

# Distal shoe: a cost-effective maintainer for primary second molars

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## SHORT COMMUNICATION

### Introduction

Space maintenance is critical in the developing dentition, and often affects the future dental needs of a pediatric patient. The premature loss of primary second molars can create a significant arch space/tooth size discrepancy.<sup>1, 2</sup> Mandibular permanent first molars have a mesioclusal eruption pattern, guided by the distal surface of the primary second molar. If the primary second molar is lost prematurely, the permanent first molar may erupt in a more anterior position.

The distal shoe space maintainer remains an acceptable standard of care, with an extension subgingivally to a location mesial to the unerupted first permanent molar.<sup>1, 3</sup> This extension serves as a guide for the erupting first molar, and prevents mesial "drifting" of that tooth. Upon eruption of the permanent first molar, the subgingival extension is removed; bacteria might adhere to the extension.<sup>1</sup>

The next problem is that a lower lingual holding arch cannot be placed until the mandibular permanent central and lateral incisors have erupted. Often, a distal band/crown and loop space maintainer is placed, extending from the primary first molar to the permanent first molar, but this option creates the need for a new appliance. The only other option is to leave the distal shoe in place until the mandibular permanent central and lateral incisors have erupted, but the subgingival extension is undesirable. The purpose of this article is to present a modified distal shoe design. The appliance can be adjusted easily, intraorally, to maintain space following eruption of the permanent first molar, until all of the mandibular permanent incisors have erupted.

### Procedure

A typical clinical situation for this appliance appears in Fig 1. The primary second molars are extracted. The primary first molars are prepared for stainless steel crowns during quadrant treatment. Following preparation, a stainless steel crown is adapted to the primary first molars and a mandibular impression is made. The crowns are removed, placed, and stabilized into the impression, and the impression is poured in dental stone. A stainless steel crown of the same size is cemented temporarily, and the patient is discharged.

A laboratory makes a distal shoe space maintainer in which a distal loop extends to the distal surface of the extracted primary second molar. A radiograph also accompanies the prescription. The gingival extension, mesial to the unerupted permanent first molar, is fabricated to extend from the distal surface of the stainless steel crown, over the distal extension of the crown and loop, then gingivally to seat at the mesial surface of the permanent first molar (Fig 2).

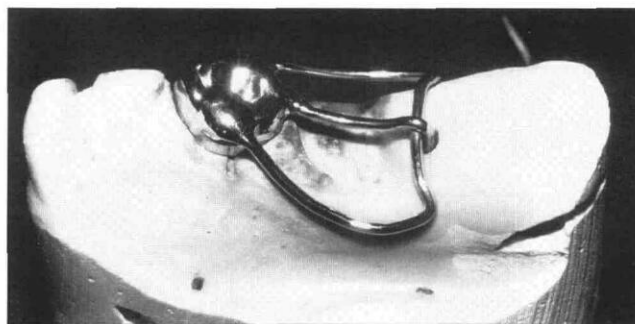
The patient returns, the appliance is seated, and a radiograph is exposed to confirm the appropriate position of the subgingival extension (Fig 3, next page). The space maintainer then is cemented permanently with a glass ionomer cement (Fig 4, next page).

### Discussion

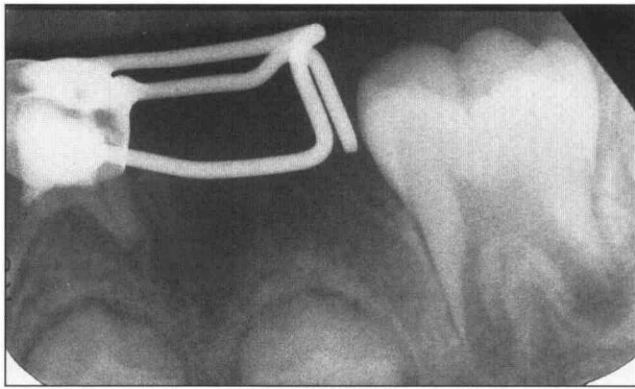
This fabrication creates an ideal situation for a temporary space maintainer. Upon eruption of the permanent first molar, the subgingival extension can be severed from the stainless steel crown at the solder joint on



**Fig 1.** Radiographic appearance of a 4-year-old patient at the initial examination. The premature loss of the primary second molars will necessitate space maintenance.



**Fig 2.** Fabricated distal shoe space maintainer on the working model.



**Fig 3.** Radiographic intraoral appearance of a distal shoe appliance.



**Fig 4.** Intraoral appearance of the distal shoe appliances after cementation.

the distal crown surface. This extension then can be removed occlusally, leaving the posterior crown and loop as a space maintainer, until a lower lingual holding arch can be placed. The buccal and lingual extension of the band and loop portion of the appliance contact the erupted tooth; therefore, removing the subgingival extension does not cause a significant mesial movement of the erupted tooth. Rotation of the erupting first molars around the subgingival extension has not been noted clinically with this appliance. The subgingival extension is placed in the middle of the alveolar ridge, which is verified to be positioned at the midline of the unerupted tooth when the appliance is cemented.

An alternative space maintainer is a bilateral acrylic "saddle" appliance. Because of poor retention and patient compliance, these appliances usually are used only for multiple tooth loss. The distal shoe appliance is time efficient, meets all the criteria for proper space maintenance, and can be fabricated easily.

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