Prefabricated light-polymerizing plastic pattern for partial denture framework

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Abstract

Our aim is to report an application of a prefabricated light-polymerizing plastic pattern to construction of removable partial denture framework without the use of a refractory cast. A plastic pattern for the lingual bar was adapted on the master cast of a mandibular Kennedy class I partially edentulous patient. The pattern was polymerized in a light chamber. Cobalt–chromium wires were employed to minimize the potential distortion of the plastic framework. The framework was carefully removed from the master cast and invested with phosphate-bonded investment for the subsequent casting procedures. A retentive clasp was constructed using 19-gauge wrought wire and was welded to the framework by means of laser welding machine. An excellent fit of the framework in the patient’s mouth was observed in the try-in and the insertion of the denture. The result suggests that this method minimizes laboratory cost and time for partial denture construction.

Keywords: Dental casting technique, dental curing light, denture

Introduction

A removable partial denture framework was constructed by waxing on an refractory cast made by duplication of a blocked-out master cast.\textsuperscript{[1,2]} The refractory cast serves as the foundation for waxing and casting procedures. However, the time and material cost required for this step are not negligible.

Recently, prefabricated light-polymerizing plastic patterns have been supplied for the framework construction. The cured plastic pattern allows for removal of the framework from the master cast without distortion for the subsequent casting procedures. This article details a technique for fabricating a cast framework by using a light-polymerizing plastic pattern.

Case Report

Master cast preparation
Survey lines were drawn on the master cast of a mandibular Kennedy class I partially edentulous patient. The framework design was transferred to the surveyed master cast and undesirable undercuts on the cast were blocked out using wax. Baseplate wax (0.46 mm thick) was placed as a relief pad on the resin-retention area of the residual ridge [Figure 1]. Aluminum foil was used to relieve the mandibular torus.

Light-polymerizing plastic pattern
A plastic pattern of the lingual bar (Light Pattern; CGK, Hiroshima, Japan) was glued and adapted to the desired position on the master cast [Figure 2]. The pattern on the master cast was polymerized in a light chamber (\(\alpha\)-Light III; J. Morita, Tokyo, Japan). Complete polymerization of the pattern was indicated by a change in color from pink to yellow [Figure 3]. Autopolymerizing acrylic resin (Pattern resin; GC, Tokyo, Japan) was added to create the minor connectors, occlusal rests, and proximal plate.

Investment without a refractory cast
Two 1.2-mm-diameter cobalt–chromium wires (Sun-Platinum Orthodontic Wire; Dentsply Sankin K.K., Tokyo, Japan) were attached to the plastic pattern, one for connecting both sides of

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**Figure 1:** Surveyed, relieved, and blocked-out master cast
the resin-retention area and the other for the minor connectors. The sprue former was arranged so that it approached the plastic framework from above and gave rise to indirect sprues attached to the major connector. The location and geometry of the sprue former were based on the alloy manufacturer’s recommendations [Figure 4].

The plastic framework was carefully removed from the master cast by using an instrument with a small rounded blade. The sprue former was connected to the crucible former of the dental casting mold [Figure 5]. A wax pattern cleaner (diluted synthetic detergent) was used to clean the pattern of any debris, grease, or oils. The plastic framework was invested with phosphate-
bonded investment (Velvety Superquick; Shofu, Kyoto, Japan). The burnout and the casting procedures were implemented according to the instructions of the alloy manufacturer (Cobaltan; Shofu, Kyoto, Japan) [Figure 6].

**Insertion of the removable partial denture**
The finished metal framework was gently seated on the master cast [Figure 7]. A retentive clasp was made using 19-gauge cobalt–chromium wrought wire and was placed on the master cast with the completed framework to coincide with the desired clasp position. The clasp was welded to the framework by means of laser welding machine (ALP50S; Yasui and Co., Tokyo, Japan) [Figure 8]. At the try-in and the placement of the denture, the rests, the minor and major connectors showed excellent contacts with adjacent rest seats and proximal surfaces of the abutments [Figures 9, 10].

**Discussion**
An excellent fit of the framework in the patient’s mouth was confirmed by a careful clinical inspection in the try-in procedure. The result indicated that the technique was effective in simplifying the fabrication process by performing the waxing step directly on the master cast. The retentive wrought-wire clasp was made separately in this case because of its advantage of flexibility, despite a cast clasp could also be constructed by using a light-polymerizing plastic clasp pattern as part of the framework. The potential causes for ill-fitting of the cast frameworks may include dimensional changes in the investment materials, solidification shrinkage, and distortion of the wax pattern. In the conventional method, the mold expansion of the refractory cast partially compensated for the casting shrinkage of the high-temperature-melting alloy, while for the method discussed in the present article, the metal wires were employed to minimize the potential distortion of the plastic framework. Although the accuracy of the framework was clinically acceptable, the dimensional stability of the denture constructed with this method should be further assessed.

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