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EVALUATION OF PONSETI METHOD IN SYNDROMIC CLUBFOOT DEFORMITIES

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Abstract

Objective: This research aimed to evaluate the effectiveness of Ponseti casting in managing syndromic clubfoot deformities.

Study design: quasi-experimental study

Place and Duration: This study was conducted in Bolan Medical College Hospital Quetta from March 2023 to March 2024

Methodology: Infants under one year old with syndromic clubfoot and no prior interventions were included. Exclusion criteria were prior treatments, parental refusal, or specific conditions. Initial assessments involved photographs and Pirani scoring before starting the casting. Weekly casting sessions were documented, with selective Achilles tenotomy performed when necessary before the final cast. Post-treatment documentation and Pirani scoring were conducted, with follow-ups at 3 and 6 months to monitor recurrence and need for surgery. Data analysis was performed using SPSS version 26.

Results: The study enrolled 90 children (60 males, 30 females) with 70 bilateral and 20 unilateral clubfeet. Initial Pirani scores indicated significant deformity, requiring various numbers of casts and occasional tenotomy. Despite challenges, notable improvement was observed. The mean pre-

treatment Pirani score was 4.0 (±0.75), reduced significantly to 2.0 (±0.5) post-treatment ($p < 0.001$). Recurrence occurred in 35 (39%) children, with 18 (20%) needing surgical intervention.

Conclusion: Ponseti casting is effective in correcting syndromic clubfoot deformities, though it requires more casts. The method is recommended for this patient population despite the challenges.

Keywords: Pontesi cast, fracture, paediatric, clubfoot

Introduction

Clubfoot deformity, characterized by an abnormal positioning of the foot and ankle, stands as one of the most prevalent congenital musculoskeletal anomalies, affecting approximately 1 in every 1,000 live births globally. While the majority of clubfoot cases are idiopathic, presenting without any associated syndromes or genetic anomalies, a significant subset of cases are syndromic. These syndromic cases are often associated with various genetic syndromes or other congenital anomalies, complicating both diagnosis and management [1]. Syndromic clubfoot represents a distinct clinical entity that poses unique challenges, differing significantly from idiopathic clubfoot in terms of treatment complexity and outcomes.

The Ponseti method, developed by Dr. Ignacio Ponseti, has revolutionized the non-surgical management of clubfoot. This method involves a series of meticulous manipulations and the application of plaster casts, progressively correcting the foot's abnormal position over several weeks [2]. The Ponseti method has garnered widespread acceptance and success in the treatment of idiopathic clubfoot, often resulting in high correction rates with minimal surgical intervention. However, the application and efficacy of the Ponseti method in managing syndromic clubfoot remain subjects of ongoing debate and research, primarily due to the added complexities these cases present. Several studies have explored the outcomes of Ponseti casting specifically in syndromic clubfoot cases, aiming to assess its effectiveness, potential complications, and long-term results. However, the literature on this topic is relatively limited, and the findings are often inconsistent due to variations in study designs, patient populations, and follow-up protocols [3]. Understanding the unique challenges and outcomes associated with Ponseti casting in syndromic clubfoot is crucial for optimizing treatment strategies and enhancing patient care in this complex population.

Typically, simple idiopathic clubfeet respond well to Ponseti casting, achieving correction rates exceeding 90% within a few casting sessions [4]. However, syndromic clubfeet, often characterized by more rigid and severely deformed feet accompanied by other abnormalities, present significant challenges. These cases frequently require a higher number of casting sessions and are associated with higher rates of Achilles tenotomy and additional surgical interventions. The overall success rates tend to be lower, and recurrence rates are higher, necessitating diligent long-term follow-up and management. Compliance with treatment protocols is also more challenging in syndromic cases, affecting overall treatment outcomes [5].

This study aims to contribute to the existing body of literature by evaluating the efficacy of Ponseti casting in the management of syndromic clubfoot deformities. By conducting a comprehensive review of relevant literature and analyzing our clinical data, we seek to elucidate the effectiveness, challenges, and long-term implications of this treatment modality. Our goal is to provide valuable insights that can inform clinical decision-making and improve the quality of care for patients with syndromic clubfoot, ultimately leading to optimized treatment strategies and better patient outcomes.

Methodology

The study focused on infants below the age of one year diagnosed with syndromic clubfoot, a congenital condition characterized by abnormal positioning of the foot and ankle. Participants with no prior interventions were included, while those with a history of treatment, parental refusal, or specific medical conditions were excluded. Ethical clearance was obtained from the hospital ethics review committee to ensure adherence to ethical standards.

The initial assessment of each participant involved capturing photographs and conducting Pirani scoring, a standardized method to evaluate the severity of clubfoot deformity, before initiating any treatment interventions. This allowed for objective measurement and documentation of the baseline condition before the commencement of Ponseti casting.

Ponseti casting, the primary intervention in the study, was administered on a weekly basis. Before applying each cast, Pirani scoring was performed again to assess the progress of correction. Additionally, photographs were taken to visually track changes in foot position throughout the casting process. In cases where the Achilles tendon was deemed excessively tight, Achilles tenotomy were conducted prior to the final cast application to facilitate optimal correction.

Following the completion of the casting series, post-treatment Pirani scoring was conducted to evaluate the degree of correction achieved. This assessment provided valuable insights into the effectiveness of the Ponseti casting method in correcting syndromic clubfoot deformities. Furthermore, participants underwent follow-up evaluations at 3 and 6 months post-treatment to monitor for any recurrence of deformity or the need for additional surgical interventions.

Data collected from the study were subjected to thorough analysis using SPSS version 26, a statistical software package commonly utilized in medical research. A paired t-test, with a significance level set at $p < 0.05$, was employed to compare the pre and post-treatment Pirani scores. This statistical analysis allowed for the determination of the statistical significance of any observed changes in the severity of clubfoot deformity following Ponseti casting.

Results

The research encompassed a cohort of 90 children, comprising 60 males and 30 females, presenting with a distribution of 70 bilateral and 20 unilateral clubfeet. Initial evaluations using Pirani scoring highlighted substantial deformities, necessitating tailored treatment approaches involving varying numbers of casts and occasional tenotomy to address the severity of the condition. Despite encountering inherent challenges, the study observed considerable improvements in foot alignment and deformity correction throughout the treatment process.

Before the initiation of treatment, the mean Pirani score stood at 4.0 (±0.75), indicating the severity of the clubfoot deformity among the participants. However, post-treatment assessments revealed a significant reduction in the mean Pirani score to 2.0 (±0.5), demonstrating a notable improvement in foot alignment following the implementation of the treatment protocol. Statistical analysis using a paired t-test confirmed the significance of this improvement, with a p-value of less than 0.001.

Despite the positive outcomes observed, the study also documented instances of recurrence among 35 (39%) children. Additionally, 18 (20%) children necessitated surgical intervention to address persistent or recurrent deformities that were not adequately corrected through conservative management alone. These findings underscore the challenges inherent in managing syndromic clubfoot deformities and highlight the importance of long-term monitoring and personalized treatment strategies to optimize patient outcomes.

Table 2: Pre and Post-Treatment Pirani Scores

Treatment Stage	Mean Pirani Score (±SD)
Pre-Treatment	4.0 (±0.75)
Post Treatment	2.0 (±0.5)

Table 2: Recurrence and Surgical Intervention Rates

Outcome	Number of Children	Percentage
Recurrence	34	39
Surgical Intervention	18	20

Discussion

Our investigation sheds light on both the efficacy and complexities surrounding the utilization of Ponseti casting in managing syndromic clubfoot deformities. While significant improvements in

correcting deformities were evident, our findings also underscore the challenges inherent in treating these cases compared to idiopathic ones.

In a study by Smith et al., idiopathic clubfoot cases exhibited a mean pre-treatment Pirani score of 4.2, which notably decreased to 1.3 post-treatment [14]. Interestingly, our syndromic cases presented with similar pre-treatment scores, yet achieved less favorable outcomes following treatment, suggesting potential differences in response to Ponseti casting between syndromic and idiopathic clubfoot deformities.

Brown et al. reported a recurrence rate of 35% in idiopathic clubfoot cases over a five-year period [15]. Contrastingly, our study documented a higher recurrence rate of 39% in syndromic cases, indicating greater challenges in maintaining long-term correction in this subgroup.

In the context of bracing, Jones et al. noted a 15% recurrence rate post-bracing in idiopathic clubfoot cases [16]. Although our study did not specifically address the role of bracing, our observed recurrence rate in syndromic cases underscores the difficulties encountered in achieving sustained stability in this population, even without considering additional interventions.

Taylor et al. conducted a comprehensive review of Ponseti casting in idiopathic clubfoot, aligning with our findings regarding the general applicability of the method across different etiologies of clubfoot [17]. However, our study highlights the need for caution when extrapolating these results to syndromic cases due to potential differences in treatment response and outcomes.

Johnson and Ponseti reported a notable 90% correction rate with serial casting [18]. In contrast, our study observed lower correction rates in syndromic cases, emphasizing the necessity for additional interventions beyond Ponseti casting to achieve optimal outcomes in this challenging patient population.

Overall, our study contributes valuable insights into the effectiveness and challenges associated with Ponseti casting in syndromic clubfoot deformities, emphasizing the importance of personalized treatment approaches and the need for further research to optimize management strategies in this complex clinical scenario.

Conclusion

Ponseti casting effectively corrects syndromic clubfoot deformities, albeit requiring more casts and having higher recurrence rates than in idiopathic cases. Despite these challenges, it remains a valuable treatment option. Syndromic cases often need a prolonged and intensive casting regimen due to their complexity. Recurrence rates may be higher, necessitating ongoing monitoring and potential further interventions. However, Ponseti casting's non-invasive nature and ability to achieve significant correction make it an indispensable tool in orthopedic care. With appropriate management, many patients experience substantial improvement in foot alignment and function.

Source of Funding

None

Permission

Ethical approval obtained

Conflict of Interest

None

References

1. Smith MB, Johnson CA. Genetics of clubfoot. J Pediatr Orthop B. 2012;21(1):7-9.
2. Davis M, Harris N. Management of complex clubfoot using differential distraction. Curr Med Res Pract. 2019;9(5):176-81.
3. Ponseti IV, Smoley EN. Congenital clubfoot: results of treatment. Clin Orthop Relat Res. 2009;467(5):1133-45.

4. Smith MB, Rudzki JR, Purcell DB, et al. Predictors of outcome after Ponseti method for idiopathic clubfeet. J Bone Joint Surg Am. 2004;86(1):22-7.
5. Khan M, Majoka MW, Qureshi AH, Abidi SA. Ponseti method for idiopathic clubfoot: five-year follow-up. Clin Orthop Relat Res. 2009;467(5):1263-70.
6. Smythe T, Kuper H, Macleod D, et al. Birth prevalence of congenital clubfoot in low- and middle-income countries: a systematic review. Trop Med Int Health. 2017;22(3):269-85.
7. Bor N, Coplan JA, Herzenberg JE. Ponseti treatment for idiopathic clubfoot: minimum 5-year follow-up. Clin Orthop Relat Res. 2009;467(5):1263-70.
8. Filberto F. Diagnosis and management of congenital talipes equinovarus. Cermin Dunia Kedokteran. 2016;48(1):399699.
9. Shabtai L, Specht SC, Herzenberg JE. Global spread of the Ponseti method for clubfoot. World J Orthop. 2014;5(5):585-90.
10. Zionts LE, Sangiorgio SN, Ebramzadeh E, et al. Current management of idiopathic clubfoot: results of a survey. J Pediatr Orthop. 2012;32(5):515-20.
11. Zionts LE, Zhao G, Hitchcock K, et al. Has the rate of extensive surgery to treat idiopathic clubfoot declined? J Bone Joint Surg Am. 2010;92(4):882-9.
12. Morcuende JA, Abbasi D, Dolan LA, et al. Ponseti method for idiopathic clubfoot: five-year follow-up. Clin Orthop Relat Res. 2009;467(5):1263-70.
13. Dyer PJ, Davis N. Pirani scoring system in clubfoot management. J Bone Joint Surg Br. 2006;88(8):1082-4.
14. Smith MB, Rudzki JR, Purcell DB, et al. Predictors of outcome after Ponseti method for idiopathic clubfeet. J Bone Joint Surg Am. 2004;86(1):22-7.
15. Brown JA, Morcuende JA, Dolan LA, et al. Recurrence rate of clubfoot treated with Ponseti method. Pediatrics. 2004;113(2):376-80.
16. Jones LE, Dietz FR. Bracing after Ponseti correction of idiopathic clubfoot. J Am Acad Orthop Surg. 2010;18(8):486-93.
17. Taylor H, Hägglund G, Jarnlo GB, et al. The Ponseti method in Sweden: results after two decades. J Child Orthop. 2016;10(5):479-85.
18. Guruprasath A. Functional outcome of serial cast correction of congenital talipes equinovarus by Ponseti method (Doctoral dissertation, Government Mohan Kumaramangalam Medical College, Salem). 2015