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**ABSTRACT... Objectives:** To determine the functional outcome of one stage posteromedial release in congenital clubfoot in terms of functional and radiological assessment. **Methodology:** Forty five patients having clubfoot deformity were included in the study. Fifteen patients had bilateral deformities. The outcome was evaluated by functionally assessing the foot in the last review visit (at the end of 14th week of surgery) using the rating system of McKay, which has ten categories and has a maximum score of 180 points. It rates the outcome as excellent, good, fair, poor and failure (Fig-1). Radiological assessment is made by measuring various angles on anteroposterior and lateral radiograph of the foot with goniometer at 3, 6, 10 and 14 weeks after release (Table-II). The values of talocalcaneal angle (measured during every visit) on AP and lateral views will be summated to yield talocalcaneal index, and an index of >40 degree was taken as normal. **Results:** Forty five patients included in the study with clubfoot deformity. Out of these patients, 33 (73.33%) were males and 12 (26.66%) were females (table-I). They were graded according to the McKay rating system. In this short term follow up of one year, the following results were observed. Thirty-nine (65%) patients had excellent results, 11 (18.33%) patients had good results, 3 (5%) patients had fair results and 7 (11.66%) patients had poor results (Fig-1). No case can be labeled as failure. **Conclusions:** Mild to moderate clubfoot deformities can be successfully treated in children up to five years of age by one stage postero-medial release.

**Key words:** Club foot deformity, posteromedial release.

## INTRODUCTION

Congenital talipes equinovarus (CTEV) is the most common orthopaedic anomaly of the foot with an incidence of approximately 1.2 per 1000 live births<sup>1</sup>. Every orthopaedic surgeon encounters cases of CTEV in his practice. Children with untreated clubfoot are still in the community.

The CTEV has the following components.

1. Ankle Equinus.
2. Heel Varus.
3. Forefoot Adduction and supination.

While the etiology of CTEV is considered to be complex and the cause is remained unknown. Genetic, maternal and environmental factors have been suggested to play an etiological role<sup>2</sup>.

Conservative treatment is the best option for CTEV, which starts at an early age almost since birth of the child<sup>3</sup>. Ponsetti casting and French physical therapy methods have picked interests of orthopaedists eager to find a less aggressive treatment method that can assure a lasting good result. Both methods have been proven

successful in reducing the number of patients requiring extensive surgical releases and as a result become integral part of paediatric orthopaedic practice<sup>4</sup>. However, the incidence of recurrence of the deformity was reported by many authors and some sort of soft tissue release or bony procedures were done later on after conservative management<sup>5</sup>.

Though the initial treatment of CTEV is conservative, but if not respond to conservative management then surgical intervention is necessary. Any surgical treatment of spastic foot deformities must be preceded by an exact preoperative analysis of every aspect of the deformity and its functional consequence. The goals of surgical treatment are correction of deformity, reestablishment of stability of the foot and preservation of functionally important ranges of motion and muscle strength<sup>6</sup>. Indication for surgery is failure to correct or maintain the correction after conservative treatment<sup>7</sup>. Factors influencing the success are age of the patient, prior surgery and compliance of the patient.

The best time to do surgery is debatable, but most of the surgeons are in favor of delaying surgical intervention

until infant is approximately four to six months old, instead to do it in early days of life.

Among the soft tissue procedures since the report of Turco, the posteromedial release in which the posterior, medial and subtalar contractures are released to permit the realignment of abnormal anatomy of bones and corrected alignment is secured with Kirschner-wires has become the operation of choice for most surgeons<sup>8</sup>.

Joseph recommended Hemi-Cincinnati incision as the incision of choice for performing posteromedial release operation on clubfeet in children younger than 2 years of age<sup>9</sup>.

In 1983 McKay introduced the rating system for evaluation of clubfeet operated and corrected by McKay extensive posteromedial and lateral release. This incision provides excellent subtalar joint exposure<sup>10</sup>.

The objective of this study is to determine the functional outcome of Turco's one stage posteromedial release in severe congenital clubfoot in terms of functional and radiological assessment.

## METHODOLOGY

This study was conducted in Department of Orthopaedics and traumatology, Khyber Teaching Hospital, Peshawar from December 2008 to December 2010. Forty five patients were included in the study. Fifteen patients had bilateral deformities.

The deformity was classified according to Harrold and Walker classification<sup>6</sup>.

Children of either sex with age between 6 months to 5 years having clubfoot deformity (Harrold & Walker-I and II)<sup>16</sup> whether unilateral or bilateral were included in the study. Those who have previously received conservative treatment in the form of serial plasters were also included. Exclusion criteria were;

- Patients with severe deformity (Harrold & Walker III) and those with clubfoot deformity secondary to any congenital (Arthrogryposis multiplex congenital,

meningomyelocele, spina bifida) or acquired disorder (poliomyelitis) are excluded from the study.

- Patients requiring bony procedures.
- Those who were previously operated for the same deformity.

Cases of congenital clubfoot meeting the inclusion and exclusion criteria were admitted through outpatient department. A written informed consent was taken from the parents. A written permission was also taken from the ethical committee of Khyber Teaching Hospital. Severity of the deformity was measured by goniometer and confounding variables were controlled by excluding patients with type III deformities. Radiological assessment was done by standing or stress dorsiflexion antero-posterior (AP) and lateral radiographs of ankle and foot, and following angles were measured;

- Talo-calcaneal (TC) angle on AP and lateral views.
- Talo-First metatarsal angle on AP view.
- Tibiocalcaneal angle on lateral view.
- The values of TC angle measured on AP and lateral views were summated to yield talo-calcaneal index, and an index of >40 degree was taken as normal.

Standard posteromedial release was performed on all the patients by same surgeon. In posteromedial release all the tight structures on the posterior and medial aspect of the ankle joint were released. The efficacy of the procedure was determined radiologically by measuring the mentioned angles on anteroposterior and lateral radiograph of the foot at 3,6,10 and 14 weeks after release and by functionally assessing the foot in the last review visit at the end of one year using the rating system of McKay. The data was collected with the help of a proforma.

## RESULTS

Forty five patients included in the study with clubfoot deformity. Out of these patients, 33 (73.33%) were males and 12 (26.66%) were females (Table I). The mean, mode and median for the age were 17.5 months, 8 months and 16 months respectively.

Fifteen (33.33%) patients had bilateral deformity out of

| Table-I. |                 |       |
|----------|-----------------|-------|
| Sex      | No. of patients | %age  |
| Male     | 33              | 73.33 |
| Female   | 12              | 26.66 |
| Total    | 45              | 100   |

which 9 (20%) were male and 6 (13.33%) were female and the remaining 30 (66.66%) patients had unilateral deformity, 24 (53.33%) males and 6 (13.33%) females. Seventeen (37.77%) patients had right sided involvement while the remaining 13 (28.88%) patients had left side involved.

Patients with a Family history were 35 (77.77%) while the remaining 10 (22.22%) patients had no positive family history.

None had a history of any previous surgical treatment, while 35 (77.77%) patients had history of serial casting.

Post-operatively 8 (13.33%) patients developed swelling of the toes. In these patients the casts were split and augmented by applying crepe bandages.

The preoperative and post-operative radiological angles are shown in table II.

The mean angle of maximum dorsiflexion was 15 degree (range: 10–25 degree) and of plantar flexion 45 degrees (range: 43–59 degrees) in 45 feet, while maximum dorsiflexion was 14 degree (range: 10–18 degree) in 15 patients and the maximum planter flexion was 19 degrees in 3 feet and 16 degrees (range: 14–20 degrees) in 12 feet.

The forefoot was in neutral position in 47 (78.33%) feet, with 5 degrees adduction in 8 (13.33%) patients and was in more than 5 degrees adduction in the remaining 5 (8.33%) patients.

The heel was in varus in 8 (13.33%) feet while neutral in the remaining 52 (86.66%) feet. All patients could stand

on tiptoe on one foot and the flexor hallucislongus was functional in all.

Ankle or Subtalar motion was painless in 50 (83.33%) feet while it was tolerable in 7 (11.66%) feet while 3 (5%) feet registered a complaint of a painful limp at the end of the day which was not disabling.

Shoe wear was normal in 55 (91.66%) feet while normal shoes wear was difficult in 5 (8.33%) feet. By the end of one-year all the 45 patients were available for evaluation.

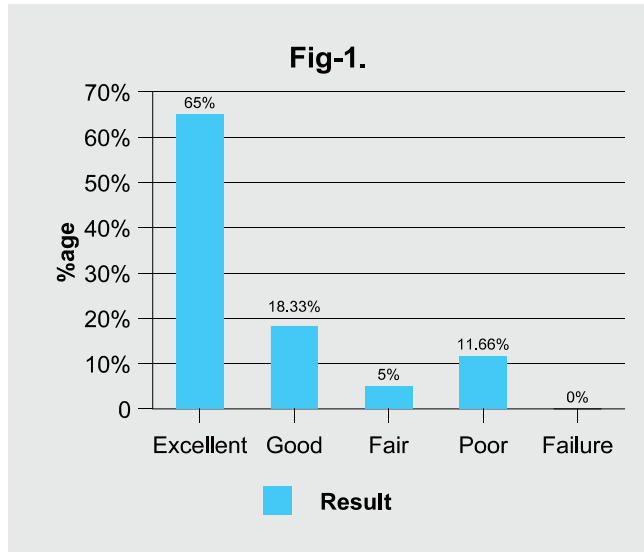
They were graded according to the McKay rating system. In this short term follow up of one year, the following results were observed as obvious from graph 7. Thirty-nine (65%) feet had excellent results, 11 (18.33%) feet had good results, 3 (5%) patients had fair results and 7 (11.66%) feet had poor results. No case can be labeled as failure (Fig 1).

| Table-II.                            |        |                |               |
|--------------------------------------|--------|----------------|---------------|
| Angles                               | Pre-op | At last review | Normal        |
| Anteroposterior Talo-1st metatarsal  | 10     | 05             | 3-15 degrees  |
| Anteroposterior Talo-calcaneal angle | 0-10   | 25             | 30-55 degrees |
| Lateral Talocalcaneal angle          | 5-15   | 30             | 25-50 degrees |
| Lateral Tibiocalcaneal angle         | 80-90  | 60             | 10-40 degrees |
| Talocalcaneal index                  | 5-25   | 45             | > 40          |

**DISCUSSION**

The congenital talipesequinovarus is the commonest congenital anomaly of foot encountered in orthopedic practice<sup>1</sup>.

Male to female ratio in our study was 2.75 to 1, while this ratio was 2 to 1 in a study conducted by Ponseti IV<sup>11</sup>. While male to female ratio was 1.1 to 1<sup>12</sup> and 1.2 to 1<sup>13</sup> in different local studies done in Hayatabad Medical Complex and Lady Reading Hospital Peshawar respectively.



Bilaterality was noted in 33% in our study while it was 30% in two other studies<sup>12,13</sup> while in Otremski I<sup>14</sup> study it was about 50% and Yamamoto reported it as more than 30%<sup>15</sup>.

In our study there were 22.22% patients with family history of clubfoot while family history was present in 8% of patients in a study conducted by Harrold A J et al<sup>16</sup>. In another study conducted in Hayatabad Medical Complex in 2007, family history was positive in 12.5% of the patients<sup>12</sup>. Positive family history was found to be Present in 11.42% of patients in another study<sup>17</sup>.

In our study 77.7% patients had received conservative treatment (i.e. serial casting) right from the initial months of life, while 22.22% of the patients had no conservative treatment till the time of presentation. This is mainly because of low socio-economic and educational status of the parents. Preoperative conservative treatment was acquired in 62.5% and 64.2% in two other studies<sup>12,13</sup> which is comparable to our study.

The degree of correction i.e. the results were measured according to the McKay rating system, according to which 65% feet had excellent results, 18.33% good results and 5% had fair results. While in the remaining 11.66% feet, 11.66% had poor results and 0% was considered as failure. Turco VJ reported 83% satisfactory results, 12% fair results and 5% failure with

his surgical procedure<sup>18</sup>.

Thompson GH et al achieved excellent results in 86% of cases corrected with Turco'spostero-medial release<sup>19</sup>.

Hoque MF got excellent to good results in 75% rigid clubfeet and had 11% fair and 13% poor results with Turco'spostero-medial release<sup>20</sup>.

With Turco'spostero-medial release, in patients of 9 months to 4 years of age, Otremski I achieved full correction, of equinus in 98%, heel varus in 91%, cavus in 85% and forefoot adduction in 91% of cases<sup>14</sup>.

In our study the main residual deformities was forefoot adduction and heel varus. Adduction was about 5 degrees in 8 (13.33%) feet and more than 5 degrees in another 5 (8.33%) feet while the rest of 48 (78.33%) feet were normal. Heel was in varus in 8 (13.33%) feet while the remaining 52 (86.66%) feet had no heel varus. Otremski I<sup>14</sup> achieved full correction of equinus in 98%, heel varus in 91%, cavus in 85% and forefoot adduction in 91% of cases. Heel varus was present in 6 patients, while it was neutral in the remaining 39 patients.

The results of our study remained excellent to good in about 77% which are comparable to studies by Turco VJ et al<sup>18</sup>, MunshiS et al<sup>21</sup>, Edmondson MC et al<sup>22</sup>, and Macnicol MF et al<sup>23</sup>.

The cause of relapse in most of the cases is primarily mismanagement or non-compliance. Severity of the deformity and natural history of the disease also contribute to the recurrence of various components of the deformity.

The limitations of our study were a short sample size and short follow up period. Further local studies of longer duration may be needed to confirm our results.

**CONCLUSIONS**

Mild to moderated clubfoot deformities can be successfully treated in children up to five years of age by one stage postero-medial release.

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