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THERAPEUTIC APPROACHES FOR EQUINUS FOOT IN CEREBRAL PALSY: A SYSTEMATIC REVIEW

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INTRODUCTION

Review question / Objective To conduct a systematic review on orthopedic therapeutic interventions for equinovarus foot in patients with cerebral palsy, focusing on the effectiveness of different surgical and non-surgical techniques.

Rationale Patients with cerebral palsy have a tendency to present with equinus foot. Therefore, this deformity generates discomfort and limitations in daily activities. Therefore, the present study aims to seek the best therapeutic condition to correct this deformity. And consequently improve the patient's quality oflife.

Condition being studied Cerebral palsy (CP) is one of the most common neuromotor disorders in childhood, affecting motor function and often resulting in permanent physical disability. Characterized by a variety of symptoms, including spasticity, athetosis, and muscle discomfort, CP can lead to a range of musculoskeletal complications, including foot deformities such as equinus foot (DIAS et al., 2018; KRAUT et al., 2020). Basset (2020) states that this deformity, where the foot is established in a plantar flexion position known as equinus foot, is one of the most common musculoskeletal manifestations associated with cerebral palsy, significantly compromising the functional capacity and quality of life of affected individuals.

METHODS

Search strategy For the literature search up to June 2024, the databases Medline (via PubMed), ScienceDirect, and LILACS were used. The search strategy focused on terms related to the target population (patients with cerebral palsy and equinus foot), the intervention (treatments for equinus foot), and the desired study type (randomized controlled trials). The descriptors were applied in English, and only articles with titles and/or abstracts in English, Spanish, or Portuguese

were included. The search had no limits on publication dates and specified languages.

Participant or population Patients with cerebral palsy and equinus foot.

Intervention techniques involving Achilles tendon lengthening and musculotendinous junction.

Comparator techniques involving Achilles tendon lengthening and musculotendinous junction.

Study designs to be included Randomized controlled trials.

Eligibility criteria Randomized controlled trials were included if they met the following criteria: (1) Presence of a group with cerebral palsy and equinus foot and another control group; (2) Use of a specific treatment for equinus foot (with details on dosage, method of application, and duration); (3) Patients treated in a controlled clinical setting. There were no restrictions based on sex or ethnicity. Equinus foot was defined in this review as the condition where the foot remains in constant plantar flexion, impairing gait and posture. Exclusion criteria were: (1) Studies that did not focus exclusively on patients with cerebral palsy; (2) Studies that included other musculoskeletal deformities caused by trauma, cancer, infections, or other neurological conditions besides cerebral palsy; (3) Studies addressing treatments for conditions unrelated to equinus foot; (4) Duplicate publications.

Information sources For the literature search up to June 2024, the databases Medline (via PubMed), ScienceDirect, and LILACS were used. The search strategy focused on terms related to the target population (patients with cerebral palsy and equinus foot), the intervention (treatments for equinus foot), and the desired study type (randomized controlled trials).

Main outcome(s) From 550 potentially relevant records identified through database searches, only 50 full-text publications were retrieved for further evaluation. Of these, 22 studies were excluded because the articles did not correspond to the topic addressed, leaving 28 articles selected for a full review. Data analysis revealed that z-plasty for calcaneal tendon lengthening showed a relative reduction in recurrences of 87%, while musculotendinous junction lengthening achieved an 84% reduction (Assumpção et al., 2008). This result suggests that z-plasty might be considered the preferred technique due to its higher safety regarding the risk of deformity recurrence. Patient age at the time of surgery also emerged as a crucial factor. Patients operated on after the age of seven showed a relative reduction in recurrences of 92%, indicating that surgical intervention should preferably be performed within this age range (Fucs; Svartman, 2008). Skeletal and muscular maturity at this time is fundamental for long-term treatment success.

The study further emphasized the need for extended follow-up until skeletal maturity to monitor potential recurrences and the formation of calcaneal deformities (Assumpção et al., 2008). Continuous follow-up is essential for therapeutic adjustments and to maximize clinical outcomes over time.

Quality assessment / Risk of bias analysis The quality assessment of the included studies, through the risk of bias, is presented in Table 6. Of the twenty selected retrospective observational studies, seven were classified as having a low risk of bias, four as having an uncertain risk of bias, and nine studies were considered to have a high risk of bias. This table summarizes the different dimensions of bias assessed in the included retrospective cohort observational studies on the recurrence of equinus deformity in patients with spastic cerebral palsy.

Strategy of data synthesis The included studies are all retrospective cohort observational studies, which implies potential risks of selection bias, performance bias, and reporting bias. The absence of randomized controlled trials limits the ability to adequately control for these biases. Therefore, the conclusions derived from this systematic review should be interpreted considering these limitations and the heterogeneity observed in the results.

Subgroup analysis This systematic review provided a comprehensive analysis of therapeutic interventions available for treating equinus foot in patients with cerebral palsy. While the results suggest that calcaneal tendon lengthening may be more effective in reducing recurrences, the heterogeneity and biases of the included studies underscore the need for further research to confirm these conclusions. The findings of this review have the potential to guide clinical practice and stimulate future research aimed at optimizing functional outcomes and quality of life for these patients.

Sensitivity analysis The studies were divided into two main groups for quantitative analysis: with and without control group.

- Group with Control Group: Studies presented relative risk results ranging from 0.25 to 2.38, with

95% confidence intervals. Heterogeneity was significant (Chi-square = 36.21, d.f. = 3, p = 0.000).
- Group without Control Group: Studies showed relative risk ranging from 0.02 to 0.32, with 95% confidence intervals. Heterogeneity was even more pronounced (Chi-square = 132.56, d.f. = 15, p = 0.000).

Language restriction No language limit will be imposed.

Country(ies) involved Brazil.

Keywords cerebral palsy; equinovarus foot; orthopedic therapeutic interventions.

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