Available online at https://www.mmpubl.com/

International Journal of Esthetics and Restorative Dentistry

Case Report

CAD CAM Guided Hollow Bulb Obturator

Kaligotla Apoorva Vasundhara[1], M Suresh Babu[2], Haragopal[3]

[1] *Consultant Prosthodontist and Implantologist., Hyderabad , Telangana, India*
[2] *Professor , Department of Prosthodontics,Sibar Institute Of Dental Sciences, Guntur, India*
[3] *Reader, Department of Prosthodontics, Sibar Institute Of Dental Sciences,Guntur, India*

How to cite: Vasundhara KA, Babu MS and Haragopal. CAD CAM guided hollow bulb obturator. Int J Esth Res Dent. Volume 2022, Article ID 22165269, 5 pages.
DOI: https://doi.org/ 10.56501/intjesthresdent.2022.665

Received: 16-08-2022 *Accepted: 01-09-2022* *Published: 10-09-2022*

Abstract

Removable prosthesis' success is determined by a variety of parameters, including retention, stability, support, aesthetics, and masticatory function. The weight of the prosthesis increases as the intraoral interarch distance increases. This could jeopardise the retention and resistance of the detachable prosthesis, both of which are essential for its effectiveness. To reduce the weight of a prosthesis, several methods, techniques, and materials have been documented. This case report depicts the use of CAD CAM guided hollow bulb obturator for the repair of ill- fitting dentures.

Keywords: *CAD CAM; Prosthesis; Obturator; Milled obturator.*

Address for Correspondence:
Dr Kaligotla Apoorva Vasundhara
Consultant Prosthodontist and Implantologist.
Hyderabad , Telangana, India.
Email: apoorvakgtla@gmail.com

INTRODUCTION

Anatomic, prosthodontic, metabolic, functional, and other elements all play a role in the resorption of the maxillary residual alveolar ridge. It is caused by excessive resorption of maxillary denture-bearing tissue and resulting in a substantial restorative space between the maxillary residual alveolar ridge and the mandibular teeth [1]. Obturators are used to provide prosthetic therapy for individuals with palatal tissue anomalies, whether they are congenital or acquired. Definitive obturators must meet the following criteria: they must be light in weight, stable, and restore the patient's lost function and appearance [2]. Because of the increased inter-ridge distance and the weight of the prosthesis in extensive maxillofacial abnormalities, the obturator's retention is frequently jeopardised. Traditionally, poly methyl methacrylate has been used as an obturator, in the recent years various other materials have been employed [3]. This case report, the ill-fitting prosthesis was corrected using CBCT with CAD CAM software, digital impression and 3D printing.

Case report

Pt reported to dept with ill-fitting maxillary obturator prosthesis. oral examination revealed defect in the left posterior region of hard palate extending from 15 to 17 region of diameter of 5 cm length and 7cm width a thick fibrous band was formed at the middle of the defect, CBCT (Carestream 9300) was taken to know the extent of the defect with obturator using puffed cheek technique, this technique improved the soft tissue resolution, and shows the better demarcation when compared to conventional scan. The obtained CBCT showed the extent of existing prosthesis and the defect was communicating with sinus. The extent of existing prosthesis was not into the defect making it less retentive. The extent of prosthesis was designed in the DDS Pro software and each segment was viewed using manual segmentation tools in software. Use of cbct eliminates the need of impression making and to know the extent of defect and the prosthesis. The designed prosthesis was converted to STL file and resin cast (Any cubic, non-castable dental resin) was milled using a 3d printer (Any cubic). The obtained resin cast was duplicated using elastomeric impression and stone cast was obtained. Denture base and occlusal rims were made followed by jaw relation and try in. Clasps were incorporated, flasking was done followed by dewaxing. In order to reduce the weight of the prosthesis, hollowing of the bulb was done using brown sugar. 2mm of wax was adapted over the defect and brown sugar was melted and once a soft consistency was obtained it was adapted over the wax. Once it becomes hard the wax along with the hardened sugar was removed to allow space for the heat cure resin and packing was done. After deflasking, 2 holes were made on the hollow bulb and immersed in water for a few minutes, all the sugar was completely dissolved leaving hollowness in the bulb. The hole was covered with self-cure resin. The prosthesis was delivered to the patient (Figure 1) and speech, function was evaluated and were satisfactory. A 1year follow up was done and patient did not report any discomfort.

DISCUSSION

Using the SLM technique to produce a CAD/CAM RPD framework made from titanium or Co-Cr alloy is a well-established technique that compares favourably to RPD frameworks made using traditional investing/casting techniques in terms of precision of fit, retention, and stability [4,5]. Nonetheless, because of the intricacy of design, structure, and component materials, CAD/CAM RPD framework fit has been evaluated using qualitative rather than quantitative criteria. CAD/CAM RPD frameworks milled from PEEK blanks have shown enhanced fit precision and could be considered a metal-free alternative for RPD framework fabrication [6,7].

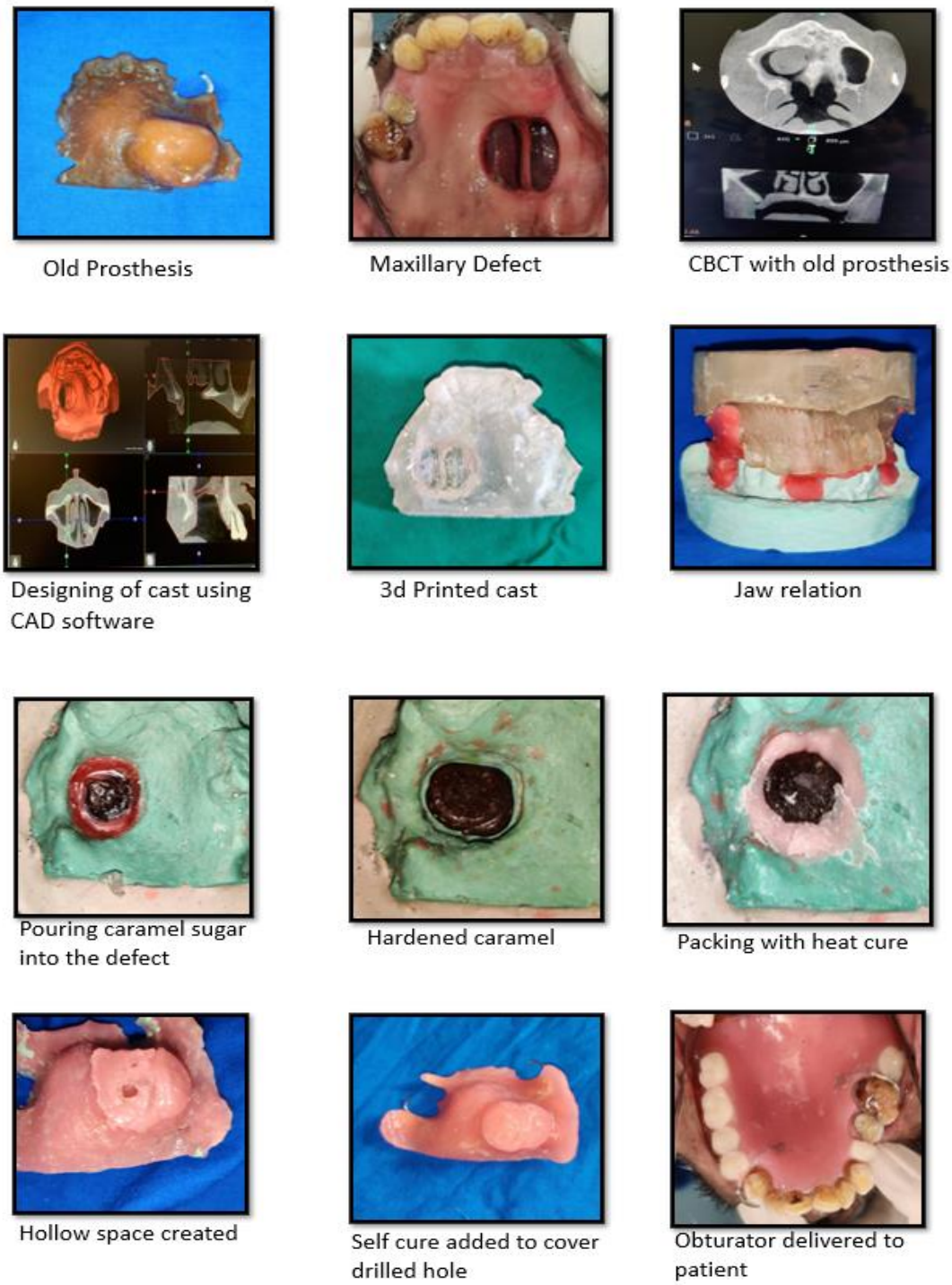

Figure 1: Shows the different steps in the fabrication of the CAD CAM guided hollow bulb obturator

The obturator prosthesis took only three clinical appointments to fabricate (digital impression, fit verification, and tooth try-in), as opposed to the five or more appointments that are typical in these patients. The reduction in the number of required visits and electronic archiving are regarded as positives in the field of computer-engineered complete dentures; nonetheless, patients' unhappiness with the final outcome has been recorded, which may be attributed to the lack of a trial placement appointment [8]. The dental try-in session was not skipped in our situation, assuring patient satisfaction with the final aesthetic result.

There are a few studies on obturator manufacturing employing digital technology and imaging systems including CBCT, CT, and MRI [9-11]. Jiao et al. [12-16] used 3D models of CT images of patients with maxillary defects to design the defect portion of obturator prostheses, and then used SLA technology to manufacture the obturator bulb, just like we did in our work. The obturators were completed on the prepared gypsum models, and the remaining soft tissues and teeth were taken by traditional means. CBCT has been reported to provide a more complete model production than conventional scale models, but it shows higher deviations than oral scanners when the model is produced with 3D printers from CBCT images, according to the results of a small number of studies conducted for use of CBCT images in the production of dental models [13,17-20].

CONCLUSION

We found that, in addition to the advantages of using CBCT in the development of 3D anatomy of the human body, the use of CBCT in the construction of 3D anatomy of the human body has other advantages. With the assistance of digital technologies, the maxillary deformities can be corrected.

Conflict of Interests: Nil

Source of funding: Nil

REFERENCES

1. Gali S, Premanand A, Lanka HB. A Novel Laboratory Technique of Fabricating a Definitive Hollow Obturator using Brown Sugar. J Clin Diagn Res. 2019 Aug 1;13(8).
2. Breeze J, Rennie A, Morrison A, Dawson D, Tipper J, Rehman K, *et al.* Health-related quality of life after maxillectomy: Obturator rehabilitation compared with flap reconstruction. Br J Oral Maxillofac Surg 2016;54:857-62.
3. Papathanasiou I, Kamposiora P, Papavasiliou G, Ferrari M. The use of PEEK in digital prosthodontics: A narrative review. BMC Oral Health. 2020 Dec;20(1):1-1.
4. Wu J, Li Y, Zhang Y. Use of intraoral scanning and 3-dimensional printing in the fabrication of a removable partial denture for a patient with limited mouth opening. J Am Dent Assoc 2017;148:338-41.
5. Liu YF, Yu H, Wang WN, Gao B. A preliminary study on the forming quality of titanium alloy removable partial denture frameworks fabricated by selective laser melting. Zhonghua Kou Qiang yi Xue za Zhi= Zhonghua Kouqiang Yixue Zazhi= Chinese Journal of Stomatology. 2017 Jun 1;52(6):351-4.

6. Alifui-Segbaya F, Williams RJ, George R. Additive manufacturing: A Novel method for fabricating cobalt-chromium removable partial denture frameworks. Eur J Prosthodont Restor Dent. 2017;25:73-8.
7. Arnold C, Hey J, Schweyen R, Setz JM. Accuracy of CAD-CAM-fabricated removable partial dentures. J Prosthet Dent. 2018;119:586-92.
8. AlHelal A, Goodacre BJ, Kattadiyil MT, Swamidass R. Errors associated with digital preview of computer-engineered complete dentures and guidelines for reducing them: A technique article. J Prosthet Dent. 2018;119:17-25
9. Michelinakis G. The use of cone beam computed tomography and three dimensional printing technology in the restoration of a maxillectomy patient using a dental implant retained obturator. J Indian Prosthodont Soc. 2017;17: 406-11.
10. Tasopoulos T, Kouveliotis G, Polyzois G, Karathanasi V. Fabrication of a 3D Printing Definitive Obturatör Prosthesis: a Clinical Report. Acta Stomatol Croat. 2017; 51: 53-8.
11. Park JH, Lee KS, Lee JY, Shin SW. Fabricating a Maxillary Obturatör Using an Intraoral Digital Impression: A Case History Report. Int J Prosthodont. 2017; 30: 266-8.
12. Jiao T, Zhu C, Dong X, Gu X. Rehabilitation of maxillectomy defects with obturatör prostheses fabricated using computer-aided design and rapid prototyping: a pilot study. Int J Prosthodont. 2014; 27: 480-6.
13. Wesemann C, Muallah J, Mah J, Bumann A. Accuracy and efficiency of full arch digitalization and 3D printing: A comparison between 189 Murat S. Fabrication of Obturator by Stereolithography. JAREM 2018; 8(3): 186-90 desktop model scanners, an intraoral scanner, a CBCT model scan, and stereolithographic 3D printing. Quintessence Int. 2017; 48: 41 50.
14. Patil PG, Nimbalkar-Patil S. Lost wax-bolus technique to process closed hollow obturator with uniform wall thickness using single flasking procedure. J Indian Prosthodont Soc. 2017;17:84–8.
15. Costa-Palau S, Torrents-Nicolas J, Brufau-de Barberà M, Cabratosa-Termes J. Use of polyetheretherketone in the fabrication of a maxillary obturator prosthesis: A clinical report. J Prosthet Dent. 2014;112:680–2.
16. Parr GR. A combination obturator. J Prosthet Dent. 1979;41:329–30.
17. Cecconi BT, Koeppen RG, Phoenix RD, Cecconi ML. Casting titanium partial denture frameworks: A radiographic evaluation. J Prosthet Dent. 2002;87:277–80.
18. Reitemeier B, Schaal W, Wolf A, Walter M. Sealing maxillary titanium obturators with removable flexible caps. J Prosthet Dent. 2016;115:381–3.
19. Suzuki Y, Ohkubo C, Abe M, Hosoi T. Titanium removable partial denture clasp repair using laser welding: A clinical report. J Prosthet Dent. 2004;91:418–20.
20. Mishra N, Chand P, Singh RD. Two-piece denture-obturator prosthesis for a patient with severe trismus: A new approach. J Indian Prosthodont Soc. 2010;10:246–8.

Published by MM Publishers
https://www.mmpubl.com/ijerd