

Comprehensive Study of Clubfoot in Children of North Chotanagpur Division of Jharkhand

Sudha Rani¹, Govind Kumar Gupta², Makardhwaj Prasad³, Pannag Bhushan Dwivedi⁴

How to cite this article:

Sudha Rani, Govind Kumar Gupta, Makardhwaj Prasad, *et al.* Comprehensive Study of Club Foot in Children of North Chotanagpur Division of Jharkhand. Indian Journal of Medical & Health Sciences. 2019;6(2):73-76

Abstract

Background: Congenital musculoskeletal deformities of the foot are relatively common in newborns. About 80% or more of clubfoot come out as result of isolated birth defects and are considered idiopathic. The aim of this study is to find out the status of such problem in North Chotanagpur Division of Jharkhand.

Materials and Methods: The present study was conducted in the Patliputra Medical College & Hospital, Dhanbad, Jharkhand. Total 250 newborns and old baby were examined during this short period.

Results: The total number of cases with clubfoot were 50 with an incidence of 1.9/1000 births. Occurrence of clubfoot was more common in male neonates than in female neonates (Male: Female ratio, 1:0.85), unilateral CTEV (58%) was more common than bilateral CTEV (42%). Idiopathic cases were more common than secondary cases.

Conclusion: Significant numbers of cases were found in males, unilateral CTEV was more common.

Keywords: Clubfoot; CTEV; Congenital; Neonates.

Introduction

Congenital deformities of the foot are relatively common in newborns. Deformities in a neonatal foot encompass a clinical spectrum ranging from an isolated intrauterine positioning deformity to a non-functional foot with progressive deformity.

A newborn foot is a small and complex structure. The foot consists of 26 bones; although most are cartilaginous and unossified at birth. The foot can be divided into 3 anatomic structures.

- (a) Forefoot (metatarsus and phalanges)
- (b) Midfoot (navicular, cuboid and 3 cuneiform bones)
- (c) Hindfoot (talus and calcaneus)

Clubfoot is one of the most common congenital orthopedic anomalies. However, it still continues to challenge the skills of pediatric orthopedic surgeon as it has a notorious tendency to relapse. Clubfoot is synonymous with the congenital talipes equinovarus (CTEV).

CETV is defined as the fixation of the foot in adduction, supination and in varus, i.e. inclined inwards, axially rotated outwards and pointing downwards. The calcenium navicular and cuboid bones are medially rotated in relation talus and are held in adduction and inversion by ligaments and tendons. Many theories have been proposed to explain the etiogenesis of clubfoot. According to Hippocrates¹ 400 bc had been given the credit of being the first to describe clubfoot, who believed that it is resulted from mechanical factors. The anatomy of clubfoot was first to describe by Antonio Scarpa (1830). He pointed out that the deformity was due to a medial twisting of the navicular, cuboid and the calcaneus with respect to talus. He believed that

Author's Affiliation: ¹Assistant Professor, Department of Anatomy, Hazaribagh Medical College, Hazaribagh, Jharkhand 825301, India. ²Associate Professor, Department of Orthopaedics, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand 834009, India. ³Professor, Department of Anatomy, ⁴Professor, Department Orthopaedics, Patliputra Medical College and Hospital, Dhanbad, Jharkhand 826005, India.

Corresponding Author: Govind Kumar Gupta, Associate Professor, Department Orthopaedics, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand 834009, India.

E-mail: gkgupta1975@yahoo.co.in

Received on 10.07.2019 Accepted on 16.08.2019

the talus itself was unaltered in shape but is oblique in position.

The Kite JH. 1939,²⁻⁴ in prepared a monograph "clubfoot" to describe the precise measurement in radiographs of the foot which helps in deciding which foot is normal and which foot falls in the clubfoot range. Kite measured the Talocalcaneal angle (Kite's angle) in both anteroposterior and lateral radiographs of the foot. In AP view, this angle less than 20 degrees, was abnormal and considered in a clubfoot category. In lateral view, this angle approaches zero and even negative in clubfoot. Mccauley 1947^{7,8} was first to stress radiographic evaluations of the results of treatment and reported that all tend to recur except those completely corrected readily in a few months. According to Turco VJ, 1981¹⁰ clubfoot described fibrosis of the medial planter structures (Tibialis posterior tendons, deltoid ligament, talo navicular capsule, spring ligament) from a mass of indistinguishable tissue on the medial side that obscures the mid tarsal and subtalar joints. He suggested that radiological assessment of correction is more reliable than clinical evaluation.

The Kowalczy KB, and Lejman T (2002) presented their own views based on intraoperative observation performing Golner's procedure. They noted that the talar bone was rotated internally, as a whole and externally in relation to the forefoot. The head and neck of the talar bone were deviated medially in relations to the trochlear axis. Atlas *et al.* 1980⁶ studied vasculature in clubfoot and documented vascular abnormalities in all deformed feet of 12 fetuses. At the level of the sinus tarsi there was blocking of one or more branches of the vascular tree of the foot and was most conspicuous in the early period of fetal life. Family surveys of congenital clubfoot were made with contradictory conclusion such as autosomal recessive inheritance

(Fetscher, 1921; Idelberger, 1939), Sex linked, recessive inheritance (Isigkeit, 1927) and Autosomal dominant inheritance with reduced penetrance (Palmer, 1964)⁹. We have gone through the different literatures via different sources and found that there was no any such study reported from this region. Therefore, we have planned this study to find out the status of the incidence of CTEV in this region.

Materials and Methods

The present study was conducted in the Patliputra Medical College & Hospital, Dhanbad, Jharkhand. The newborn and old baby coming in the department of obstetrics and gynecology, Pediatrics and Orthopedics department for their treatment were considered for the study. The study was completed in a period of four month from November 2018 to February 2019, during which total 250 newborns and old baby were examined. A proper consent was taken with their parents or legal guardians to include and examine the baby. Out of 250 newborns cases, 50 babies were affected with clubfoot and were included for further studied. The detailed information regarding maternal age, parity, details of antenatal history, gender of the baby, history of consanguinity and prenatal ultrasonography reports were recorded. Photographs and radiographs were also taken as per requirement. The findings are depicted in Table 1 under result.

Results

In our study, the incidence of CTEV is 1.8 per 1000 births. As it is depicted in Table 1 that the majority (70%) cases of CTEV were male. It was also observed that the maximum were suffering from unilateral clubfoot in both male and female.

Table 1: Unilateral and Bilateral clubfoot cases

Clubfoot	Total No. of Cases (N = 50)	Male N = 35 (70%)		Female N = 15 (30%)	
		Cases	Percentage	Cases	Percentage
Unilateral	29 (58%)	20	57.1	9	60
Bilateral	21 (42%)	15	42.8	6	40

Table 2 presents the parameters to evaluate the characteristics of CTEV and it were observed that small heel size was maximum reported unilateral both in male and female. Similar observation was

reported for other parameters studied. In our study idiopathic cases were more common in secondary cases. Out of 50 cases, 47 cases were idiopathic while only 3 cases were secondary (Table 3).

Table 2: Parameters to evaluate the characteristics of CTEV

Variables/Parameters	Male		Female	
	U/L	B/L	U/L	B/L
<i>Heal Size</i>				
Small (<2.5 cm)	20	15	09	06
Large (>2.5 cm)	00	00	00	00
<i>Skin Creases</i>				
Back of the Heal – Absent	20	15	09	06
Medial side of the Heal – Present	20	15	09	06
<i>Abnormal bony prominences</i>				
On the lateral side of the foot – Present	20	15	09	06
Head of the talus – Absent	20	15	09	06
Lateral maleolus – Present	20	15	09	06
<i>Type of visible Anomalies</i>				
Adduction at the Midtarsal Joint – Present	20	15	09	06
Inversion at subtalar Joint – Present	20	15	09	06
Equinus at ankle joint – Present	20	15	09	06
<i>Kite's Angle</i>				
A.P View – Reduced	20	15	09	06
Lateral View – Reduced	20	15	09	06
Talocalcaneal Index – Reduced	20	15	09	06

Table 3: Idiopathic and Secondary cases

Gender	Idiopathic	Secondary
Male	33	2-AMC Spina bifida
Female	14	1-Polio

Discussion

The incidence of CTEV is estimated to be 1–2/1000 births. In our study, the incidence of CTEV is 1.8 per 1000 births. The incidence at birth recorded by other workers has varied in different series from 1 in 2000 Stewrt (1951), 1.7 per 1000 Malpas (1937), 3 per 1000 Alberman (1956); Mckeown and Richard (1960) noted 4.4 cases per 1000 in Birmingham area. The incidence of CTEV is higher in studies of Aigoro NF (7.9/1000).¹¹

The male to female sex ratio recorded in this series of clubfoot was 2:9:1. Many authors have reported preponderance of CTEV in males. Oyinbo CA *et al.*¹² found the incidence of CTEV 4 times more common in males compared to females and it was statistically significant. Lochmiller¹³ found an overall ratio of affected male to female as 2.5:1. Other workers like Life Hugger, Redden RF, Morcuende JA, Rathjen KE *et al.* found the ratio as 2:1. Bakare TIB¹⁴ reported CTEV in 5 cases with 3 cases in females and 2 cases in males. Choudhary AR *et al.*¹⁸ found no significant relation between occurrence of CTEV and sex ratio. In our study among 50 cases of CTEV, 29 cases (58%) were unilateral and 21 were bilateral (42%). Thus unilateral cases of CTEV

were common than bilateral cases. But previous workers found that bilateral clubfoot were more common than unilateral. (50% Dolan LA, Dietz FR; 50% Cumming RJ, Davidson RS, Armstrong PF *et al.*; 50% Siapkara A, Duncan R). Miedzybrodzyka Z¹⁵ reported 51% cases of B/L CTEV and 49% U/L CTEV. Boo NY²⁰ found 68.5% of CTEV cases being B/L. The findings of our study did not match from above workers study.

In almost all cases family history were positive. In our study idiopathic cases were more common than secondary cases. Out of 50 cases, 47 cases were idiopathic while only 3 cases were secondary. The various risk factors associated with CTEV in our study were AMC, spina bifida, polio.

Association of CTEV with spina bifida, affected infant had scoliosis and muscle weakness in both lower limbs and back. Gaetano Pagnotta *et al.*¹⁷ reported association of clubfoot with neural tube defects in 6 patients by antenatal U/S.

In our study, there was one case of CTEV which was associated with AMC, in which affected infant had contractures of various joints. Muga RO⁵ reported one case of bilateral CTEV associated with Prune-belly syndrome, posterior urethral valves and hydroureters. Alsulaimani AA¹⁶ has reported

one case of multiple malformations which had spina bifida with hydrocephalus and clubfoot.

In our study, there is one case of CTEV which is associated with polio. Robertson¹⁹ noted seasonal variations to be a factor in his epidemiologic studies in developing countries. This coincides with a similar variation in the incidence of poliomyelitis in the children in the community. Clubfoot was therefore proposed to be a sequel of a prenatal polio-like condition.

Conclusion

Clubfoot leads to disability and handicaps. The birth of an infant with CTEV evokes an emotional parental response require sensitive counseling. Prenatal U/S can detect CTEV which can later be followed by adequate *t/t* at the earliest. Early recognition of CTEV at birth is important as appropriate measures can be taken to correct CTEV.

References

- Hippocrates. *Great Books of Western World*. Vol. 10 Chicago Encyclopedia Britannica. 1952.p.114.
- Kite JH. Non-operative treatment of congenital clubfoot. *Clin Orthop*. 1972;84:29-38 [PubMed].
- Wyne-Davies R. Genetic and environmental factors in the etiology of Talipes Equinovarus. *Clinical Orthopedic*. 1972;84:9-13.
- Wyne-Davies R. Family Studies and the cause of congenital clubfoot: Talipes Equinovarus, Talipes Calcaneovalgus and Metatarsus Varus. *The Journal of Bone and Joint Surgery*. 1964 Aug;46(3):445-63.
- Muga RO, Mumah SCJ, Juma PA. Congenital malformations among newborn in Kenya. *AJFAND* 2009;9(3):814-29.
- Atlas S, Menacho LCS, Ures S. Pathology of Clubfoot. *Clinical Orthopedic*. 1980;149:224.
- Mccauley JC. Clubfoot history of the development and the concept of the pathogenesis and treatment. *Clinical orthopedic and related research*. 1972;44:51-56.
- Mccauley J, Lusskin R and Bromley J. Recurrence in congenital metatarsus varus. *The Journal of Bone and Joint Surgery*. 1964;46-A:525-33.
- Palmer RM. The Genetics of Talipes equinovarus. *The Journal of Bone and Joint Surgery*. 1964;46-A:542-56.
- Turco VJ. Clubfoot (current problem in orthopedics) New York Edinberg, London and Melbourne: Churchill Livingstone. 1981.
- Aigoro NF, Oloko M, Popoola M. Pattern of congenital Musculoskel *et al.* Deformities at the state hospital, Abeokuta, South-West Nigeria. *Nigerian Journal of Orthopaedics and Trama*. 2009;8(2):87-89.
- Oyinbo CA, Dare NW, Amain ED. Prevalence of polydactyly, syndactyly, amniotic band syndrome, cleft lip, cleft palate and Talipes Equinovarus in Bayelsa state, Nigeria. *GMS Med Inform Biom Epidemiological*. 2009;5(2):14.
- Lochmiller, Johnston D, Scott A, *et al.* Genetic epidemiology study of idiopathic Talipes Equinovarus. *Am J Med Genet*. 1998 Sep 1;79(2): 90-6.
- Bakare TIB, Sowando OA, Adejuyigbe OO, *et al.* Epidemiology of external birth defects in neonates in South-Western Nigeria. *Afr Paed Surg*. 2009;6(1):28-30.
- Miedzybrodzyka Z. Congenital Talipes Equinovarus (clubfoot): A disorder of the foot but not the hand, *J Anant*. 2003 Jan;202(1):37-42.
- Alsulaimani AA, Alzahrani AK. Prevalence of congenital anomalies at high altitude area in Saudi Arabia. *Journal of Medical Research and Science*. 2011;1(3):44-51.
- Gaetano Pagnotta *et al.* Antenatal sonographic diagnosis of clubfoot. A six-year experience. *Journal of foot and ankle* January-February. 1996;35(1):67-71.
- Choudhury AR, Mukherjee M, Sharma A, *et al.* Study of 1,26,166 consecutive births for Major congenital defects. *Indian J Pediatr*. 1989;56(4):493-9.
- Robertson, CORR, Prenatal polio-like condition, epidemiological evidence, seasonal variation.
- Boo NY, Ong LC. Congenital Talipes in Malaysian neonates; Incidence, pattern and associated factors. *Singapore Med J* Dec. 1990;31(6):539-42.