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ABSTRACT

Introduction: Down syndrome (DS) causes intellectual disability and craniofacial changes due to chromosomal alterations. The Palatal Memory Plate (PPM) is an effective preventive measure for orofacial hypotonicity in DS children. Involving dentists and speech therapists, this multidisciplinary treatment addresses issues like hypotonic tongue, diastasis, and tongue protrusion. **Objective:** To evaluate the use of PPM in DS children. **Cases Report:** Two children participated in the study, a 3-month-old female with no erupted teeth and a 2-year-old female with erupted teeth. After receiving professional instructions on the use, benefits, and implications of the PPM, the participants underwent digital scanning for the fabrication of the device. Mothers were guided on how to place, remove, and the recommended frequency and duration for daily use of the PPM. Throughout the monitoring period, it was found that the participants were unable to fully adhere to the recommended protocol for PPM use, due to a variety of individual factors such as difficulties in adapting to the device, personal commitments of the families, children's health problems, and the absence of a multidisciplinary team involved in the treatment, which limited the achievement of effective results. **Conclusion:** Despite deviations from the prescribed protocol, the study emphasizes the need for individual adaptations and multidisciplinary teamwork. Tailoring interventions to unique patient need in DS orofacial management is crucial for comprehensive and effective care. Additionally, recognizing family challenges also aids healthcare professionals in devising strategies for a more positive experience.

Keywords: Down Syndrome; Child Health; Dental Care for Children.

ABSTRACT

Introdução: A síndrome de Down (SD) causa deficiência intelectual e alterações craniofaciais devido a alterações cromossômicas. A placa palatina de memória (PPM) é uma medida preventiva eficaz para hipotonicidade orofacial em crianças com SD. Envolvendo dentistas e fonoaudiólogos, esse tratamento aborda questões como hipotonia, diástase e protrusão lingual. **Objetivo:** Avaliar o uso da PPM em crianças com SD. **Relato de Casos:** Participaram do estudo 2 crianças, uma de 3 meses edêntula e uma de 2 anos com dentes erupcionados. Após receberem instruções profissionais sobre uso, benefícios e implicações da PPM, as participantes foram submetidas a um escaneamento digital para a confecção do dispositivo. As mães foram orientadas sobre como colocar, remover e a frequência e duração recomendadas para o uso diário da PPM. Ao longo do período de acompanhamento, verificou-se que as participantes não puderam seguir completamente o protocolo recomendado para o uso da PPM, devido a uma variedade de fatores individuais, como dificuldades na adaptação ao dispositivo, compromissos pessoais das famílias, problemas de saúde das crianças e a falta de uma equipe multiprofissional envolvida no tratamento, o que limitou a obtenção de resultados eficazes. **Conclusão:** Apesar dos desvios do protocolo prescrito, o estudo destaca a importância de adaptações individuais e colaboração multidisciplinar. A personalização das intervenções no tratamento orofacial da SD é fundamental para garantir um cuidado completo e eficaz. Além disso, reconhecer os desafios familiares também auxilia os profissionais de saúde na elaboração de estratégias para uma experiência mais positiva.

Palavras-chave: Síndrome de Down; Saúde da Criança; Assistência Odontológica para Crianças.

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INTRODUCTION

Down syndrome (DS) or trisomy 21 is the most common chromosomal abnormality in Brazil, affecting approximately 300,000 individuals. It is a congenital condition associated with intellectual and physical developmental delays.^{1,2}

Clinically, individuals with DS present distinct craniofacial and oral changes, including malocclusion, a protruded and fissured tongue, an atresic and high-arched palate, macroglossia, periodontal issues, dental stains, and caries lesions.²⁻⁴ Notably, hypotonia in these individuals influences speech, swallowing, posture, and various dento-maxillofacial aspects.⁵

Muscle hypotonia in DS stems from brain pathology, reducing neurons and synapses, resulting in a global neurological deficit affecting motor and oral function.^{6,5} In children with DS, this leads to inadequate oral habits, impacting tooth alignment, lip sealing, pacifier sucking, chewing, swallowing, and speech, causing atypical patterns like a hypotonic tongue resting on the lower lip and increased salivation.^{3,7}

The Palatal Memory Plate (PPM) is an intraoral device enhancing lip closure, correcting tongue positioning, and strengthening mouth muscles. It improves suction, speech, swallowing, and nasal breathing, reducing drooling and eliminating harmful habits. Recommended for children with mouth breathing, hypotonia, and inadequate lip seals, early initiation in infancy enhances orofacial development.^{6,8-9}

Thus, the present study aimed to report two cases in which the PPM was used in children with DS, and the results will be evaluated later.

CASES REPORT

The clinical case reports presented in this study were approved by the Ethics Committee for Research on Human Beings, Juiz de Fora Federal University (CAAE 74882023.5.0000.5147). In securing ethical treatment for human subjects, informed consent was obtained from minors' parents or legal guardians.

Clinical case 1

A 2-year-old female subject was confirmed to have DS at birth by karyotype; her mother reported lingual protrusion at rest and a proclined position of the lower teeth. With 14 erupted teeth, the patient underwent the digital scanning for a PPM after professional explanations about its use, benefits and implications. The device was manufactured in a specialized laboratory.

The initial PPM was unfit for the patient's mouth, leading to the creation of a new device in a

different laboratory (Figure 1, A). The second PPM was adapted, affixed to the palate using flavorless denture fixative cream (Figure 1, B), securing it with dental floss, glued outside the child's face, to prevent swallowing if detached (Figure 2).

After demonstrating the PPM placement and removal to the patient's mother, she was instructed to use it thrice daily, up to 60 minutes, always supervised. In addition, exercises to stimulate specific tongue movements were explained to the accompanying speech-language pathologist, aiming to enhance upper lip mobility, facial muscle tone, and improve various aspects like breastfeeding, sucking, swallowing, speech development, lip sealing, and nasal breathing development.

During the follow-up, the mother reported difficulty in placing the PPM, leading to non-compliance. A new demonstration was performed, with adjusted positioning aimed for more comfortable and safe use in the home environment.

After approximately 30 days, the guardian reported device breakage despite progress in usage. Consequently, a third PPM was prepared and adapted, but due to family issues, it wasn't used as per recommended frequency and duration (Figure 2, C).

The follow-up, around 45 days later, was delayed due to personal commitments. The mother reported difficulty placing the PPM and clinical examination revealed eruption of the maxillary deciduous second molars, which explained the difficulty. Therefore, the device couldn't be adapted, and a new PPM wasn't considered due to ongoing teeth eruption, complicating proper adaptation. An appointment will take place in 3 months for a new evaluation.

Despite not adhering to the recommended PPM frequency, the mother noted improved tongue positioning and lip sealing in her daughter during therapy and expressed interest in continuing treatment.



Figure 1: A- patient at rest without the PPM; B- patient at rest with the PPM.

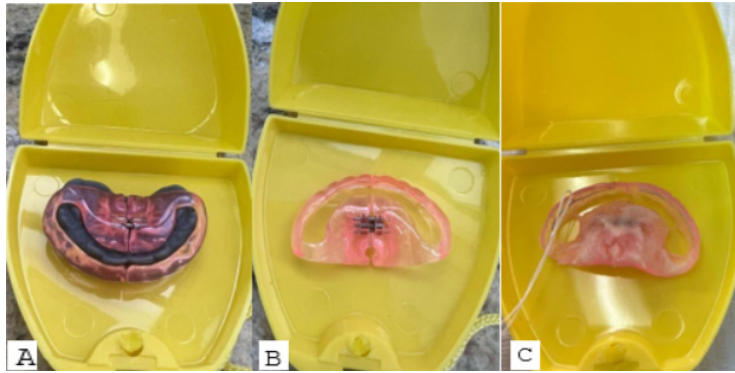


Figure 2: A- first PPM; B- second PPM; C- third PPM.

Clinical case 2

Case 2 involved a 3-month-old female subject with a DS diagnosis confirmed; her mother complained of tongue protrusion at rest. With any erupted teeth, the patient underwent the digital scanning for a PPM after professional explanations about its use, benefits and implications; the device was manufactured in a specialized laboratory.

In the second visit, the PPM (Figure 3) was adapted and secured to the patient's palate using flavorless denture fixative cream. A dental floss piece, tied to the appliance and glued outside the child's face, served to prevent swallowing if detached (Figure 4). The identical instructions about the use of PPM provided in Case 1 were imparted to the mother of the second child.

The follow-up was impeded as the patient underwent lung surgery; during recovery, she was hospitalized again for pneumonia and remains under health care.

Unable to adhere to the recommended PPM frequency and duration, the mother observed no change in tongue or lip positioning. However, the mother expresses interest in continuing treatment, and a follow-up appointment will be scheduled once the patient's overall health stabilizes.

DISCUSSION

DS involves clinical challenges, demanding a careful and personalized dental approach.^{3,4,10,11} In the reported cases, the complications experienced by the children and their families inevitably influenced PPM treatment. These challenges emphasize the unique obstacles encountered by DS patients.^{12,13} The study's exceptional circumstances reflect the complexity of providing effective and empathic dental care for such cases.

This study aimed to evaluate the results of PPM use in two children with different situations: one with no erupted teeth and another with erupted teeth. Differentiating these scenarios was crucial to understand



Figure 3: A- patient at rest without the PPM; B- patient at rest with the PPM.



Figure 4: PPM.

the device's impact based on tooth eruption stage. However, significant challenges impacted treatment continuity and completion in both cases.

A notable limitation of the study is the lack of complete results, especially for the second patient who was not followed up. Despite this, the article highlights the need for individualized treatment plans and shows the impact of unique patient circumstances on dental

care outcomes. This underscores the importance of further research to develop adaptive strategies for DS patients, ultimately improving care quality in this field.

These difficulties contrast with previous study in which treatment was completed even in the face of some obstacles.^{9,13} This is supported by the results of some researchers, indicating that palatal plate therapy may have beneficial long-term effects on oral motor function in children with Down syndrome.¹³⁻¹⁶

One of the factors that most influences stability is tooth eruption, which hinders device retention and adaptation. This has been shown by some researchers,¹³ who found that the use of plates during periods of tooth eruption interferes with their adhesion. However, researchers addressed this challenge by adjusting the plate where teeth emerged or creating a new PPM.⁹

As in the present study, parental adherence and treatment adaptation are limiting factors noted in the literature.¹⁷ Interruptions in therapy led to worsened tongue and lip posture, preventing plate use even after adjustments. External conditions may also hinder treatment success, requiring interruption until the circumstances are favorable.

The Castillo-Morales approach emphasizes that starting treatment early (at 2–3 months of age) is crucial, as it reduces the negative impact on psychosomatic development within the oral cavity and helps achieve normal oral motor function in children with Down syndrome.¹⁸ Studies show children's therapy start age ranged from 2 months to 12 years,¹³⁻¹⁶ with durations from 4 to 48 months. This variability complicates determining the ideal age and duration for therapy. Future studies should standardize age groups and treatment durations to identify optimal timing and length.

Beyond dental considerations, the PPM emphasizes speech therapy involvement for effective results.^{3,6,7,12,13,19} Implementing speech-language pathology interventions promptly after PPM installation strengthens orofacial muscles and desensitize the intraoral region, facilitating PPM acceptance.^{2,11,18,20} Studies have shown that combined therapeutic approaches are recommended for complementary benefits.^{2,8,11,17}

Recording children's faces during treatment through videos and photos aids communication between professionals and families, allowing for orofacial muscle, tongue, and lip positioning analysis (with and without the PPM). However, despite benefits, this assessment has limitations, including short recording periods and susceptibility to environmental conditions and child fatigue.¹⁷

In addition, children with DS encounter health complications affecting dental treatment, including PPM usage.^{10,21} Personalized dental care is crucial, necessitating collaboration among dentists, physicians, and therapists for effective coordination.^{3,6,7,10-13,19} This

approach addresses oral and general health conditions, considering the emotional needs of children with DS and their families.^{10,22}

CONCLUSION

These challenging experiences, influenced by tactile sensitivities, breathing difficulties, and other DS-related health complications, highlight the need for personalized dental care, requiring flexible protocols. Recognition of family challenges guides health professionals to adapt strategies for a more positive experience. Initially designed to compare device efficacy in different tooth eruption stages, numerous factors hindered the protocol's proper implementation. Furthermore, continuous research for innovative and adaptable dental interventions capable of addressing individual case particularities is encouraged.

CONFLICT OF INTEREST

The authors have declared that no competing interests exist.

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