

CASE REPORT

An Innovative Method for Fabricating a Closed Hollow Cast Partial Denture for a Patient with Mandibular Discontinuity Defect: A Case Report

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ABSTRACT

Aim: Fabrication of lightweight dentures for hemimandibulectomy patients.

Background: The discontinuity in case of a mandibular resection leads to decreased stability, retention and support of a prosthesis. The weight of the prosthesis is one of the primary dislocating factors because it often acts as a cantilever. To decrease the leverage action, reduction in the weight of the prosthesis is mandatory.

Case description: In this case report the use of expanded polystyrene (thermocool) has been done to increase the stability of the prosthesis, thereby, increasing the comfort and acceptance of the patient.

Conclusion: This case report gives an insight as to how a lightweight material can be added to reduce the weight of denture, without compromising its integrity and function.

Clinical significance: Lightweight materials such as expanded polystyrene (thermocool) allow control of spacer thickness to reduce the weight of the denture without compromising the integrity of the denture.

Keywords: Cast partial denture, Hemimandibulectomy, Lightweight, Polystyrene.

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BACKGROUND

Swallowing, speech, mandibular movements, mastication, and functioning are adversely affected by radical mandibular surgery for any odontogenic or non-odontogenic

tumors. In addition, it is therapeutically unrealistic to discuss functional impairment only without making reference to the psychic and social factors affecting the mandibulectomy patient.¹

Retention, stability, and support are the basic principles on which the success of a prosthesis relies. The discontinuity in case of a mandibular resection provides decreased support, retention, and stability. Also, the weight of the prosthesis is a dislocating factor because it often acts as a cantilever. To decrease the leverage action, reduction in the weight of the prosthesis has been found beneficial.²

Various weight reduction approaches have been achieved using a solid three-dimensional spacer, including dental stone, cellophane-wrapped asbestos, silicone putty, modeling clay and thermocol during laboratory processing.³

CASE DESCRIPTION

A 22-year old male patient was referred to the Department of Prosthodontics and Crown and Bridge, Guru Nanak Institute of Dental Sciences and Research with a need for a prosthodontic rehabilitation following a segmental mandibulectomy (Fig. 1). The surgery was conducted five years ago to resect a follicular ameloblastoma involving the molar, pre-molar and cuspid region of the right side of the mandible without disarticulation (Cantor and Curtis class IV). Reconstruction was done with an anterior iliac



Fig. 1: Frontal view of the defect

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cortico-cancellous bone graft which was stabilized at two points with mini-plates.

Extra-oral findings showed minimal asymmetry and deviation of the face along with adequate mouth opening. Intraoral findings revealed missing teeth from the central incisors on the left side with an obliterated lingual sulcus of the defect side with class I molar occlusion on the non-resected side. Radiographic examination showed the presence of bone graft with a partial union (Fig. 2). Hollow cast partial denture was planned as an implant-supported prosthesis in the existing condition would not be possible, and the patient was unwilling for any further surgical intervention.

Irreversible hydrocolloid (Algitex; The Bombay Trading Corporation, Mumbai) impressions of upper and lower arches were made, and diagnostic casts were poured with type III dental stone (B. N. Stone; B. N. Chemicals, Kolkata). Following surveying of cast, mouth preparation was done, and secondary impressions were obtained with medium body poly-vinyl siloxane (Reprosil, DENTSPLY, Germany), after border moulding with green stick (DPI-Pinnacle tracing sticks; Bombay Burmah Trading Corporation,

India), using a self-cure acrylic (DPI-RR; Bombay Burmah Trading Corporation, India) custom tray. The definitive cast was poured (Fig. 3) with type IV dental stone (Kalstone, Kalabhai Karson Pvt. Ltd., Mumbai).

The metal framework was fabricated (of Co-Cr), in accordance with the design which provide satisfactory support, stability, and retention of the final prosthesis. After the intra-oral trial of the metal framework, a bite was registered using a wax occlusal rim (Y-Dents, MDM Corporation, Delhi) and the trial was conducted to verify the occlusion. The wax trial denture was processed following conventional laboratory procedures up to the de-waxing stage. During packing, expanded polystyrene (thermocool) was positioned over the metal framework with an initial layer of heat-polymerized poly-methyl methacrylate (DPI-RR; Bombay Burmah Trading Corporation, India) resin dough (Fig. 4), following which the remaining area was packed using the same resin dough. The dimension of the expanded polystyrene spacer was such that it occupied an area 2-mm below the teeth and 3-mm from the denture base.

During the insertion appointment, occlusion was checked and adjusted (Fig. 5), and patient was instructed



Fig. 2: Orthopantomogram showing the partial union of bone graft

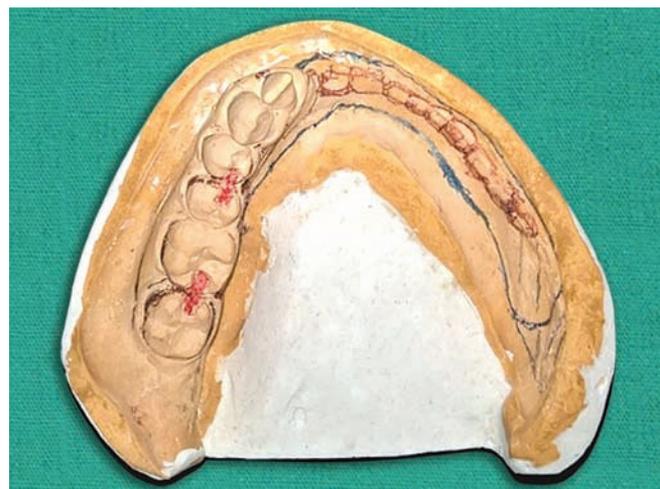


Fig. 3: Survey and design of partial denture prosthesis



Fig. 4: Thermocool inserted into the mold during packing



Fig. 5: Frontal view of the hollow denture

to masticate on the non-resected side and maintain good oral hygiene. Relining was advised to improve the tissue adaptation.

DISCUSSION

Rehabilitation of mandibular discontinuity defects is a challenge to the prosthodontist. Implant-supported rehabilitation is by far the best option to rehabilitate such patients, but it is not possible in cases where there is a partial union of a bone graft. Hollowing the denture reduces the weight by 25%.⁴ In the pursuit of lightweight denture materials, expanded polystyrene (thermocol) is one material that has several benefits of being lightweight, simple to carry out, control of spacer thickness and the denture integrity being uncompromised, when compared to other techniques where a hollow bulb is present. It also brings down the tedious effort to remove the spacer material from the prosthesis and prevents the potential for leakage as seen with the other materials.²

Literature is resplendent when it comes to thermocol being used in the fabrication of a maxillary hollow denture, but discussions are restricted when it comes to applying this material in prosthesis used to treat mandibular discontinuity defects. The use of thermocol against other materials has proven to reduce the weight considerably without compromising the flexural strength of the denture and masticatory efficiency of the patients.⁵

CONCLUSION

This case report gives an insight as to how materials, such as polystyrene, can be added to dentures to reduce the weight of the prosthesis, without compromising its integrity and function.

CLINICAL SIGNIFICANCE

Lightweight materials such as expanded polystyrene (thermocol) allow control of spacer thickness, reduce the weight of the denture without compromising the integrity of the denture. Thereby, maintaining patient comfort and function.

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