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Dr. Jagannatha Sahoo
MBBS, DNB(PMR),
DNB(Orthopaedics), Associate
Professor, Department of PMR,
AIIMS, Bhubaneswar, Sijua,
Patrapada, Odisha, India

Dr. Sreeja KS
Senior Resident, Department of
PMR, AIIMS, Bhubaneswar
Sijua, Patrapada, Odisha, India

Demographic evaluation of children with clubfoot admitted for postero–medial soft tissue release: An institutional study

Dr. Jagannatha Sahoo and Dr. Sreeja KS

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Abstract

Objective: The study was aimed at evaluating the demographic characteristics of CTEV children requiring surgical intervention.

Methodology: An observational study was done in Balaji Institute of Surgery research and rehabilitation for the disabled from October 2007 to May 2009. 35 children with 57 idiopathic club foot requiring soft tissue release by different approaches were taken for study. Severity of deformity were recorded by DiMeglio scores. Radiological assessment was done by AP and lateral radiographs of ankle and foot, Talo-calcaneal angles, Talo – 1st metatarsal angle was measured. The demographic characteristics was recorded.

Results: The mean age at the time of surgery was 18.75 months with a range of 10 months to 36 months. Out of 35 patients, 27 patients were male and 8 patients were female with a ratio of 3.37:1. 20 children were first child of family, 11 children were 2nd order child and 4 children were third order delivery. 3 feet were benign feet, 14 feet were moderate feet, 38 feet were severe feet and 2 feet were very severe feet as per DiMeglio classification.

Conclusion: In our study 77.14 % of male children and 22.85 % of female children are affected with club foot with 62.85 % bilateral involvement among children requiring Posteromedial soft tissue release. We had male to female ratio 3.4:1 of 57 feet 66% of severe grade DiMeglio club foot were in age group of 1 to 3 among the children for surgery.

Keywords: CTEV, clubfoot, deformity, PMSTR

Introduction

Talipes equino varus was first introduced into the medical literature by Hippocrates in 400BC. The term is derived from Latin word Talus (ankle) and pes (foot); equines: horse like (heel in plantar flexion) and Varus: inverted and adducted. The deformity known as club foot is probably most common (1 -2 in 1000 live births) congenital dysplasia of musculoskeletal tissue (musculotendinous, ligamentous, osteoarticular and neurovascular structures) distal to the knee. It is a deformity due to malalignment in calcaneo-talar –navicular complex. CTEV has increased male predominance and nearly 50% patients have bilateral limb involvement. In CTEV there is defective tarsal morphology and abnormality in all three planes with soft tissue contractures in medial and plantar aspects of foot. The deformity can be positional, congenital or associated with neuromuscular, syndromic (trisomy 18, chromosome 22 q 11 deletion syndrome) or focal dysplasia of musculoskeletal tissues (arthrogryposis and myelodysplasia). The initial treatment of club foot is conservative. Various treatment regimens are followed, including use of corrective strapping, taping and serial casting. Ponseti method of manipulation and serial casting (weekly) is the standard initial treatment. It is minimally invasive as about 90% of children may need Achilles tenotomy at end of casting. Abduction bracing is required 23 hrs/day for 3 months and night time bracing is required for nearly 3-5 yrs. Although success reports with conservative management are reported in literature, results have been less optimal as recurrence rates are high and obtaining compliance with braces are difficult.

Surgery is indicated for deformities that fail to respond to conservative and minimally invasive techniques. Rigid neuromuscular and syndromic clubfoot require surgical correction early.

Corresponding Author:
Dr. Jagannatha Sahoo
MBBS, DNB(PMR),
DNB(Orthopaedics), Associate
Professor, Department of PMR,
AIIMS, Bhubaneswar, Sijua,
Patrapada, Odisha, India

Surgical procedures are tailored specifically to type of foot, pathology of occurrence and age. However, surgery also carries significant risks and complications. In this study our aim is to evaluate the demographic data of children requiring surgical intervention.

Materials and Methods

Study Design: Observational study

Study Setting: Balaji Institute of Surgery research and rehabilitation for the disabled

Study Period: October 2007 - May 2009

Sample Size: 35 patients (57 feet)

Idiopathic club foot children treated with soft tissue release by different exposures during the above periods are included in the study. Other than above criteria all others are excluded. Institutional ethical clearance was taken. After obtaining parent informed consent this demographic study of 35 patients with idiopathic club foot who were to undergo surgical intervention in our institution were selected. These patients

were evaluated and graded according to pre-operative DiMeglio score. A detailed history, including pre-natal, natal and post-natal history were recorded. Any family history of congenital anomalies, consanguineous marriage and drug history was taken in detail. Standard orthopedic examination of hips, spine, extremities and gait analysis findings were recorded. Severity of deformity by DiMeglio and Pirani scores were recorded. Length and width of feet, calf circumferences were measured. Radiological assessment was done by AP and lateral radiographs of ankle and foot, Talo-calcaneal angles on AP and lateral views, Talo – 1st metatarsal angle on AP view were assessed. Statistical analysis was expressed in mean, percentage and ratios. Results were expressed in appropriate bar, pie and tables.

Results and Discussion

Age Distribution

The mean age at the time of surgery was 18.75 months with a range of 10 months to 36 months.

Table 1: Age distribution

Age in months	No. Of patients	Percentage
0-10	03	8.5
11-16	11	31.42
17-22	07	20
23-28	08	22.85
29-36	06	17.14

Out of thirty-five patients, twenty-seven patients were male and eight patients were female with a ratio of 3.37:1.

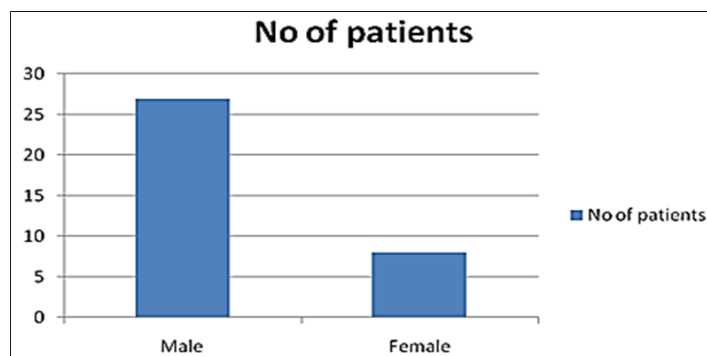


Fig 1: Sex distribution

Five children had left leg involvement, eight children had right leg involvement and twenty-two children had bilateral involvement.

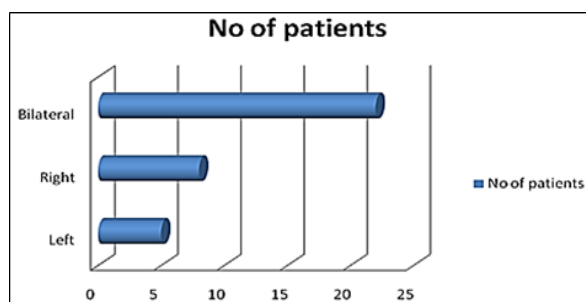


Fig 2: Distribution by side of involvement

20 children were first child of family, 11 children were 2nd order child and 4 children were third order delivery.

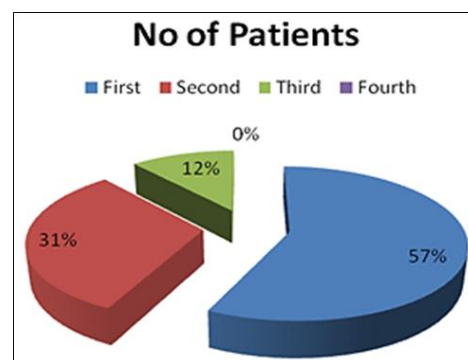


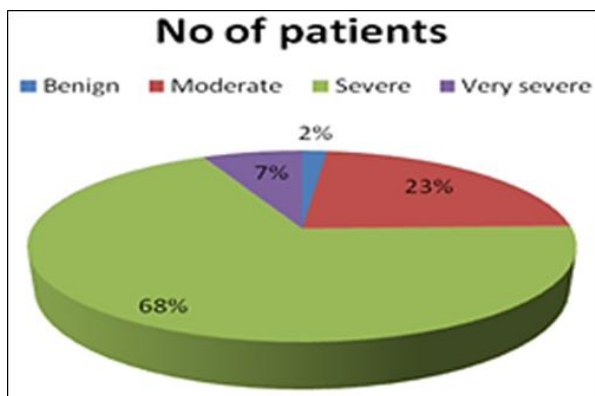
Fig 3: Children in the "order of delivery"

Forty-four feet had foot length between 8-10cm, forty-five feet had breadth between 2-3cm and forty eight feet had breadth at base of toe had 3-6 cm.

Table 2: Size of the foot

Size of the foot in CM			No of patients	Percentage
Length of the foot	<8-cm		1	1.75
	8-10cm		44	77.19
	>10 cm		12	21.05
Breadth	Heel	<2cm	1	1.75
		2-3cm	45	78.94
		>3cm	11	19.29
	Toe	<3cm	2	3.50
		3-6cm	48	84.21
		>6cm	7	12.28

3 feet were benign feet, 14 feet were moderate feet, 38 feet were severe feet and 2 feet were very severe feet as per DiMeglio classification.

**Fig 4:** Grade of foot

There was a wide range of variation seen in the radiographic evaluation of the angles. But postoperative angles of all the three groups came to normal range without any statistical significance.

Table 3: Radiological findings

Radiological angle	Views	Pre - operative angle (mean average of Gp1, Gp2, Gp3)
Talo - calcaneal	AP	17.12 ± 6.25
	Lateral	15.26 ± 6.59
Tibio - calcaneal angle	Lateral	48.56 ± 17.21
Talo - 1 st metatarsal angle	AP	51.82 ± 14.21

Analysis of report

Incidence

In our study 77.14 % of male children and 22.85 % of female children are affected with club foot. We had male to female ratio 3.4:1. Moorth *et al.*,^[1] reported a Male: Female ratio of 2:1 in their study conducted in America and United Kingdom. In another study conducted at Western Australia, Carey *et al.*,^[2] described Male: Female ratio of 4:1.

In our study 62.85% child had bilateral involvement, 22.85% had right sided involvement and 14.85 % had left sided involvement of clubfoot. Shahabuddin *et al.*,^[3] in Peshawar documented bilateral involvement of foot in 51 % cases. Right foot was involved in 26 % and left foot in 23%. In another study Nordin *et al.*,^[4] published 50% of cases among the club foot had bilateral involvement. In our study 88% were either 1st or 2nd order birth of which 57 % were 1st order birth.

Length of foot

In our study 44 feet had foot length of 8-10 c m, 45 feet had

heel breadth 2-3cm and 48 feet had breadth at base of toe 3-6 cm in the age group of 1-3yrs. It is argued that in infants of less than 3-6months of age, foot size makes surgery technically demanding, as identification of anatomical structures becomes difficult. Roye *et al.*,^[5] reported surgery at this age leads to increased scar formation that compromises the function of the tissues. It is suggested that delaying surgery allows for prolonged conservative management, which may prevent the progression of the deformity and thus reduce the extend of required surgical release and (Ballantyne and Manicol, 2002)^[6]. In our study delaying of the surgery till one year is noted to get the adequate foot size and to avoid complications.

Grade of Foot

In our study we had come across 66% of severe grade Dimeglio^[7] club foot in age group of 1 to 3. Nordin *et al.*,^[4] had documented 61 % cases were stiff/ severe grade foot among the club foot population. In 1995 Dimeglio *et al.*,^[7] had reported 35 % severe grade and 30 % moderate grade of club foot.

Radiological evaluation

There was a wide range of variation seen in radiographic evaluation of the angles. George⁽⁸⁾ documented that there was no significant shift out of normal range of angular measurement post operatively in different methods. Joseph⁽⁹⁾ had reported the wide range of variation from 10-25 in the radiological angle measurement both pre and post operatively. In our study there is no influence of radiological findings for selection of surgery as it varies widely.

Conclusion

Many controversies in the treatment of idiopathic talipes equino varus exist in the literature, such as the role of operative versus non- operative treatment, optimum age for surgery, type of foot, size of foot and grade of foot.

In our study all the criteria evaluating the suitability of performing the postero- medial soft tissue release was studied. Children around 18 months are mostly requiring postero medial soft tissue surgery. Most of the severe grade foot as per DiMeglio classification needs soft tissue release. Radiological evaluation has not much impact for selection of surgery in club foot. However; this study has limitation on short follow up and institutional based study though it gathers patient all around Andhra Pradesh.

This study will help the surgeon for selecting cases for postero medial soft tissue release in case of club foot.

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