

CASE REPORT

Using digital impressions to fabricate space maintainers: A case report

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Abstract

Digital impressions improve patient experience and compliance. Digital impressions enable dental offices to collaborate and work with distant dental laboratories and specialists with ease. Although the initial cost of acquiring an intraoral scanner is significant, its use has the potential to reduce the cost per procedure.

KEYWORDS

3D printing, digital impression, intraoral scanner, space maintainer

1 | INTRODUCTION

The current case report describes the use of an intraoral scanner to make a digital impression for fabrication of a lower lingual holding arch space maintainer. This method reduced chair time with an uncooperative patient, could increase practice efficiency, and enhance patient comfort and compliance.

Space maintainer fabrication remains a routine procedure for pediatric and general dentists. Space maintenance is typically recommended as an interceptive treatment to reduce complex orthodontic treatment at a later age.¹ Further, maintaining arch length becomes a concern with the loss of primary second molars, unilateral loss of primary canines, or the loss of first primary molars before the eruption of the permanent first molars. The most common method of obtaining an impression for a space maintainer, an alginate impression with subsequent dental stone model, has disadvantages offending to distort over time as water evaporates from or absorbs into the impression thereby causing inaccuracies in the impression and subsequent stone casts.^{2,3}

Behavioral issues of an apprehensive or uncooperative patient can be particularly problematic when the clinician is trying to make a conventional intraoral impression for appliance fabrication. In such cases, the use of digital intraoral impressions would eliminate the need for a conventional alginate

impression. Since impressions are considered an unpleasant experience by some children, the switch to digital impression procedures may have a long-term positive impact on patient perceptions of dental procedures. In one study, measurements for orthodontic treatment planning were compared between dental stone and 3-dimensionally printed models; no significant differences were found.⁴

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2 | CASE REPORT

A 7-year-old male presented to a dental clinic for a routine clinical examination with a noncontributory medical history. His dental history included stainless steel crowns on the primary mandibular first molars and the primary mandibular right second molar, and he had a recent extraction of the primary mandibular left second molar, which was completed under general anesthesia because of the patient's behavior and lack of compliance.

After a comprehensive examination, it was determined that the patient had mixed dentition with the primary mandibular left second molar missing and the permanent mandibular



FIGURE 1 Intraoral preoperative image showing the mixed dentition of the patient



FIGURE 3 Intraoral image taken after the space maintainer appliance was cemented in

left first molar present (Figure 1). Because of the patient's age, a lower lingual holding arch space maintainer was recommended to preserve arch length and maintain intra-arch space for eruption of the permanent mandibular left second premolar.

Given the patient's history of noncompliance in the current case, it was decided that a digital impression would be made since it would be faster and more comfortable for the patient. The patient was prepared for the impression by placing a small OptraGate retractor (Ivoclar Vivadent, Schaan, Liechtenstein) to retract the cheeks. A lower full arch digital intraoral impression was made with a Cerec Omnicam scanner (Dentsply Sirona) (Figure 2A). The resulting file was electronically transferred, using a HIPAA compliant portal, to the dental laboratory so that a resin model could be 3-dimensionally printed (Figure 2B) using a Form 2 printer (Formlabs). After the resin model was produced, the dental laboratory followed their normal protocol to fabricate a cast metal lower lingual holding arch.

When the patient returned for cementation, the appliance was tried in and, once placement was confirmed, cemented with a resin-modified glass ionomer cement (RelyX Unicem; 3M) (Figure 3). Postoperative instructions were given.

3 | DISCUSSION

Digital impressions have the potential to increase efficiency, be more comfortable for the patient, and reduce long-term costs of the procedure. Digital impressions have been used routinely in other areas of dentistry, and expanding their use to pediatric dentistry could be beneficial for both patient and provider. A study by Vasudavan et al⁵ found that 77% of patients preferred intraoral scans over alginate impressions. Digital impressions were found to be more comfortable for patients, when evaluated by both patients and clinicians.⁶ Another benefit is that digital impression scans can be obtained in segments, which is useful with noncompliant

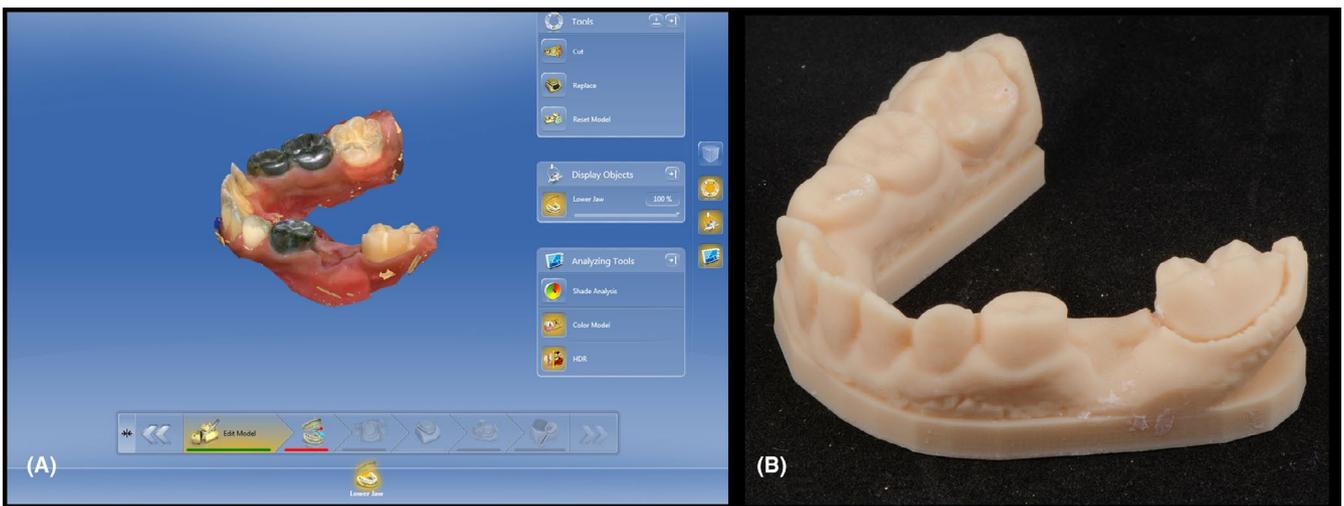


FIGURE 2 A, Lower full arch digital intraoral impression made using the Cerec Omnicam scanner B, 3-Dimensionally printed resin model of the patient's lower arch produced using the digital intraoral impression file

patients. Intraoral scans can also be performed by auxiliary team members if state laws allow, freeing clinicians for other tasks. For dental offices in geographical areas that do not have dental laboratories nearby, digital impression files can be quickly transferred to a laboratory anywhere in the country, which reduces cost, limits damage of impressions/models because of shipping and handling, and reduces turnaround time for the case.

Despite all the benefits of digital impressions that contribute to increased patient comfort and compliance and reduced cost of the procedure, acquiring the equipment can be expensive and requires training of the dental team so that the equipment can be used predictably and cost effectively. Clinicians should also evaluate the size of the scanner head, when comparing intraoral scanners from different manufacturers, and its effect on scanning time, patient comfort, and ease of intraoral maneuvering especially in patients with shallow vestibules, limited mouth opening, and presence of missing or unerupted teeth.⁶ Acquiring a digital intraoral impression does require a level of cooperation from the patient similar to cooperation needed for an examination.

The use of intraoral scanners for standard space maintainer fabrication should be considered by dentists.

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CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

AV and AR: conceived the ideas. AV and AR: performed and executed the clinical and laboratory procedures and treatment for the patient. AV and AR: lead the writing of the manuscript.

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