REVIEW ARTICLE

Talipes Equinovarus (club foot): A conservative management of the disease

FARHAN ISHAQUE

ABSTRACT:
Talipes equinovarus a deformity of the foot has been reported in 1-2 /1000 live births .It can manage effectively if it is treated in young age. The conservative treatment methods have been put into practiced as the primary treatment for clubfoot, through out the world.It will provide an updated awareness about conservative management of idiopathic congenital deformity. Trained physical therapist should provide proper parents counseling, so that parents can take a definite decision about the line of treatment and possibly avoid surgical intervention. The rationale for this article is not only to formulate a conservative treatment plan but also to make the treatment of CTEV feasible for physical therapy community as well.

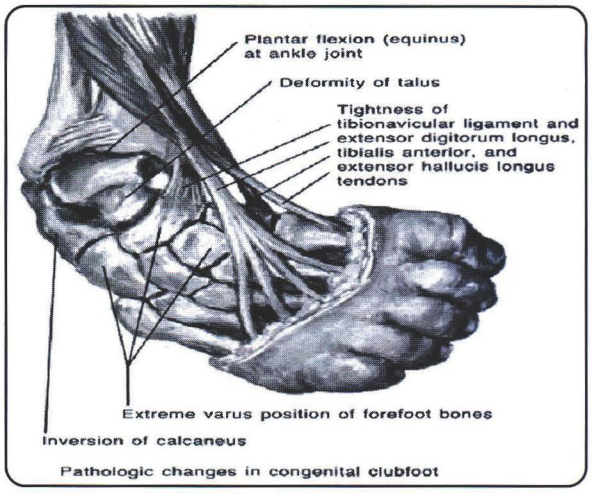
KEY WORDS:
Cavus deformity,CTEV, Club foot, equines deformity, AFO.

INTRODUCTION:
The club foot is an idiopathic or congenital deformity which occur in children, and its causes are yet unknown[1,2]. In case of the idiopathic club foot, the deformity is limited to the foot only while the rest of the musculoskeletal structure appears normal[3]. On the other hand the non-idiopathic clubfoot may be associated with other neuromuscular conditions like muscular dystrophy, diastrophic dwarfism, arthrogryposis and myelomeningocele[3]. However great effort is being made to trace an association between its genetic behavior and to link with other medical conditions, such as spina bifida, hydrocephalus and meningomyloceal etc [2,3].

The affected child acquires the combinations of the following deformities of the foot :

- ***Forefoot:*** The forefoot is adducted and supinated.[2,3]
- ***Midfoot:*** High medial arched(cavus deformity).The first metatarsal is more plantar flexed than the fifth metatarsal which results in high arch appearance of the foot.[12,3]
- ***Hind foot:*** The hind foot is held in planter flexion and inversion (varus) position and the foot is twisted in towards the other foot. The heel is drawn up as in equinus deformity)[2,3,15]

Fig. 1: Club Foot (BMU)



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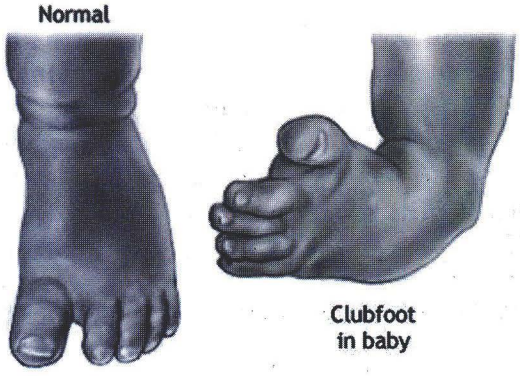
* Assistant Professor, Baqai Institute of Physical Therapy & Rehabilitation Medicine, Baqai Medical University, Karachi.

MANAGEMENT:

There are different treatment approaches for club foot deformity[11]. Conservative (serial casting) method is the treatment of choice, other procedures are surgical and external fixators[7,11]. Idiopathic clubfoot deformity is best treated with Conservative Techniques[4,11]. In conservative treatments, the Ponsti method of treatment comes on the top of the list. While the French Physiotherapy comes next and is found to be equally effective[4,20]. According to a long-term follow-up study, physical therapy without anesthesia or plaster casts was used to treat 338 cases of clubfoot (CF). The technique was based on progressive sequential manipulations at birth. Varus deformity was reduced first and the equinus component of the club foot was manipulated later, followed up by gentle stretches, active physiotherapy and then a foot orthosis to secure its extent of rearrangement[11-13]. This technique accomplished 77% good and fair results. In challenging cases, subsequent surgical procedures were employed which showed 96% good and fair results[9].



PONSETI METHOD (Serial Casting):

Ponseti method of serial casting is commonly executed by Orthopedic surgeons and Physical therapists. Gentle manipulation and serial casting is performed to rectify the foot position. This non-operative technique is put into practiced in 27 countries and has rapidly become the standard method of care as an initial treatment for clubfoot throughout the world, because it is efficient, secure and economical[6,7,11,19]. The basic idea of this technique was developed by Dr. Ignacio Ponseti in the 1940s in which a weekly manipulation of the foot allows collagen relaxation of contracted ligaments, capsules and tendons, which results in remodeling of the joint surfaces[11,12]. Thus in this procedure the need for surgical correction, in many cases, can be eliminated[11]. After remodeling and reducing the deformity, the normal position is maintained by particular footwear i.e, Ponseti FAO (Foot Abduction Orthosis) and regular physical therapy exercise (stretching)[12]. This conservative method results good when treated within the age of 3-6 months[4-12]. After the age of 5-6 months the ligaments get stiffer and child may require surgical correction[12].

Method and Sequence of Manipulation of the CTEV:

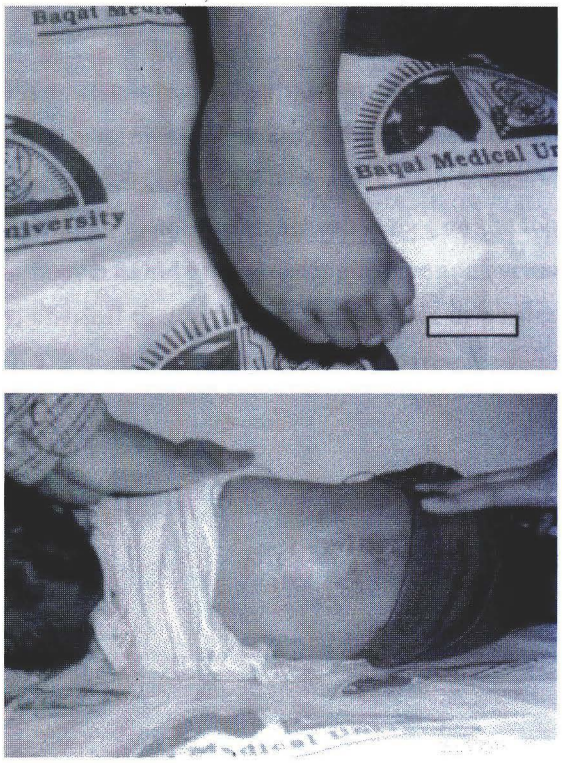
- *Ponseti method of serial casting is recommended within 2-3 months after birth.*
- *The preferable total length of management is three months.*
- *Manipulation is followed by plaster cast for five to seven days.*
- *To achieve maximum improvement, feasiblely 6-8 toe-to-groin plaster casts are adequate[12].*

The method and sequence of manipulation continue along the following lines[1]:

Order of correction:

1) Cavus Deformity:

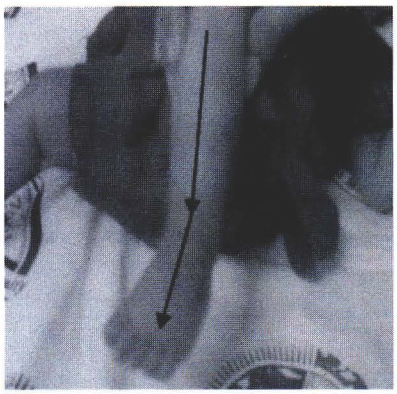
In cavus deformity forefoot is supinated and the first metatarsal is dorsiflexed. Cavus deformity must be addressed followed by the other deformities. This reverses the contracted forefoot pronation.



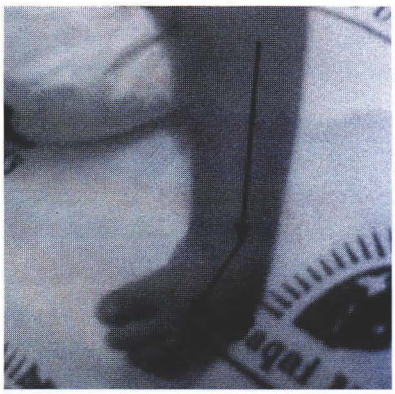
An example of CTEV, associated with Maningeiomyloeeal

2) Correction of the Varus and Adduction:

An effort is made first by immobilizing the heel with one hand and other thumb is positioned on the talus using it as a fulcrum (counter pressure is applied), the fore foot is slowly abducted and everted[1,12,13]. Heel must not be touched during this manipulation. It helps in stretching of the medial tarsal ligaments. Vigorous foot pronation should be avoided because it compliments the cavus deformity[12,2].



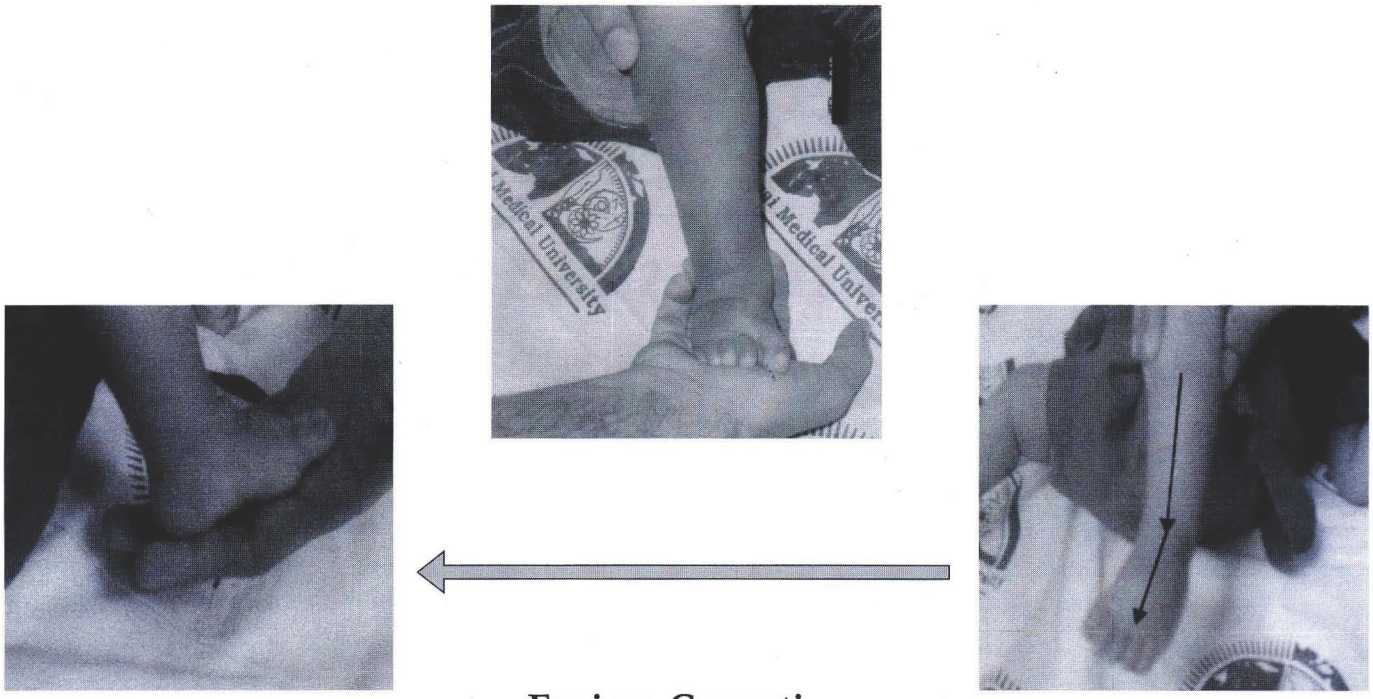
(After 1 Month)



Correction of Verus & Adduction

This manipulation abducts calcaneus with correction of the heel varus (Heel must not be touched during this Manipulation) 12

3. **EQUINUS CORRECTION:**
Finally the equinus deformity is addressed by dorsiflexing the ankle[11,2]. The hand is placed beneath the foot and is raised into dorsiflexion[1,12].



Equinus Correction

French Physical Therapy:
French physical therapy method of talipes equino varus has attained a significant status with respect to the conservative treatment[20]. Physical therapy focuses on an individual's functional ability and facilitates to re-establish the physical activities.The French method consists of physical therapy, taping and continuous passive motion exercises.

More often it is started three months after birth and can be highly successful[4,20].

Mobilization:
Physical therapy treatment focuses on the mobilization of the foot, stretching of tight soft tissues and increasing the range of movement. The manipulation should proceed in the following order:

Order Of Mobilization (*ADVERB*)[1]:
AD = *Forefoot adduction is corrected first*
V = *Correction of heel is corrected after adduction.*
E = *Equinus deformity of hind foot is addressed last.*
RB = *"Rocker Bottom Foot" is the deformity, which is curable through this sequence of foot mobilization[1].*

Fig. 11

Fig. 12

Fig. 13

After Stretching Exercise

Taping:
A physical therapist takes on frequent sessions, who tapes the foot in a realigned or remodelled position after stretching exercises followed by the use of orthosis. This method has established highly successful statistics.

Continuous Passive Movement Exercises:
To maintain the gained range of motion therapist has to focus on passive range of motion exercises. These exercises not only help in maintaining the normal biomechanics of the ankle but also prevent muscle contracture and consequently recurrent TEV.

ORTHOTIC MANAGEMENT:

The success of conservative or non-operative treatment is extremely dependent on two to four years of orthotic management[17,20]. Patient's non compliance is one of the key factors responsible for the risk of recurrence[21]. The reason is that they cause muscle atrophy as they immobilize the leg and promote continuous muscular imbalance which causes ankle and knee rigidity. On the other hand a new dynamic foot abduction orthosis (FAO) has replaced this incompatible orthosis for the club foot treatment[18,20]. That foot abduction orthosis is called Dobbs Brace and permits active mobility at the ankle and offers minimum resistance to the child, than the conventional braces. Foot abduction orthosis is used to control abduction[6]. Careful evaluation of these techniques and results of these two above stated conservative approaches may increase their use and decrease or minimize the use of surgical management and thus the associated morbidity resulting from extensile releases[4].

DISCUSSION:

In the treatment of idiopathic clubfeet, the Ponseti method and the French functional method have been successful in reducing the need for surgery[10,20]. Being one of the most common congenital deformities, its management has become an immense challenge to deal with[16]. Physical therapy has really proved its effectiveness in different research studies e.g, according to a comparative study the results of patients treated by Ponstei technique whether directed by the physical therapist or the orthopaedic surgeon were the same. Infact the cases directed by the physical therapist did not require additional procedures compared to those directed by the surgeons[14]. It was a general perception that non-surgical management does not offer adequate correction and long –lasting results. Due to this impression the majority of children with idiopathic clubfoot went through surgical procedures with extensive postero-medial and lateral release. Certain studies show that surgical management results in residual stiffness, pain and abnormality in some children and the reason was noncompliance of the patients. Therefore the encouraging and long standing outcomes with the Ponseti and French methods of conservative treatment have earned general public attention. The Ponseti method includes manipulation and casting of talipes equinovarus while the French method consists of physical therapy exercises, taping techniques and continuous passive motion. A thoughtful estimation of these methods may boost up their utility and diminish or minimize the use of surgical management and thus the allied morbidity[10]. Previously an undiagnosed neuromuscular disease is one of the reasons for late relapses in patients with idiopathic clubfoot and must be thoroughly evaluated[5]. These neuromuscular diseases include myotonic dystrophy, myasthenia gravis, multiple core disease and Charcote-Marie –Tooth Type IA[5]. The poor consequences could be due to severe deformity, poor braces quality ,inappropriate techniques of correcting the deformity or poor patient compliance with the bracing protocol[20].

CONCLUSION:

There are numerous approaches to treat congenital club foot deformity but the selection of every particular procedures must be adopted according to the specific individual, as each club foot is a particular case in its parameters. Functional independence is the be all and end all of any treatment technique which is strictly dependent on early onset of physical therapy treatment, soft tissue mobilization and avoid over correction. An accurate treatment method and parent's counseling can progress the result constructively for CTEV with the conservative treatment technique.

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REFERENCES:

1. John Ebnezar, Essentials of Orthopaedics for Physiotherapists, p:343 to344,vol 1,2003
2. Louis Solomon, David J.Warwick, Selvadurai

Nayagam, Apley's system of Orthopaedics and fractures, 8th edition, p: 488-490,2001.
3. James N.Athearn, Justina S .Case ,John M. Roberts,Impression Techniques and model Modification of a Custom –Method Ankle –Foot Orthosis for the Idiopathic clubfoot .Journal of Pedi Northup, Vol. 7 pp.91-95,1995.
4. Stephens Richards. B, Shawne Faulks et. al, A Comparison of Two Nonoperative Methods of Idiopathic Clubfoot Correction: The Ponseti Method and the French Functional (Physiotherapy) Method, The Journal of Bone and Joint Surgery, 2008; 90:2313-2321.
5. Matthew E Lovell and Jose A Morcuende, Neuromuscular Disease as the Cause of Late Clubfoot Relapses, the Iowa Orthopaedic Journal. 2007, 27: 82–84.
6. Michelle J. Hall, Ignacio V. Ponseti, Ponseti Treatment Method for Idiopathic Clubfoot, Continuing Education Module, U.S. Department of Education, Rehabilitation Services, Administration, Award # H235J050020.
7. Lourenco A. F., J. A, Morcuende, Correction of neglected idiopathic club foot by the Ponseti method, Journal of Bone and Joint Surgery - British Volume 89-B, Issue 3, 378-381.
8. , , Plantar pressures following ponseti and French physiotherapy methods for clubfoot, Journal of , 2010 Jan-Feb;30(1):82-9
9. , , , , Results of physical therapy for idiopathic clubfoot: a long-term follow-up study.journal of , 1990 Mar-Apr;10(2):189-92.
10. Kenneth J. Noonan, MD and B. Stephens Richards Nonsurgical Management of Idiopathic Clubfoot, The Journal of American Academy of Orthopaedic Surgeon, Volume, 11, No 6, 392-402, 2003.
11. Tindall A J, Steinlechner CWB, Lavy CBD, et al, Results of manipulation of idiopathic clubfoot deformity in Malawi by orthopaedic clinical officers using the Ponseti method, Journal of Pediatric Orthopaedics. 2005; 25:627–629.
12. John E. Herzenberg, Ponseti versus Traditional Methods of Casting for Idiopathic Clubfoot, Journal of Paediatric Orthopaedic, 2002; 22:517-521.Original text by Clifford R Wheels III ,last updated 2 Feb,2010.
13. Milind M. Porecha, Hiral Chavda, Serial Corrective Cast Manipulation in Idiopathic Club Foot by Ponseti Method. (A Study of 70 Feet with 3 Year Follow Up),The Internet Journal of Orthopedic Surgery, Volume 11, Nov 2,2009.
14. Joseph A. Janicki, Unni G. Narayanan et.al, Comparison of Surgeon and Physiotherapist Directed Ponseti Treatment of Idiopathic Clubfoot, The Journal of Bone and Joint Surgery (American), 2009.
15. David S. Grice, Barbara J. Talipes Equinovarus,A common congenital deformity is discussed from the point of view of doctors, the nurse in the hospital and the nurse in the community,Vol 51,No 12,Dec,1951.
16. Siapkara A, a review of current management of Congenital talipes equinovarus ,Journal of Bone and Joint Surgery ,Vol,89-B 995-1000. 2007.
17. Matthew B.Dobbs ,J.R. Rudzki,et al.factors predictive of outcome after use of the Ponseti method for the treatment of idiopathic clubfeet ,The journal of bone and joint surgery ,86:22-27(2004).
18. Chen ,Ryan C , Gordon ,Eric J ,et al ,New Dymanic Foot Abduction Orthosis for clubfoot Treatment ,Journal of pediatrics,Volume 27-Issue 5-pp 522-528,2007.
19. McElroy , Konde- Lule.J, et.al , The Uganda Sustainable Clubfoot Care Project Understanding the barriers to clubfoot treatment adherence in Uganda, journal of , Volume, Issue, pages 845 – 855, 2007.
20. Chaska A,Rascal S, Results of treatment of club foot by Poinsettia's technique in 40 cases: Pitfalls and problems in the Indian scenario .Indian Journal of Northup, 40: 196-9,2006.