

THE FUNDAMENTALS OF FREEWAY SPACE IN PEDIATRIC DENTISTRY

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EMPHASIS

ABSTRACT

The understanding of the concept of freeway space guides in treatments pertaining to interceptive orthodontics and myofunctional therapy. This paper jots down the importance of assessing the freeway space in clinically relevant scenarios in pediatric patients.

Keywords: *Freeway Space, Interceptive Orthodontics, Pediatric Dentistry, Myofunctional Therapy, Dental Occlusion*

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INTRODUCTION

Freeway space is defined as the neural rest position of the mandible which it attains as it is involuntarily suspended by the reciprocal coordination of the elevator and depressor masticatory muscles with the upper and lower teeth separated.¹ The term freeway space has also been used interchangeably with the terms ‘interocclusal space’, ‘vertical occlusal distance’, ‘occlusal vertical distance’, and ‘interocclusal distance.’^{2,3}

The concept of freeway space takes its roots in the field of orthodontics and prosthodontics. However, the gradual advent of myofunctional therapy made it imperative for pediatric dentists to fundamentally understand freeway space. Despite the works of the earliest proponents of the freeway space, the concept of freeway space in the 21st century is unbeknownst to specialized dental professionals.³



This review is detailed with the notion of providing the reader with the elementary ideas about the freeway space in the interceptive orthodontics of pediatric dentistry.

PHYSIOLOGICAL FREEWAY SPACE

There are two facets to understanding the biomechanics of dentistry. The first one deals with teeth-together concepts, more popularly known as occlusion. The second deals with teeth-apart concepts, headed by the norms of the freeway space. Both these concepts are interdependent. Furthermore, the measure of freeway space is one of the three important principles (alongside lip competency and rest position of the tongue tip) that ensures a normal functional dentition.

Maintenance of the physiological freeway space is done by the tandem between associated myology and neurology. No muscle is ever at rest. The rest position of the mandible is key in defining the freeway space. This resting tonus of the mandible is monitored by gravity and the neuromuscular spindles in the masseter, temporalis, and medial pterygoid. Additionally, the Ruffini endings and the Golgi tendon organs in the temporomandibular joint also contribute to the proprioceptive mechanism.

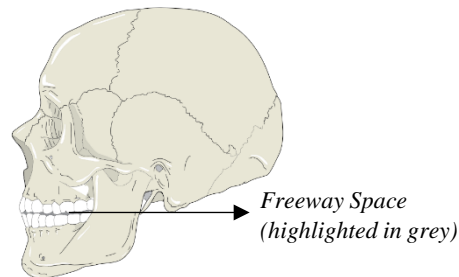


Figure 1 Freeway Space

Neurological components involved include both the sensory and motor pathways from the trigeminal nerve. Sensory receptors in the periodontium, gingiva, palate, and mucosa transmit impulses to the brainstem through the trigeminal nerve that responds by acting on the muscles of mastication through its motor component (gamma motor neurons).^{3,4}

PEDIATRIC FREEWAY SPACE

Understanding the freeway space in the developing age becomes a challenge owing to the dynamic transition of dentition and the constant growth of the jaws that are spread across the different growth spurts. Yet, it cannot be ignored that an abnormal freeway space in the

clinical scenario has been associated with differential dental eruption, malocclusion, abnormal vertical facial height, and parafunctional habits.^{3,5}

Fast eruption of the posterior teeth and simultaneous impairment in anterior teeth eruption have led to open bite cases. This is when the measurement of the anterior freeway space falls outside the normal range. Alternatively, if the anterior teeth eruption is unimpaired, but the mandibular condyles rotate abnormally due to the supraeruption of the posterior teeth, it results in a longer vertical face dimension (Long Face syndrome).

The direction of the maxillary teeth during eruption is downwards and forward. If the tongue abnormally covers the lower teeth during eruption, it can slow down the rate of eruption. However, the maxillary teeth continue to drift forward, resulting in a Class II malocclusion. This leads to an abnormal freeway space in the molar region.

Parafunctional habits like thumb sucking contribute to open bite, whereas bruxism or clenching can result in a negative freeway space value.

CLINICAL ASSESSMENT OF THE FREEWAY SPACE

The normal range of freeway space is 2-3 mm at the molars and 2-5 mm at the incisors. While there is sparse literature on methods to measure the freeway space posteriorly, measuring the anterior freeway space can be done by multiple techniques. Before measuring the freeway space, it is recommended to ask the patient to get rid of nasal debris as it may contribute to an open-mouth posture.⁵

Intraoral methods to measure the freeway space include kinesiographic recordings. Sensors positioned on the patient's head and a magnet attached at the lower incisors help in kinesiographic recordings that eventually give the measure of the freeway space. Whether or not a head-stabilized device like a Faraday cage should be used while recording the freeway space is a debatable topic.⁴

Extraoral methods to measure the freeway space include analysis of lateral profile photographs of the patient. Extraoral assessments done using a millimeter ruler, measuring tapes and Boley's gauge are more feasible clinically. They are used to measure the distance from the base of the nose to the bottom of the chin at both rest and closed mouth postures.



The difference between the two is equal to the freeway space. The advantage of this technique is that it can be used successfully even in cases of posterior crossbite and open bite. However, in patients with thumb sucking, the results cannot be accurate using this technique due to compromised airway.

Correction of freeway space in patients with myofunctional disorders is a key aspect of the treatment plan. However, correction of tongue position at rest and the treatment of allergic conditions of airway are prioritized over freeway space correction.³

CONCLUSION

Freeway space remains an underexplored concept in the developing age group. Considering the importance of interceptive orthodontics and the growing use of myofunctional therapies, further research is warranted in this physiologic space.

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