were operated at age more than 4 years and one at 25 months. Two feet had wound dehiscence after surgery. One foot operated at an age of 5 years had wound infection. Poor compliance with postoperative management noticed in one case.

Discussion

Clubfoot or CTEV constitutes one of the more commonly presenting Paediatric Orthopaedic problems\(^{3,4,6}\). In this study, clubfoot constituted more than 15% of all patients presented to our department. Only in the last few years our department adopted Ponseti technique for clubfoot management which depends mainly on non surgical management and proved to be very successful worldwide, however, we are seeing many neglected cases and we are still using Turco’s PMR technique for resistant and neglected cases.

Male to female ratio was 2.5:1 and the bilateral cases constituting two thirds of the cases and left side slightly more involved than the right, is comparable with and goes in conformance with most of similar studies\(^{10,15,16,17}\).

Patients diagnosed as resistant cases were operated on when they are around the age of 10 months; when the child starts to walk. Most of the operations were performed between the age of 1 to 2 years using the same surgical technique and postoperative management recommended by Turco\(^{6,8,9,10,11}\).

A limitation of this study is that, we didn’t use the talocalcaneal angle as a parameter to evaluate the outcome of surgical management as it was designed in the original work of Turco\(^{11}\), although many authors have questioned the significance of the
talocalcaneal angle as a parameter to evaluate the outcome; Roye et al showed that there is no consistent relationship between functional outcome and radiographic appearance, they advise to evaluate the outcome based on clinical examination\(^{18}\).

Another limitation is that, a minimum of two years follow-up was recommended by Turco and many other authors\(^{10,11,14,19}\). In this series, this period was 6 months, although the majority (16) feet had follow-up more than 18 months at the time of assessment.

In 1979, Turco had excellent and good results in more than 80% of his series, 15% fair and 5% failure\(^{11}\). In our series, we had 79.3% excellent and good, 3.5% fair and failure in 17.2% of cases, this variation in outcome could be due to higher age group in our series compared with that of Turco’s.

Although it is very difficult to compare our results with other studies adopting different operative techniques and assessment criteria for treatment of clubfoot, variable percentages of success and acceptable results near to that we achieved were reported; 82% (Ghali et al 1983), 72% (Simons 1985), 81% (Hutchins et al 1985) and 88% (Lanveg and Ponseti 1980)\(^{5,14,17,20}\).

It seems that the best time of operation is between 1 and 2 years of age. As 91% of our excellent and good results were operated on when they were 1-2 years of age. The operation and results are in line with what was recommended by Turco\(^{11}\).

One of the failures was operated at 5 years of age. Turco had 82% acceptable results and 17.3% fair results in his 23 feet that was operated above the age of 6 years, but he also considered the fair results as acceptable as the alternative was triple arthrodesis\(^{11}\).

The best time for surgical procedure is still a point of discussion and dispute\(^{6,8,9}\). In their series, McKay and Simons recommended an age less than 4 years for their complete subtalar release operation to get the best results\(^{13,14}\). However, in 1982, Thompson showed that there is no correlation between results and age at surgery for posteromedial release operation\(^{10}\).

Acceptable results were also obtained in children who had limited soft tissue release operations at a very early age\(^{12,14}\). In other series, surgical treatment at very early age was associated with high rate of relapse\(^5\).

In our series, we had few patients with prior surgery and they were excluded from the study, however, the main cause for an outcome to be labeled as failed was prior surgery, as redo PMR is associated with high risk of injury to neurovascular bundle as stated by Turco\(^{11}\).

In 22 feet (95.5%) of those with excellent and good outcome in our series, only the talonavicular joint was fixed without fixation of the subtalar joint. However, Turco claimed 70% of the fair results in his patients to over correction probably due to fixation of only one joint (talonavicular)\(^{11}\), but this was not the case in our study.

Wound dehiscence or breakdown or skin necrosis occurred in 8 feet (27.5% of cases) compared to 6 feet (3%) in Turco series and 4 of these 6 attributed to previous surgery\(^{11}\) which was not the case in this study (ie none of the 8 cases underwent previous surgery). This could be due to other factors (severity of deformity at the time of surgery or age of the patient).

We had 2 (6.8%) cases of post-operative superficial wound infection compared to 5 (2.4%) cases in Turco series\(^{11}\). However, 6 out of 8 feet with wound dehiscence (75%) and one out of 2 with wound infection healed satisfactorily with no loss of surgical correction when the foot was maintained in plaster in the corrected position while waiting for the wound to heal by secondary intention and this is comparable to that of Turco\(^{11}\), the other 3 cases ended with failure.

Our observation was that we had higher rate of complications compared to other series studying PMR regarding wound dehiscence.
and infection\textsuperscript{(10,11)}. This can be attributed to the fact that operation theatre complex in our hospital does not have dedicated separate orthopaedic operative room.

All surgeons agree that postoperative management is an important factor in maintaining correction gained by surgery and in all series studying surgery for clubfoot every surgeon described his own postoperative management very clearly and stated that all failures were due to loss of correction obtained by surgery postoperatively. This factor is in part is dependent on the parents' compliance with postoperative management\textsuperscript{(6,8,10,11,14)}.

We noticed poor compliance in only 4 cases results in 3 good results and 1 failure in Turco series (1979) he had one case of poor compliance of parents resulted in failure\textsuperscript{(11)}. However, in this study since most of the failure (4 feet out of 5 feet) were cases of good compliance, this factor alone cannot be considered as the main factor in determining the end results of surgery unless having a bigger number of cases.

From our results, we can consider failure is due to loss of correction after surgery and this is a multifactorial problem and no single factor can be blamed alone to be the main cause of all the failures (unless having a bigger number of cases), but all the factors discussed before have their effects on the final result and this explanation was also concluded by Turco\textsuperscript{(11)}.

In conclusions and recommendations, in spite of all the problems mentioned one-stage PMR of Turco has proved to be an effective single soft-tissue procedure in correction of resistant (rigid) and lately presented clubfoot, the commonest complication of surgery is wound dehiscence and we have a higher rate of infection, failure of surgery is a multifactorial problem and health education of the parents about the importance of follow-up.

References