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Analysis of clubfoot clinic at a paediatric tertiary care government hospital in Karnataka

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Abstract

Purpose: This study was done to give an overview of the structure, functioning and outcomes of a clubfoot clinic at a tertiary government hospital in Karnataka which is being run in collaboration with a Non-government organisation.

Method: This study was based at a tertiary paediatric government hospital in Karnataka between 2010 to 2018. The clubfoot clinic has medical staffs who look into the assessment and treatment, whereas the support staffs take care of the registration, counselling, brace issue and documentation work. Then the child undergoes ponseti method of treatment for clubfoot. The data collected at the clubfoot clinic between 2010 to 2018 was compiled. It was assessed for various variables, demographic data, recurrence rate and overall outcome of the clinic.

Result: We had a total of 1257 patients of whom bilateral presentation was seen in 50.43% of children. A positive family history for clubfoot was seen in 8% of patients. A majority of 44.2% patients presented to us in first three months of life and 5.3% of patients were above the age of 5 years at presentation to our clinic. Idiopathic clubfoot comprised 92.8%, syndromic associations in 5.08% and neurogenic clubfoot was seen in 2.64%. At presentation the average Pirani score of our study population was 5.5 and the average number of casts for correction was 7 casts [age <3 months] and 10 casts [> 3months]. Percutaneous tenotomy of tendo achilles was done in 94%. The relapse rate in children treated by ponseti method at our centre is 22.5% who were managed by various methods. We at our tertiary care hospital were successful in attaining correction in 86.7% feet with clubfoot. The treatment protocol was completed in 356[28%] patients with no relapse after 5 years.

Conclusion: A well-structured and dedicated clubfoot clinic with involvement of medical fraternity, government and non-government organisations are necessary for efficient and large-scale management of clubfoot to reduce the burden of the disease in our communities.

Keywords: clubfoot clinic, paediatric tertiary, government hospital, Karnataka

1. Introduction

Clubfoot is one of the most common deformity of the lower extremity encountered in paediatric orthopaedic practice. The worldwide prevalence is 0.6 to 1.5 per 1000 births, in India the prevalence is 1.19 per 1000 birth [1-3]. Clubfoot may occur in isolation or be associated with other syndromes, neurological conditions and congenital malformations. Clubfoot is a burden to the child and can diminish the quality of life [4, 5]. Early screening, recognition, and prompt treatment are crucial in achieving a near normal foot. Ponseti method revolutionised the treatment of CTEV with an aim to achieve a plantigrade foot [6-10]. It includes a correction phase wherein the child undergoes serial corrective casting and maintenance phase where the child is put on a bracing protocol. Surgical intervention may be required in 3-5% of cases [11]. Despite good outcomes of ponseti treatment, achieving them on a larger scale requires substantial involvement from parents, medical fraternity, and government and non-government organisations. A well-structured and dedicated clubfoot clinic are necessary for efficient management of clubfoot at a larger scale. This study was done to give an overview of the structure, functioning and outcomes of a clubfoot clinic at a tertiary government hospital in Karnataka which is being run in collaboration with a Non-government organisation [NGO].

2. Method and Material

2.1 Structure and functioning of clinic

Clubfoot clinic at this tertiary government hospital was established in the year 2010 with help of a non-government organisation. The clinic provides free treatment to children with clubfoot. The government provides the place for clinic, casting materials and medical staffs, whereas the NGO provides the support staffs, documentation materials and braces.

The clinic is headed by a paediatric orthopaedic surgeon and assisted by 2 other paediatric orthopaedic surgeons, fellows, physiotherapist and orthotist. We also have a support staff comprising of nursing staffs, clubfoot clinic co-ordinator, counsellor and cleaners. The medical staffs look into the assessment and treatment of these patients, whereas the support staffs take care of the registration, counselling, brace issue and documentation work. The clinic has a dedicated office space and a casting/clinical area.

Paediatric orthopaedic surgeon is the first point of contact to every child who comes with clubfoot at our clinic. The child undergoes a detailed clinical examination to assess the severity of the deformity, the cause and any associated

conditions. Based on this the child is broadly classified as idiopathic, syndromic or neurogenic clubfoot. Genetic specialist opinion is sought for all syndromic clubfoot and Paediatric neurologist opinion is sought for neurogenic clubfoot. Following which the child is sent for clubfoot clinic registration.

The clubfoot clinic coordinator then registers them under the clinic and takes a detailed family, social history and issues a special clubfoot file. The patients then proceed to the casting room where a paediatric orthopaedic surgeon scores the foot according to Pirani scoring and the child undergoes corrective casting as per ponseti technique [Fig 1: Clubfoot clinic - casting area and office]. The parents are counselled in detail with regards to expected duration of treatment, cast care/hygiene advice and on how to remove cast. The child is reviewed on every Friday and foot is scored using pirani score every week to look for progress. Once the score is favourable the child undergoes tendo achilles [TA] per-cutaneous tenotomy on outpatient basis under local anaesthesia and casted in maximum corrected position for three weeks. After three weeks the child is put on a foot abduction brace as per bracing protocol.



Fig 1: A) Clubfoot clinic, B) Casting area, C) Casting in progress, D&E) Ta tenotomy in progress

The child is then reviewed at regular fixed intervals to assess for any recurrence and for brace size change. Whenever the child is absent for the clinic or follow-up, the coordinator follows up on them and counsels them with regards to being

regular for the clinic. The child is followed up till completion of bracing protocol. In case of any recurrence the child is taken up for necessary intervention either conservative or surgical. [Fig 2: Functioning and structure of clubfoot clinic]

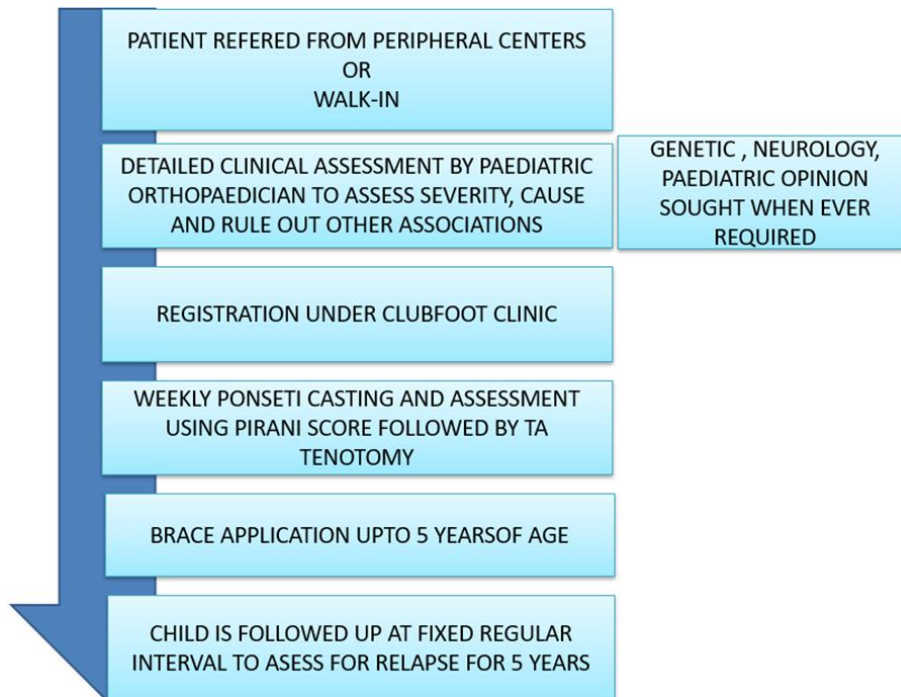


Fig 2: Functioning and structure of clubfoot clinic

2.2 Data analysis

The data collected at the clubfoot clinic between 2010 to 2018 was compiled. It was assessed for various variables, demographic data, recurrence rate and overall outcome of the clinic.

3. Results

This study was based at a tertiary paediatric government hospital in Karnataka, India. We had a total of 1257 patients [1891 feet] underwent treatment for clubfoot at our clubfoot clinic between 2010 to 2018. Of whom 352 were female patients and 905 patients were male patients. Bilateral

presentation was seen in 50.43% of children and the remaining 49.57% had unilateral involvement. A positive family history for clubfoot was seen in 8% of patients. A majority of 44.2% patients presented to us in first three months of life, 13.1% between 3 months to 6 months, 14.5% were between 6 months to 1 year at presentation, 14% were of one to two years of age, 8.9% were between two to five years and 5.3% of patients were above the age of 5 years at presentation to our clinic. [FIG 3: Age distribution] A majority of 92.28% comprised of idiopathic clubfoot of whom complex or atypical clubfoot were seen in 6% of cases presenting to us.

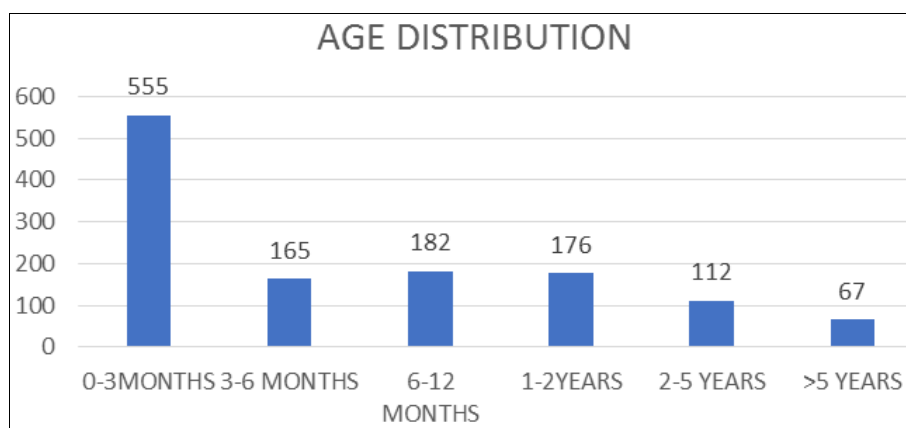


Fig 3: Age distribution

There were syndromic associations in 5.08% of patients of whom 35.8% were associated with arthrogyriposis, 14.9% of the syndromic cases were diagnosed to have Larsen’s syndrome, 7.5% with limb deficiency syndromes, 7.5% had constriction band syndrome, 4.5% had duplication in foot, 3% were Freeman Sheldon syndrome and the remaining has unnamed/miscellaneous syndromes. [Fig 4: Syndromic

clubfoot associations] Neurogenic clubfoot was seen in 2.64% of patients which included spina bifida, sacral agenesis, spinal dysraphism myelomeningocele and myopathies. Developmental dysplasia of hip was noted in 1.9% of patients with clubfoot. There were no association with congenital muscular torticollis in our group of patients.

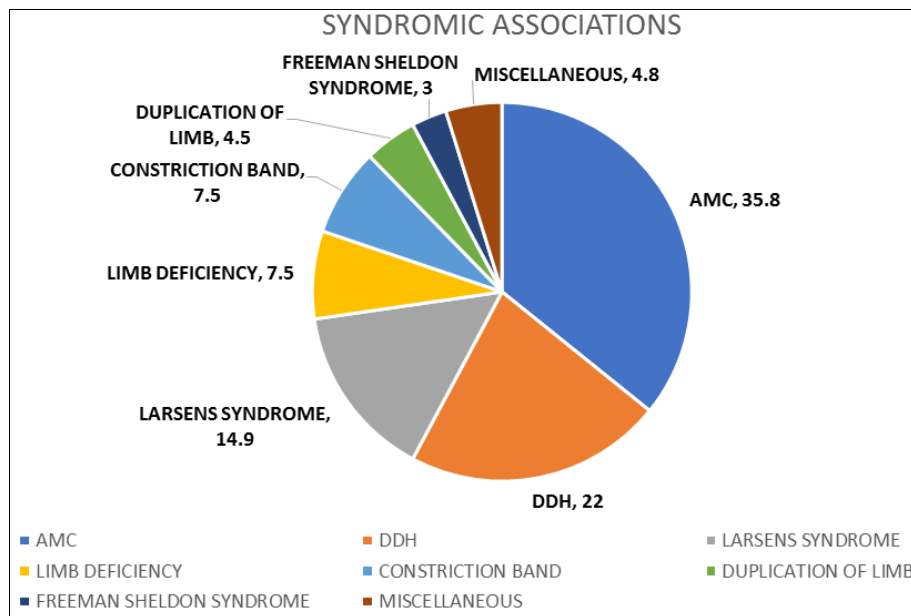


Fig 4: Syndromic associations [Percentage of various syndromes in 5.08% of syndromic clubfoot]

At presentation the average pirani score of our study population was 5.5 and the average number of casts for correction was 7 casts for children presenting within 3 months of life and 10 casts for children presenting after 3 months of age. A total of 18% of our study population required more than 8 casts, they comprised mainly of syndromic cases and late presenters. Percutaneous tenotomy of tendo achilles was done in 94% of patients. Currently 36.8% of patients are on bracing protocol and are being followed up at regular interval. The relapse rate in children treated by ponseti method at our centre is 22.5% of which more than 70% were identified early and intervened. Among the relapsed patients 18.4% were managed conservatively with re-casting, 27.5% required tibialis anterior tendon transfer of whom 1/3rd required a simultaneous tendo achilles tenotomy, 9% required Postero-medial soft tissue release, 14.8% required secondary percutaneous ta tenotomy. We at our tertiary care hospital were successful in attaining correction in 86.7% feet with clubfoot. The treatment protocol was completed in 356[28%] patients with no relapse after 5 years. 2.6% patients were lost to follow-up and 0.3% died due to other medical comorbidities. The centre has seen a steady increase in number of referrals for management of clubfoot especially complex and late presenters. At present there are 46- 52 children being casted for clubfoot every week.

4. Discussion

Clubfoot treatment has seen tremendous change in the past three decades with increasing trend towards conservative nonsurgical treatment. Though Ponseti first description took some time to popularise, at present with its simplicity, high success rate it is the most widely accepted method for treatment of clubfoot. In a developing country like India where there is a larger population to provide for there is a need for a structured programme to eradicate disability due to clubfoot. In lines with this the government of Karnataka in collaboration with an NGO started their first clubfoot clinic at a tertiary government paediatric hospital in Bengaluru, Karnataka. With a steady increase in number of patients attending the clinic at present we have a total of 1257 patients [1891 feet] who are either on treatment or have completed.

In our study population the male to female ratio of patients was 2.5:1, similarly Gupta A *et al* and Pulak S *et al* had a

higher number of occurrences of clubfoot in males with 81% and 80% respectively [12, 13]. There is a higher incidence of clubfoot in male children compared to females. According to Lochmiller C *et al* 25% of all isolated cases had a positive family history and Engell V *et al* has stated that heritability of isolated clubfoot is 30% [14-15]. Where as in our group we had a family history of clubfoot in 8% of patients.

According to Verma A *et al* and Pulak S *et al* they had a higher incidence of unilateral clubfoot of 80% and 64.1% respectively [13, 16]. Gupta A *et al* in their series of 154 patients had 75.32% bilateral involvement [12]. Whereas in our series 50.43% of cases had bilateral involvement. Ours being a larger study population we conclude that there isn't a significant variation in number of patients affected bilaterally or unilaterally. A majority of 40.7% patients presented to us in first three months of life, 12% between 3 months to 6 months and 13.3% were between 6 months to 1 year at presentation. A significant 25.8% of patients presented to us after the age of 1 year. This shows the need for further sensitisation, involvement among grass-root level with regards to clubfoot and its treatment.

There were syndromic associations in 5.08% of patients in our group with majority of them with arthrogyriposis, followed by Larsen's syndrome and limb deficiency syndromes. Studies shows genetic association of clubfoot with many syndromes and that there is a need to assess each child in detail to rule out any syndromic associations. We also so 2.64% of patients with neurogenic cause for clubfoot, similarly Gupta A *et al* had 3% neurogenic clubfoot [12]. There were no association with congenital muscular torticollis in our group of patients.

The average cast to correction in Pulak S *et al* was 5 casts in 75% of patients and Gupta A *et al* also had a 5 cast to correction in 71% of patients [12, 13]. A majority of their patients presented early in life and Pirani score at presentation was 5.6 and 5.57 respectively. Whereas at our centre the mean pirani score was 5.5, and cast to correction was 7 casts in children less than 3 months and 10 in children with older than 3 months. Syndromic clubfoot required higher number of casts. It was noted that late presenting and patients with higher pirani score at presentation need a greater number of casts for correction.

Tenotomy is an essential part of ponseti method in treating clubfoot and at our centre we had a tenotomy rate of 94%. It

was noted that many series of studies from different parts of the world have shown the importance and need for of TA tenotomy. It is crucial and reduces the rate of relapse significantly^[11-15].

Relapse after primary treatment by ponseti method was as high as 22.5% in our series. Forefoot adduction followed by equinus were noted to be the most frequently relapsed deformity. We considered recurrence of any of the following-forefoot adduction, equinus, cavus-varus deformity and dynamic supination as relapse. Gupta A *et al* in their series had a relapse of 17.1% [9/154] of which forefoot adduction was the most common deformity relapse^[12]. Kulambi V *et al* in their series of 40 patients had a relapse rate of 10% with a mean follow-up of 18 months^[17]. In our series with a mean follow up of 3.8 years and 5 years follow up in 32.4% of patients, a longer duration of follow up showed higher rate of relapse. It was noted that most of the relapses were secondary to improper adherence to bracing protocol and irregular follow-up by the patient. Hence it is very important to have a regular follow up for long term post treatment to detect recurrence early and manage them efficiently. Also, a regular follow-up helps us to reinforce the importance of adhering bracing protocol and counselling the parents.

Clubfoot though an easily treatable deformity by ponseti method, replicating the results at a larger scale is a challenge. We at our tertiary care hospital were successful in attaining correction in 86.7% feet with clubfoot. The treatment protocol was completed in 356[28%] patients with no relapse after 5 years. A well-structured clinic with trained medical staffs and good support staff has helped us to provide good service to the people in our community. Late presenting children, irregular attendance to the clinic, non-adherence to treatment protocol has been the most commonly faced challenges. But with a prompt follow-up/tracing of patients by the clubfoot co-ordinator and counsellors the clinic has been able to reduce the rate of relapse and intervene early when needed. This further reduces burden of the deformity in our society. The current model of clinic has been able to provide sustained care for patients with clubfoot in Karnataka. The current model of our clinic is being replicated in all district government hospitals in Karnataka with the help of our government and NGO.

5. Conclusion

A well-structured and dedicated clubfoot clinic with involvement of medical fraternity, government and non-government organisations are necessary for efficient and large-scale management of clubfoot to reduce the burden of the disease in our communities.

6. Compliance with ethical standards

Conflict of interest: The authors declare that we have no conflict of interests.

Ethical approval: Institutional internal ethical board has approved this study.

Informed consent: Informed consent was obtained from all parents of children included in this clinic and study.

7. Acknowledgement

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