

## Fabricated space maintainers: Improving fit and function in pediatric patients

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### Abstract

**Introduction:** Premature Loss of primary molars can significantly disrupt the normal eruption sequence and lead to complications such as Loss of arch length, crowding, midline deviation, and malocclusion. Early intervention through space maintenance is crucial, especially in the mixed dentition phase. This case highlights the clinical application of a fixed crown-loop space maintainer in preserving the mesiodistal space post-extraction of a non-restorable primary molar.

**Case History:** An 8-year-old female presented with extensive caries in tooth 85 and structural compromise in tooth 84. Clinical and radiographic examination indicated the necessity of extraction and immediate space maintenance. A stainless-steel crown was fitted on tooth 84 with a custom-fabricated loop, followed by extraction of tooth 85 and appliance cementation. Over four months, the eruption of tooth 45 was observed, and the appliance was removed due to loosening.

**Discussion:** The use of a crown and loop space maintainer was indicated due to the poor prognosis of the adjacent abutment tooth, offering both full coronal coverage and reliable anchorage. Compared to band-retained alternatives, stainless steel crowns enhance durability and chairside efficiency. Regular monitoring ensured the appliance did not interfere with soft tissue or tooth eruption. This case supports the efficacy of such appliances in maintaining arch integrity and guiding proper occlusal development.

**Conclusion:** A fixed crown-loop space maintainer effectively preserved arch space, facilitated proper eruption of the successor tooth, and maintained function in a pediatric patient with premature molar Loss. Its success underscores the importance of individualized planning, durable materials, and routine follow-up in pediatric space management strategies.

**Keywords:** Premature Tooth Loss; Space Maintainer; Crown-Loop Appliance; Interceptive Orthodontic; Human and Health

### 1. Introduction

Premature Loss of primary teeth can disrupt the natural sequence of eruption and alignment of permanent teeth, potentially leading to malocclusion, crowding, or impaction. Dental caries is the most common cause of tooth loss in the posterior primary dentition. Furthermore, trauma involving teeth might be the cause (1).

Premature Loss of primary teeth can lead to several orthodontic complications that may require intervention if not addressed early. Common issues include Loss of arch length: Adjacent teeth may drift into the space left by the missing tooth, reducing room for permanent teeth to erupt properly. Dental crowding: With less space, permanent teeth may erupt misaligned or become impacted. Midline deviation: If tooth loss occurs on one side, it can cause the dental midline

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to shift, affecting symmetry. Ectopic eruption: Due to blocked eruption paths, permanent teeth may erupt in abnormal positions. Malocclusion: This includes overbite, underbite, or crossbite, which can develop or worsen due to disrupted eruption patterns.(2,3)

To prevent space loss from early Loss, primary teeth that undergo premature Loss must be treated immediately with space management. Space regainer (SR) and space maintainer (SM) comprise space management. While SR restores space that has been reduced owing to premature Loss, SM keeps available space constant. The use of detachable space maintainers to save space because of early loss is explained in this case study.(4,5)

Space maintainers are essential appliances in pediatric dentistry used to preserve the space of prematurely lost teeth until the eruption of their successors. These devices are especially crucial in the mixed dentition phase, typically between the ages of 6 and 12 years, where timely intervention can significantly influence the outcome of occlusal development.(6)

In this case report, we present the use of a unilaterally fixed space maintainer in an 8-year-old girl following the early extraction of a primary molar. The case underscores the importance of individualized appliance selection, regular monitoring, and caregiver compliance in ensuring the success of interceptive orthodontic treatment. According to the American Academy of Pediatric Dentistry, space maintenance is recommended following premature tooth loss to preserve arch length and prevent undesirable tooth movement, especially when the permanent successor is not expected to erupt within six months(3)

## 2. Description of Case

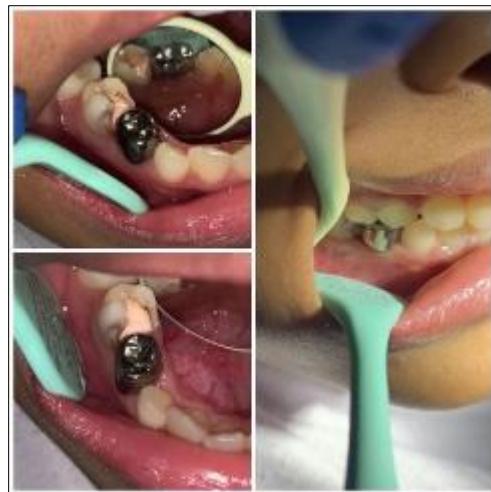
An 8-year-old healthy female patient, accompanied by her mother, was referred to the Department of Pediatric Dentistry at Airlangga Dental Hospital with the chief complaint of her lower right permanent molar (tooth 85) exhibiting extensive occlusal and proximal caries, with noticeable enamel breakdown and dentin exposure. The tooth is non-restorable due to structural compromise and possible furcation involvement. The first permanent molars (tooth 46) have erupted and are in acceptable alignment. The first deciduous lower right molar (tooth 84) has dentine caries and lost the proximal contact (Fig.1).



**Figure 1** Intraoral and radiographic examination

This patient is in the mixed dentition phase. The curved shape of the teeth of the maxilla was parabolic, and the mandible was parabolic, overjet, and overbite 2mm. The treatment objective for the patient was to preserve the mesiodistal space created by the premature Loss of the lower right second primary molar in an 8-year-old female patient. A fixed space maintainer will be constructed and placed to ensure proper alignment and direction for the eruption of the permanent successor tooth.

Before reducing the tooth, surface and adapting the crown, we select a crown by measuring the mesiodistal dimension of the tooth before tooth preparation. After that, the occlusal plane reduction is carried out for 1.5 to 2.0 mm of the surface of the occlusal cavity. The original shape of the cusps must be maintained. The next step is to reduce the proximal area. The aim here is to create a smooth taper from the occlusal to the gingival area, and this should be free of any ledges or shoulders. The third phase in the preparation is to reduce the lingual and buccal surfaces. In this patient, we tried to place the selected crown; the distal medial width was appropriate, but a slight reduction in the buccal plane was needed.



**Figure 2** Inserted removable orthodontic appliance

After preparing the tooth, we place a trial crown and check the occlusion elevation and gingival condition (Fig.2). Once fitted, it is sent to the dental laboratory for the loop arm on the SSC to be manufactured. After the crown and loop had been completed from the lab, we extracted tooth 85, and we cemented the luting onto tooth 84 (Fig.3)



**Figure 3** Intraoral condition post-treatment

After four months of using the appliance, tooth 45 appeared to have begun erupting, and the space maintainer device on tooth 84 was also loose. Finally, during this appointment, we removed the crown and loop (fig.4).



**Figure 4** Intraoral condition post-treatment

### 3. Discussion

The early loss of primary molars, particularly the second primary molars, has significant implications for dental arch integrity and occlusal development. In pediatric patients like the 8-year-old girl presented in this case, space maintenance is critical to prevent mesial drift of adjacent teeth and the potential for malocclusion. (7) A space maintainer device is used to preserve the space between primary teeth that are extracted or lost prematurely. The goal of this appliance is to prevent the patient's teeth from extruding or elongating and from shifting and narrowing the gap caused by neighboring teeth (1).

SM is essential in early primary dentition tooth loss cases to avoid malposition, supra eruption, impaction, or permanent dentition crowding (1). A crown and loop space maintainer were selected over the conventional band and loop due to the compromised structure of the abutment tooth, which required full coronal coverage (8). This decision aligns with best practices when the first permanent molar is not fully erupted, or the adjacent tooth lacks structural integrity. (7,9)

The stainless-steel crown provides a durable and stable anchorage for the loop component, offering improved longevity and resistance to dislodgement compared to band-retained designs. Moreover, the preformed nature of these crowns streamlines chairside adjustments and reduces chair time, which is particularly beneficial in managing pediatric behavior during treatment (8). Proper fabrication and periodic reassessment are essential to ensure the loop does not impinge on soft tissue or interfere with the eruption path of the permanent successor. Ideally, space maintainers should be monitored at 6-month intervals or sooner if symptoms arise (7).

In this case, the crown and loop appliance served dual purposes: restoring the functional integrity of a compromised molar and maintaining space for the unerupted premolar. The outcome supports the effectiveness of this appliance in preserving arch length, guiding eruption, and preventing long-term orthodontic complications.

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### 4. Conclusion

In the case of an 8-year-old girl requiring space maintenance following the premature loss of a primary molar, using a fixed crown-loop space maintainer proved to be an effective modality. It preserved the mesiodistal space for the permanent successor, minimized patient compliance issues compared to removable appliances, and maintained masticatory function. The custom adaptation of the loop to the banded crown ensured stability and optimal tissue tolerance.

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### Compliance with ethical standards

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#### *Disclosure of conflict of interest*

The authors declare that there is no conflict of interest regarding the publication of this document.

#### *Statement of informed consent*

Informed consent was obtained from patients included in the study.

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