Fabricating a Maxillary Obturator Using an Intraoral Digital Impression: A Case History Report

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Digital impressions can be a useful option that reduces patient discomfort and simplifies clinical procedures such as accurate impression recordings. In this report, a patient with a partial maxillectomy was managed with a metal frame fabricated from a digital impression through an intraoral scanner. The final impression employed the altered cast technique for the fabrication of the obturator. *Int J Prosthodont 2017;30:266–268. doi: 10.11607/ijp.5213*

The maxillary obturator is a common treatment option for the functional recovery and improvement of the quality of life of patients with acquired maxillary defects.[1] However, the conventional method of obturator fabrication requires several impressions to construct the diagnostic, master, and altered casts, which may be uncomfortable for patients with maxillary defects.

The rapid evolution of conventional computer-aided design/computer-assisted manufacturing technology has permitted the use of digital scanning for prosthodontics and restorative dentistry treatment. Intraoral digital impressions (IOD) help reduce patient discomfort.[2] This case history report describes the fabrication of an obturator using an IOD with the altered cast technique on a partial maxillectomy patient.

Case History Report

A 59-year-old man was referred to the dental department of Korea University Medical Center for prosthodontic treatment. The patient had been diagnosed with a right palatal mucoepidermoid carcinoma and had undergone a unilateral maxillectomy from the maxillary right first premolar to the maxillary tuberosity 6 months earlier. He complained of difficulty when swallowing and hypernasal speech. The defect was categorized as Aramany Class II (Fig 1).[3] Based on the clinical and radiographic examinations, it was determined that a maxillary obturator would have to be fabricated for the prosthodontic reconstruction for the patient.

The preliminary impression was acquired by digital impression using an intraoral scanner (Trios3, 3Shape). The scanned images were subjected to digital surveying, and the obturator design was planned using LAPtools software (SensAble Technologies). The selected metal frame design[3] included an additional rest and clasp in the maxillary left premolar region.

Abutment tooth preparation was performed and a final impression was acquired using the intraoral scanner. The final design of the framework was printed out in a resin pattern and was converted to metal using the conventional investment casting method (Fig 2).[4] After intraoral fitting and adjustment of the framework, a functional impression was taken using the metal framework with modeling compound and rubber impression material. The metal framework was seated on the 3D-printed polyurethane cast, and an altered cast was constructed. The cast was mounted on an articulator after bite registration at the maximum intercuspal position, and the obturator was subsequently fabricated (Fig 3). The definitive obturator was finally delivered, and the patient was satisfied with it in both function and appearance.

Discussion

IODs offer various advantages compared to the conventional impression method, including prevention of discomfort by not using actual impression material,

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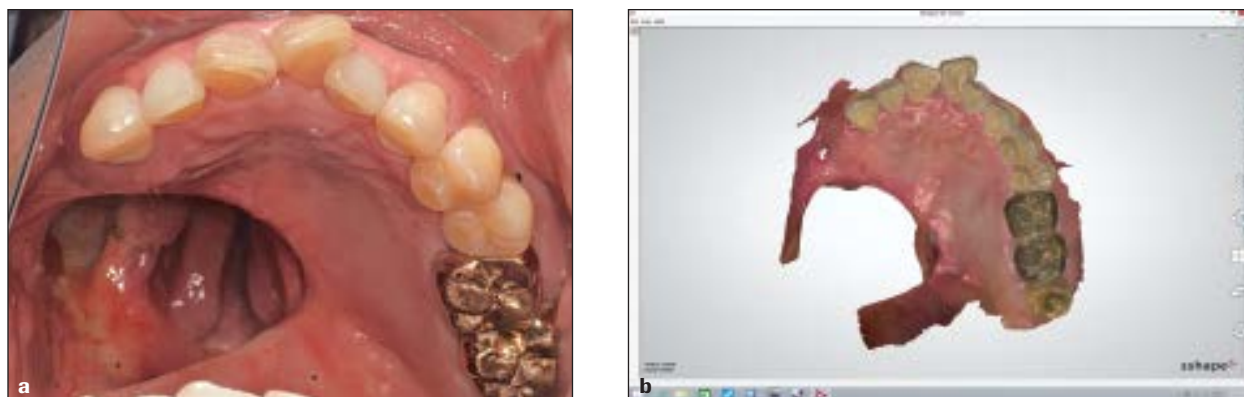
Fig 1   **(a)** Intraoral photo before treatment. **(b)** Digital impression using the intraoral scanner.
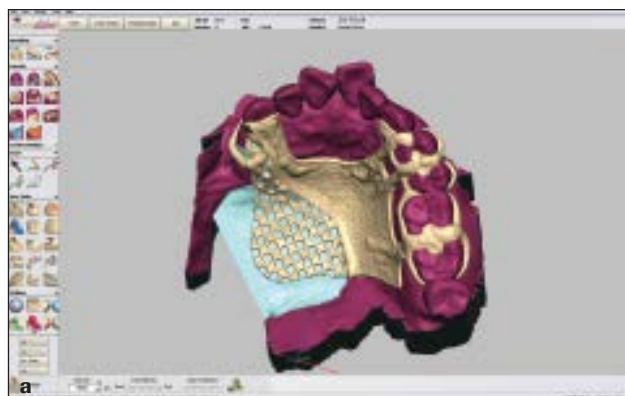

Fig 2   Fabrication of the metal frame. **(a)** Design of the metal frame. **(b)** Printed resin pattern of the obturator. **(c)** Finished metal framework on the polyurethane model.

avoidance of distortion of dental materials during cast fabrication, convenient storage and transferring of the scanned image, and potential time and cost effectiveness. However, there are some limitations of IODs in deep defect regions and soft tissue border areas (ie, denture flange and defect margin areas) in a patient with a maxillary defect. In this case, while the preliminary and final impressions were replaced by IODs, the fabrication of the altered cast through conventional functional impressions was carried out additively.

Since the impression for removable partial dentures should include a wide range of dentition and soft tissue, IODs still pose some challenges. To evaluate the trueness of the IODs, an additional stone model of the patient was made through the conventional impression method. The stone model was scanned using a laboratory scanner and then overlapped with the intraoral scanned image using 3D analysis software (Geomagic Studio, 3D Systems). The result showed a larger difference between the IODs and the model scanned image on the soft-tissue region of the palate compared to the

Fig 3 **(a)** Functional impression using the metal frame. **(b)** Wax denture on the altered cast. **(c)** Final prosthesis.
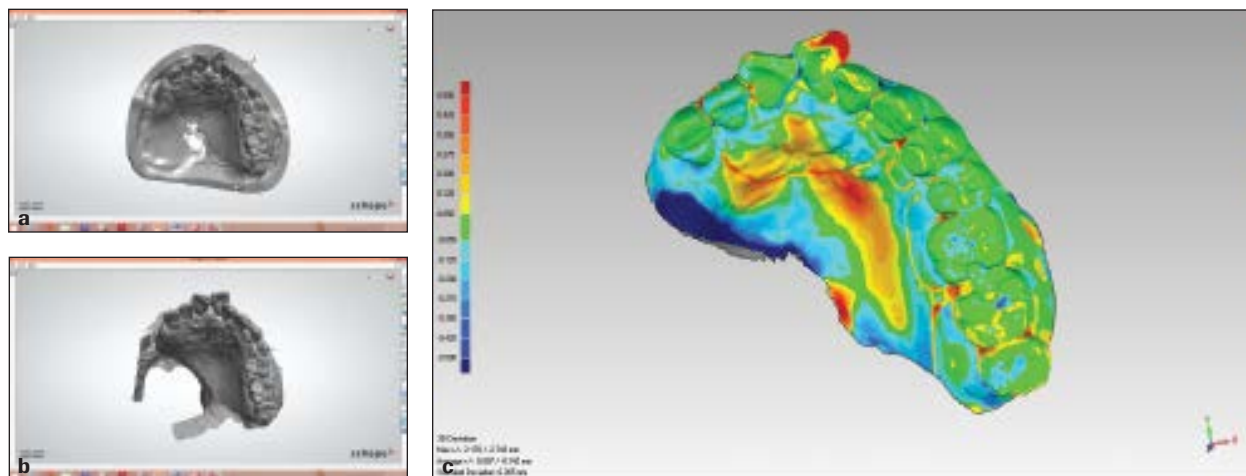

Fig 4 Superimposition of the scanned images. **(a)** Model-scanned image of the conventional master cast. **(b)** Intraoral scanned image of the patient. **(c)** Three-dimensional color-coded deviation map (scale unit: mm). The two images were superimposed using the best-fit alignment method. As a result, a difference of up to 678 μm appeared in the palatal soft tissue region and a difference of < 50 μm was generally observed in the teeth region. However, there was a difference of > 500 μm on the maxillary left central incisor because there was a worn area on the master cast.

other parts (Fig 4) that seemed to derive from the nonpressed anatomical impression of the palatal soft tissue by the intraoral scanner. In this case, additional components of the metal framework were placed on the left premolar region to compensate for the deficient support from the palatal region. However, further studies on the difference in the displacement of the soft tissue from the nonpressure impression and its clinical impact on denture support are necessary.

A clinical follow-up maintenance program was organized to assess the outcome of the selected management protocol in a time-dependent context.

Conclusions

In a partially edentulous patient with a maxillary defect, the maxillary obturator fabricated from the digital impression with the altered cast technique exhibited acceptable short-term treatment outcomes.

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