

## Preventive Orthodontics: Space Maintainers in the Early Loss of Deciduous Tooth - Clinical Case Report

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### Abstract

The management and control of dental spaces are problems frequently found in Preventive Orthodontics. The teeth eruption supervision and orientation is part of the treatment performed during the mixed dentition period, which may influence the eruption pattern and the position of the permanent teeth during their transition. Space maintainers are devices used in cases of premature tooth loss to save space for the successor tooth. The aim of the present study is to report a clinical case of a 6-year-old boy with the first right lower deciduous molar with extensive caries lesions and pulp involvement. In this case, the exodontia and insertion of a Band-Loop space was proposed. After three months of clinical and radiographic evaluation, the results showed the excellent durability and resistance of the space maintainer. Favorable oral health conditions were also observed: absence of biofilm accumulation or gingival bleeding. The conclusion indicates that the space maintainer, when well prescribed, assists the child in both functional and aesthetics aspects, by reducing future expenses in orthodontics. The space maintainers prevent tooth movement and inclination, loss of space for permanent teeth, crowding and impaction. The Band-Loop space is an excellent treatment option for such cases.

**Keywords:** *Interceptive Orthodontics; Space Maintainer; Premature Tooth Loss; First Dentition; Malocclusion*

### Introduction

The deciduous dentition plays a significant role in child growth and development; it helps in speech, nutrition and social life, as well as “keeps” space for the permanent teeth successors until the right time for dental exchange [1].

The severity and prevalence of dental caries has declined during the last few years. Yet in many countries it is still a serious health issue, causing the extraction of first teeth even before the ideal exfoliation time [2].

The premature loss of the deciduous teeth, before an ideal or natural moment, is defined as exfoliation or extraction. It is most commonly caused by lack of hygiene, injury or lesions. The caries disease affects the deciduous tooth and makes it impossible to remain in the dental arch [3].

Lately, the premature disappearance of primary dentition has received greater attention due to its negative consequences, among them the loss of further space for the eruption and accommodation of permanent teeth [4].

The early loss of deciduous teeth can lead to multiple disorders such as crowding, periodontal problems, permanent tooth ectopic eruption, dental impingement and crossbite. Moreover, it can provoke the migration of the adjacent teeth to the region where the tooth loss first occurred; thus, causing the closure or reduction of permanent space to the successor tooth [5-8].

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Prevalence studies, such as that by Santos, *et al.* 2013 [9], show extremely varying deciduous teeth early loss frequency, from 15.1% to 54.62. According to them, most dental losses occur in the mandible and the commonly affected teeth are the deciduous molars.

Primary losses have minor negative impact on subsequent dentition development when they are early detected. The longer the detection time, greater the likelihood of tooth positioning changes [5,10].

Inclination in the adjacent teeth or decrease in the arch space are hardly seen in situations where tooth loss occurs in the anterior region. However, an aesthetic damage to the smile, as well as phonetics impairments and the difficulty to bite and chew food are common consequences [4]. Children between 2 and 4 years of age are affected by such condition, which is mostly caused by trauma or caries [11].

Many types of space maintainers have been developed so far and their selection depends on child dental development, as well as on the involved tooth. The children's collaboration and their commitment to dental hygiene is also an asset [12,13]. A thorough clinical and radiographic examination should be performed before the dentist can assess whether the use of space maintainers is necessary and which are the best options for each case [9].

There are several choices of space maintainers for each clinical situation. However, longevity should be the standard and first element to consider when selecting the most appropriate maintainer. The band and loop space maintainer is still the most commonly used for isolated early loss, unilateral and bilateral, maxillary and for mandibular first molars [14,15].

The variety of space maintainers available in the market shows advantages and disadvantages. It is important to highlight how they should not interfere with the patient's masticatory function, nor inhibit or impair dentoalvear maturation and growth [16]. They should be simply manufactured, easily maintained, resistant, durable, stable and of straightforward sanitization [6].

The aim of the present study is to report a clinical case of early loss of the first deciduous right first molar of a six-year old child due to caries lesion. The patient was subjected to clinical and radiographic evaluation three months after the insertion of a Band and Loop space maintainer to prevent tooth movement, loss of posterior space and crowding.

### Case Report

A 6-year-old male patient FGRS presented to the dental clinic complaining of pain and frequent swelling in the gingiva region related to tooth 84. The clinical examination showed extensive carious lesion in the area. A complementary radiographic examination was requested to further diagnosis. The child's responsible guardians were informed of their options. They decided for the extraction of the deciduous tooth 84 and for the placement of a Band and Loop space maintainer on the tooth 85. The device was primarily selected because of the patient's young age and the permanent tooth successor was presenting less than ¾ root (Figure 1).



**Figure 1:** Panoramic Radiography. Tooth 84 showing extensive carious lesion compromising the distal pulp horn. Formation of the coronal part of element 44.

The orthodontic band was tested on the tooth 85. Next, the lower arch was molded and the device transferred to allow the space maintainer to be manufactured. The exodontia was performed without intercurrences (Figure 2).



**Figure 2:** Patient 15, after the exodontia performed to install the space maintainer.

After testing the device, a glass ionomer cement was chosen for the cementation at the time of installation (Figure 3). The patient and his caregiver received all the guidelines regarding the care, hygiene and maintenance concerning the space maintainer. The caregiver was advised about the need of periodic consultations to follow-up on the eruption of the permanent dental element 44.



**Figure 3:** Patient after the device was installed.

The patient returned to the clinic after three months since the device presented excellent hygiene, absence of gingival bleeding or mobility. A radiographic test was also performed to determine the stability of the device (Figures 4 and 5). The need of periodic consultations and plaque control until the eruption of the permanent tooth was once more emphasized.



**Figure 4:** Radiographic aspect showing the fitting of the space maintainer at the time it was installed.



**Figure 5:** Patient 3 months after the space maintainer was installed; it is possible seeing the excellent adaptation and the lack of gingival inflammation.

## Discussion

Orthodontists are often asked to solve problems such as crowding and lack of dental spaces even during the deciduous dentition [8]. The loss or premature extraction of deciduous teeth is one of the causes of space limitation for adjacent teeth in the arch, which results in several malocclusion types [11].

The premature loss of primary teeth in children is still very common despite technological and scientific advances in dentistry, oral health promotion and disease prevention measures [2,9].

The herein presented case corroborates several authors who state that the deciduous molars are the most affected teeth in child's early losses. Between the age of five and seven years, there is also a high prevalence of teeth located in the mandible rather than in the maxilla [3,9,10].

The literature is unanimous to agree that the loss during first dentition in a developing occlusion may result in decreased space for permanent tooth accommodation, impacting teeth, extrusion of the antagonist, or in changes in the arrangement of preexisting dentoalveolar discrepancies [2,8,13].

According to Srivastava, Grover and Panthri (2016) [15], the maintenance and monitoring of the arch perimeter during the first dentition, the mixed dentition and the new permanent dentition have great significance for the normal development of future occlusion.

There is no controversy regarding the indication of a space maintainer after early loss of the first deciduous molar. Accordingly, the use of this device prevents dental movements of both the deciduous and the permanent teeth, fact that avoids loss of the arch perimeter and ectopic eruptions [12,14].

However, Kanna and colleagues (2015) [1] alert for contraindicated situations when the mesiodistal width of the underlying permanent tooth is smaller than the current space. They also pose a warning to such measures if the permanent tooth is about to erupt or if there is agensis. Still, according to Alexander, Askari and Lewis, 2016 [10], the arch contraction occurs in the first six months after premature loss, during the active eruption of the permanent dentition. After that, complications can occur due to lack of an early intervention.

Space maintainers can be found in fixed or removable forms, unilateral or bilateral, functional or non-functional [11]. For many authors, the main model used by interceptive orthodontics today is the Band and Loop space maintainer due to its easy fabrication, simple adjustments and repairs, as well as to its practical placement and removal [12,16]. However, it is not recommended for patients with multiple dental losses [14].

Fixed devices require less patient collaboration. Yet they can have the disadvantage of producing biofilm accumulation on the tooth edges and be the cause of carious lesions, gingival inflammation, and disintegration of cementing material [6].

Fixed space maintainers should be cemented with a high retention material to minimize enamel demineralization. The literature [5,14] is unanimous in prescribing the use of glass ionomer cement; the material adheres well to the tooth surface and metal, is biocompatible and releases fluoride.

Initially, the herein described case testifies against the work of Arikan and colleagues (2015) [7], who says that after three months of use, the fixed space maintainers cause greater plaque accumulation and increase gingival bleeding; thus, compromising periodontal health over time.

Therefore, during the three-month consultation period, the patient and the family were reminded about the importance of proper hygiene in the oral cavity and in the space maintainer region, as well as about the need of regular consultations with the dentist for case evaluation. Radiographs were also requested to follow-up in the permanent tooth eruption, as described by Linjawi and colleagues (2016) [13] in their study.

### Conclusion

The best way to maintain the necessary space for the eruption of permanent tooth is to have the first dentition in a satisfactory state. However, when the teeth are prematurely lost, it is essential to create a strategy to preserve this space. Therefore, space maintainers help the child in both functional and aesthetic matters when they are well prescribed. They also minimize future expenses with orthodontics. Orthodontists must evaluate and make decisions accordingly, given the individuality and development of their patients, and take into consideration the deciduous dentition.

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