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Prospective Study to Evaluate the Ponseti Technique in the Management of Idiopathic Clubfoot

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Abstract

Introduction: The 20th century was marked by the classification of two concepts in the management of clubfoot. The first is the general acceptance of the principles of manipulation, strapping and serial correction plaster casts and the other favours numerous surgical procedures for the correction of clubfoot. *Methodology:* Detailed personal history was recorded including the age, sex, father's & mother's name, address, date of first reporting, age of reporting, detailed history of previous treatment, etc. A thorough general & local examination was carried out & the deformity was scored according to Pirani' s classification at each visit before applying cast. The score was plotted against the time and the trend of score was noted with reference to effect of manipulations or other interventions on deformity. Manipulations were done by Ponseti's method followed by corrective casts at weekly interval without anaesthesia. *Results:* The number of cast application required to achieve full clinical correction were 4.7 (average) in patients whose initial Pirani scores were 3 while in patients with initial Pirani scores 6, number of cast required to obtain full clinical correction increased to 8 (average). *Conclusion:* Ponseti Method is an excellent conservative method for treatment of Congenital TalipesEquinoVarus.

Keywords: Ponseti's Method; Congenital Talipes EquinoVarus; Club Foot.

Introduction

Clubfoot has been existent and known since time immemorial and similar is the duration of controversies it carries within itself. The subject has been studied by innumerable workers; they all have contributed to its literature. Still the literature on treatment of club-foot is as a general rule that of unvarying success [1].

The first written record of clubfoot treatment is found in the works of Hippocrates from around 400 BC. Hippocrates was the first to advocate Orthopaedic treatment of club-foot by gentle manipulation and bandaging. Nicholas Andry (1743) in his "Orthopaedia" called the deformity as Pedes equines resembling the hoof of a horse [1]. The first advance in non operative treatment occurred in 1836 when Guerin introduced the plaster-of-paris cast. In 1932, Dr. Hiram Kite, recognizing that forceful manipulation and extensive surgical releases were harmful, recommended a return to gentle manipulation and cast immobilization for the nonoperative treatment of congenital clubfoot [2].

The literature from about 1970 to 1990 contains enthusiastic reports on the correction of congenital clubfoot through extensive surgical release procedures. Over time, we have come to recognize the complications of such surgeries including recurrence, overcorrection, stiffness, and pain. Perhaps because of these findings there seems to be a renewed interest in nonoperative techniques for the

correction of congenital clubfoot [1].

Robert Jones discussing the treatment of clubfoot, rightly insisted "……. the goal may be reached successfully by different routes" [3].

The 20th century was marked by the classification of two concepts in the management of clubfoot. The first is the general acceptance of the principles of manipulation, strapping and serial correction plaster casts and the other favours numerous surgical procedures for the correction of clubfoot. But none of the described method can completely achieve the goal of functional, painless and cosmetically acceptable looking foot [1].

Long back in 1960s Dr. Ignacio Ponsetidevised his method of conservative treatment of Congenital TalipesEquinoVarus which starts from day one of age and is based on the fundamentals of kinematics and pathoanatomy of the deformity and successfully realigns clubfoot in infants without extensive and major surgeries [4].

This method has correct biomechanical basis for realigning deformed ankle and foot joints and corrects deformity due to favourable fibroelastic properties of the connective tissue and the ligaments [4].

Now most Orthopaedic surgeons agree that the initial treatment of congenital clubfoot should be non operative, beginning from the first day of life when the deformity can be easily dealt to achieve a plantigrade foot at earliest because it gives better functional results. So at present the mainstay in management of clubfoot is to diagnose the disease as soon as possible and then to deal with the deformity as early as possible to realign the foot biomechanically correct. The cooperation of the parents and their education regarding the disease is another important but neglected aspect in achieving successful results [4].

Methodology

This is a prospective study for all the children from birth to 6 months of age with congenital idiopathic clubfoot registered at our hospital that is willing to undergo treatment. With the following inclusion and exclusion criteria.

Inclusion Criteria

1. Infant from birth to 6 months of age who are eligible for Ponseti method of treatment for clubfoot.
2. Infants with idiopathic clubfoot.

Exclusion Criteria

1. Infants with myelodysplasia , complex idiopathic clubfoot, paralytic clubfoot.
2. Previously operated for clubfoot.
3. Age of patients more than 6 months.

Detailed personal history was recorded including the age, sex, father's & mother's name, address, date of first reporting, age of reporting, detailed history of previous treatment, etc.

A thorough general & local examination was carried out & the deformity was scored according to Pirani' s classification at each visit before applying cast. The score was plotted against the time and the trend of score was noted with reference to effect of manipulations or other interventions on deformity. Manipulations were done by Ponseti's method followed by corrective casts at weekly interval without anaesthesia. Depending upon the response of the deformity to serial casting as evident by graph obtained by plotting score against time since institution of treatment, the treatment was either continued or modifications were recommended. Patients were followed up weekly for corrective casting till tenotomy and corrective cast was applied for 3 weeks after final correction or percutaneous Tendo Achilles tenotomy. We performed the tenotomy under anesthesia. Then the patients were advised regarding bracing with Dennis Browne splints for 3 months and followed-up to instruct regarding night time bracing for 3- 4 years. Modified CTEV shoes in children who had started bearing weight on lower limbs were given.

Results

In the present study, 53% cases presented in the first month of life. Youngest patient presented 4 days after birth. The oldest patient was 6 months of age.

There were 23 male and 7 female patients in our series with a male female ratio of 3.3: 123 cases had bilateral clubfeet and 7 had unilateral presentation with 4 being right sided deformities and 3 left sided As regards laterality, the ratio of bilateral to unilateral clubfoot is 3.3:1.5 patients out of 30 had other associated congenital anomalies.

If we look at the age wise distribution it is obvious that most of the patients, who had reported in first month of their life, showed a pattern three response i.e. both the scores (mid foot and hind foot) got corrected and did so fairly quickly. The average

number of manipulation required in a foot before maintenance cast was given was 5.03 (average) in age group of 0-1 month while the number of manipulation required for full correction increased steadily with increase in age at presentation; 6.5 (average) at 5- 6 months of age. If we categorize the feet on the basis of initial Pirani Score, we find that those feet which had lower initial score 3 to 4 (that is less severe and less rigid deformity) were more amenable to correction and responded relatively early when compared to those with higher initial score 4.5 to 6 (i.e. more severe and more rigid deformity). The number of cast application required to achieve full clinical correction were 4.7 (average) in patients whose initial Pirani scores were 3 while in patients with initial Pirani scores 6, number of cast required to obtain full clinical correction increased to 8 (average).

Age Wise Distribution

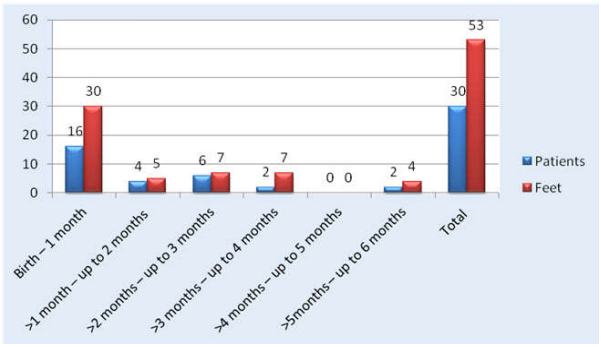

Fig. 1: Age Distribution

Laterality

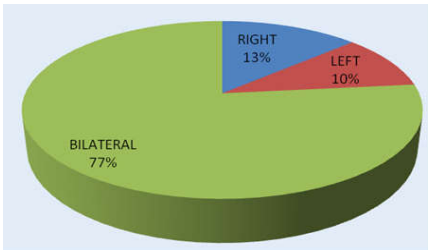

Fig. 2: Distribution based on laterality

Intial Pirani Score Versus Age at Presentation

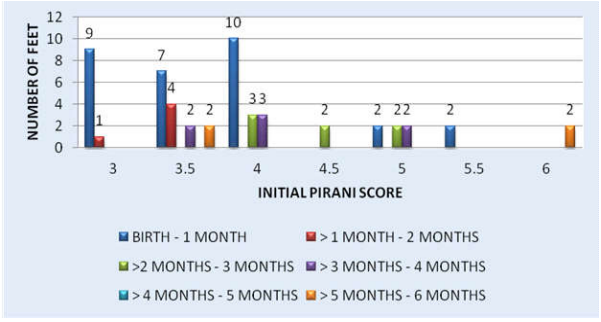

Fig. 3: Age and initial Pirani Score

Number of Casts Requires Versus Age at Presentation

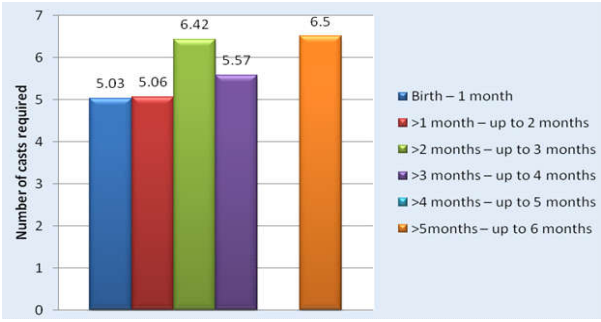

Fig. 4: Distribution based on number of casts required

Number of Casts Required versus Pirani Score at Presentation

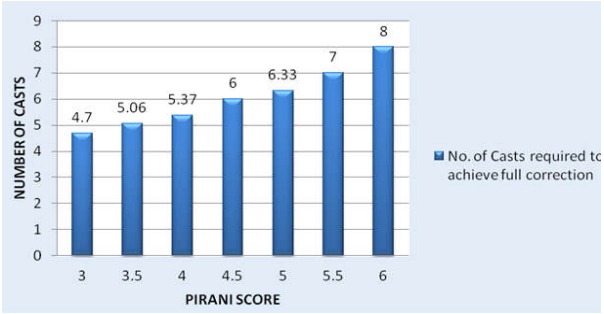

Fig. 5: Casts required and Pirani score

Discussion

Treatment of idiopathic clubfoot is either conservative or surgical. Despite long-term experience in many centers, there still are outcome controversies surrounding both alternatives. Controversies persist because of lack of a) standards for evaluating functional outcomes, rendering comparisons between treatment groups problematic, and b) long-term follow-up studies showing results.

Lloyd-Roberts [5] wrote "Clubfoot will doubtless continue to challenge the skill and ingenuity of Orthopaedic Surgeons, but so long as much fundamental knowledge eludes us, our practice will continue to be flavored with a certain ingenious empiricism. Art-has had its day. Let us now resolve to concentrate on the science of Orthopaedic surgery" Long back in 1960s Prof. Ignacio Ponseti [4] devised his method of conservative treatment of Congenital Talipes EquinoVarus which starts from day one of age and is based on the fundamentals of kinematics and pathoanatomy of the deformity. This method successfully realigns clubfoot in infants without extensive and major surgeries.

This method has correct biomechanical basis for realigning deformed ankle and foot joints and corrects deformity due to favorablefibroelastic properties of the connective tissue and the ligaments.

So this method does not aim at anatomical and radiological correction and can be evaluated critically on the basis of clinical correction [4].

The longest published follow-up is the 30-year follow-up of 45 patients (with 71 clubfeet) treated with the Ponseti method of manipulation and castingat the University of Iowa Hospital and Clinics between 1950 and 1967 [6].

If we categorize the feet on the basis of initial Pirani Score, we find that those feet which had lower initial score 3 to 4 (that is less severe and less rigid deformity) were more amenable to correction and responded relatively early when compared to those with higher initial score 4.5 to 6 (i.e. more severe and more rigid deformity). The number of cast application required to achieve full clinical correction were 4.7 (average) in patients whose initial Pirani scores were 3 while in patients with initial Pirani scores 6, number of cast required to obtain full clinical correction increased to 8 (average).

Another point which is worth noting is that in patients who were seen at early age i.e. first month of life, the initial scores were lesser, most being in the range of 3 – 4. In less than 1 month age group, out of 30 feet, 16 feet had scores 3 to 3.5, 12 feet had scores 4 to 5 and one had higher score (5.5). This may be due to the fact that in early days of life because of generalized laxity of ligaments due to effect of maternal 'relaxin' hormone the deformity is suppler.

This implies that deformity can be corrected with greater ease when treatment is started in the initial days of life taking advantage of favourable fibroelastic properties of connective tissue and ligaments.

On the whole we can say that lesser the age of presentation of child (that is age at which treatment is started) and lesser the initial score i.e. less severe and less rigid the deformity more amenable it is to the correction.

First deformity to correct by manipulation and casting in our study which we obtained by plotting the Pirani score at every visit against time were: Medial crease disappeared first. Last deformity to correct similarly was disappearance of posterior crease.

Conclusion

Treatment must start at earliest possible age. Patients who presented at early age showed a fast and casts required to achieve full correction increases as the age at presentation increases.

The patients who have lower Pirani score at initial visit (i.e. less severe deformity) respond better and faster to the treatment as compared to those who have higher Pirani score at initial visit

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