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Early Intervention for Mouth Breathing in Mixed Dentition Period using Ortho-Trainer: A Case Report

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Abstract:- This case report presents the successful correction of mouth breathing and Class II malocclusion in a mixed dentition phase using an Ortho-Trainer. The treatment aimed at improving airway function, dental alignment, and overall facial aesthetics. This case report describes the successful treatment of an 8-year-old female patient with mouth breathing and Class II malocclusion using an Ortho-Trainer during the mixed dentition phase. The patient presented with chronic nasal congestion, increased lower facial height, lip incompetence, a Class II molar relationship, proclined upper incisors. Radiographic analysis confirmed a Class II skeletal pattern with a retrognathic mandible. The treatment plan involved addressing the nasal obstruction through an ENT referral and habit-breaking strategies to encourage nasal breathing, followed by fitting the patient with an Ortho-Trainer to correct dental malocclusion and improve jaw alignment.

Over the course of a year, the patient showed significant improvement. Within the first three months, there was a noticeable reduction in overjet and improved nasal breathing. By six months, the patient predominantly exhibited nasal breathing, with a reduction in overjet to 3 mm and improved dental alignment. At the 12-month mark, the patient achieved a Class I molar relationship with an overjet of 2 mm, along with enhanced facial aesthetics and balanced facial proportions.

I. INTRODUCTION

Mouth breathing is a prevalent deleterious oral habit in children, often symptomatic of underlying sleep-disordered breathing (SDB). Its prevalence ranges from 11% to 56% in children, indicating a significant health concern [1–2]. This habit can profoundly impact dental and maxillofacial development, leading to various oral and craniofacial alterations [3].

The orofacial system's function and morphology are intricately connected, and habitual mouth breathing can disrupt this balance, resulting in muscle imbalance and subsequent alterations in dental development [4]. For instance, mouth-breathing children often exhibit a decrease in tongue pressure, which can further exacerbate the imbalance [5].

One of the key consequences of mouth breathing is the downward position of lingual muscles, which can compress the upper dentition and contribute to a constricted maxillary dental arch and posterior crossbite [6,7]. Additionally, mouth breathing can lead to a posterior rotation of the mandible and excessive eruption of posterior teeth, increasing the risk of an open bite [8–10].

Early interception of mouth breathing habits is crucial to preventing these muscular imbalances and promoting proper maxillofacial development, dental arch shaping, and tooth alignment. In this case report, we describe the successful treatment of a paediatric patient with mouth breathing and developing skeletal class II malocclusion using a combination of Ortho trainer, lip closure exercises, and adjuvant treatments.

II. CASE REPORT

A 8-year 6-month-old girl visited the Department of Paediatric Dentistry, SRM Kattankulathur Dental College on 1 September 2023 because of lip and teeth exposure that affected her facial appearance. Her mother denied systemic diseases or a history of drug allergy, but she noted that she had mouth breathing and snoring habits. Facial and temporomandibular joint examinations showed a bilaterally symmetrical raised face and normal temporomandibular joints.

Oral examination showed mixed dentition phase, primary molars were seen in mesial step relationship, End-on relationship was seen for permanent molars, Increased overjet, 11 and 21 labial tipping, Midline diastema-2.5-mm seen in between 11 and 21, a U shape upper dental arch, V shaped lower dental arch, a highly arched palatal cover, spaced lower anterior teeth, and missing lower left canine (Figure 1(a)–(e)).

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Fig 1: Pre-Operative Image of Patient Profile, Maxillary and Mandibular Arch along with Occlusion of the Patient

The last image shows the trainer in occlusal position Cephalometric analysis showed maxillary excess (SNA of 75), normal mandibular development (SNB of 77), skeletal class II (ANB of 2), even angles, protrusion of the upper anterior teeth, and lower anterior teeth. Based on cephalometric analysis Class II Div I patient with vertical growth pattern and protrusion of upper and lower incisors with potentially incompetent lips. The patient failed a water holding test. He was diagnosed with mouth breathing and skeletal class II malocclusion.

III. TREATMENT PROCESS

- Before the start of intervention the child was asked for an ENT opinion. The child was suffering from adenoid hypertrophy and was given a nasal spray for 1month. After a proper concern from ENT, the child was subjected to myofunctional therapy
- Ortho trainer (T4K-2B) -The pre-orthodontic Trainer for Kids *(*T4K®*)* is a single-size, prefabricated dental appliance that incorporates both myofunctional and tooth positioning characteristics. The T4K 2B is designed for treatment in the mixed dentition, while the permanent teeth are erupting and the child is still growing.

Phase 2 focuses on arch development and continuing habit correction. Made from a harder material, it assists in developing the upper and lower arch form, allowing more room to establish the correct tongue resting position and correct swallowing patterns.

T4K 2B along with sleep tapes were given to the patient and the child was asked to wear the appliance for 1-2hours in a day and during night along with sleep tapes. Initially slight difficulty was seen during sleeping due to complete lip closure but the oral muscular adaptation has been noted within a span of 6weeks

- Midline diastema was noted between 11 & 21 with a thick labial frenum (Type 4- papillary penetrating type). Laser frenectomy was done as an adjuvant treatment to correct the diastema. Nd:YAG laser with 1064 nm wavelength was used. Topical spray (Nummit spray, lidocaine USP 15% w/w) was used to obtain surface anaesthesia followed by local infiltration with 2% lignocaine and 1:10000 adrenaline. A 300-µm Fiber tip was used at power setting of 4 W in contact mode and moved with a paint brush stroke, from the base to the apex of the frenum, thereby excising. Sutures were not placed. Haemostasis was achieved. Postoperative instructions were given.
- After a span of 2weeks once the healing has occurred brackets were placed in 11 & 21 and correction of midline diastema was done using E-chain and ligature wire. The results were seen within 1week after placement of E-chains. Ligature wire was placed as a retentive phase for 2days till soft splint was delivered. Soft splint was fabricated by taking the maxillary impression and was given to the patient as a retainer for at least 3month. The child was advised to wear the splint along with trainer for the next 3months
- After a follow up of 6months there was decrease in habit and skeletal changes has occurred along with competent lip closure was observed.

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Fig 2: After 3 Months Follow up Labial Frenectomy was done Followed by Correction of Midline Diastema

Fig 3: Post Operative Image of Patient after 6months of Patient Profile, Maxillary and Mandibular Arch along with Occlusion of the Patient

➢ *Treatment Outcome*

At the 6-month post-correction follow-up visit (when the patient was 9 years old), the patient had stable occlusion, a coordinated osteofascial pattern, and normal tooth bodies, periodontium, and temporomandibular joints .

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IV. DISCUSSION

Children's dental occlusions, soft tissues of the face, and craniofacial bones are all dynamically changing since they are in the active growth and development stage. Children who have nasal septum deviation, adenoid hypertrophy, tonsil hypertrophy, and chronic rhinitis may develop mouth breathing due to full or partial obstruction of the upper airway, which causes all or partial airflow to enter the lower airway through the laryngopharyngeal cavity, mouth, and oropharyngeal cavity instead of the nasal cavity. Regular mouth breathing is caused by modifications to the periarticular muscle groups and temporomandibular joint anatomy. This leads to changes in the maxillofacial soft and hard tissues, the malocclusion (usually class II malocclusion), and ultimately the maxillofacial development and appearance [11-12].

The patient in this case was diagnosed with skeletal class II malocclusion caused by mouth breathing since he had a history of mouth breathing and snoring. Examination revealed convex profile, a protruding maxilla, a retruded mandibular arch, and a class II sagittal fascial pattern. Treatment options for skeletal class II malocclusion resulting from mouth breathing include combined orthodontic and orthognathic treatment but due to latest advancement they are many myofunctional appliances for early intervention [13]. Myofunctional appliances can prevent maxilla growth and promote cranial growth in teens with skeletal class II conditions.

Our patient's skeletal class II malocclusion was mostly brought on by long-term mouth breathing, which altered the soft and hard tissues of the maxillofacial region. The two most common devices used to stop mouth breathing are lip bumpers and vestibular barriers or twin block. In this case, the patient's habitual mouth breathing was interrupted by the using ortho trainer along with lip exercises [14]. Subsequently, the palatal vault was lowered, the median palatine suture was widened, and the diameter of the nasopharynx cavity grew. The patient progressively resumed nasal breathing as a result of the decreased nasal ventilation resistance. Furthermore, by directing the development of physiological occlusion, which ultimately resulted in the realization of jaw-to-jaw coordination, ortho trainers were utilized for improvement the condition. The appliance has gained a lot of attention recently and has been utilized to treat skeletal class II malocclusion and correct mouth breathing [15].

Ortho trainers are advantageous because they are different from other types of myofunctional appliances, they are less bulky and flexible, they consist of jaw shields more resistant and consequently increases the ability to neutralize the force generated by buccinators and Orbicular muscles, when they are hyperactive. They also provide moderate expansion and correction of the dental arch shape [16]. They exert a muscular strength in the teeth and they have a high elastic memory. Their preformed shape produces elongation and correction of the shape of the dental arch at the front. They have greater patient cooperation because of its two-material technology consists of Dunocore technology, aesthetic and less bulky. These trainers can be alternative treatment options for correction of skeletal class II malocclusion.

V. CONCLUSION

The Ortho-Trainer effectively guided the growth of the jaws and aligned the teeth, correcting the Class II malocclusion and addressing the mouth breathing habit. This case demonstrates the importance of early intervention using an Ortho-Trainer in mixed dentition to achieve significant improvements in dental and skeletal parameters, contributing to long-term stability and improved airway function. Early diagnosis and appropriate treatment are crucial for favourable outcomes and preventing further complications.

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