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Modification of Tooth Contourfor Retention of an Obturator Prostheses: A Clinical Report

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Abstract: Adenoid cystic carcinoma is a malignant neoplasm of the salivary glands. Surgical resectionis the treatment of choice, which may be combined with radiotherapy. Prosthetic rehabilitation with an obturator is one of treatment that restores oral functions and esthetics. The proper use of the remaining teeth and defect area for retention helpsto distribute the occlusalforces without deleterious effects on the remaining structures. This article proposesasimple approach of modifying an abutment tooth contour by dimpling for the retention of an obturator prosthesis.

Key words: Adenoid Cystic Carcinoma · Maxillectomy · Obturator · Retention · Dimpling

INTRODUCTION

Adenoid cystic carcinoma (ACC) is a slowly progressing tumor. In the head and neck region, it arises mainly within the secretory glands such as salivary and lacrimal glands. ACC accounts approximately 10% of salivary gland neoplasms of minor salivary glands, submandibular and parotid glands [1]. Extensive forms of the tumor can also involve the maxillary sinus and orbital floor along with the site of origin [2]. The treatment of ACC involvesa multi-disciplinary approach that includessurgery, radiotherapy, chemotherapy or a combination therapy depending on the clinical and histological diagnosis [3].

After resection of the associated hard and soft tissues, the management can be challenging due to resultant communication between oral and nasal cavities which compromises the oral functions and esthetics. Rehabilitation with obturatorprosthesis is a recommended treatment modality as it replaces the part or all of the maxilla reproducing a normal palatal contours and associated teeth lost due to surgery [4]. Furthermore, it creates an oral seal that makes swallowing and speech effective and restores contour after partial loss of the facial skeleton [5].

According to the remaining teeth and surgical defect, Aramanyclassified the postsurgical maxillary defects into 6 categories [6]. Various authors proposedmaxillary obturator framework designs to permit the use of leverage for the support, retention and stabilization of the prosthesis [7, 8]. Brown [9] suggested the use of the lateral wall of the defect for indirect retention. In addition, a buccal flange type obturator with sufficiently high lateral wall and lower medial bulb were reported to be preferable due to less vertical displacement [10]. However in certain clinical situation, it is not possible to follow the ideal framework design, therefore, necessitating modifications.

This article describes an approach of modification of an abutment tooth contour for the retention of anobturatorprosthesis.

Clinical Report: A 33-year-old male patient was referred to Maxillofacial Prosthetic Service, Mahidol University for prosthetic rehabilitation following tumor resection. The patient had been diagnosed with ACCof maxillary left palate and had underwentleft maxillectomy and ethmoidectomyalong with the radiation therapy (6600 cGY). He had been usingan interim obturatorbefore being referred for definitive treatment.

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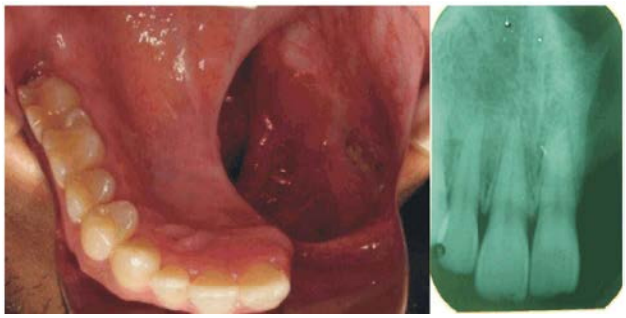

Fig. 1: A. Postoperative intra-oral view of the surgical defect with remaining palate and dentition, B. X-ray showing the remaining bone on maxillary left central incisor adjacent to defect area

Clinical examination revealed anAramany Class I maxillary defect area on the left side. The remaining dentition extended from maxillary left central incisor to right second molar (Figure 1A). In addition, grade I mobility of maxillary left central incisor wereobserved. Peri-apical radiographs revealed lack of adequate bone support on the mesial aspect of maxillary left central incisor, which was the anterior most abutmentnearest to the defect (Figure 1B). Preliminary maxillary impression was taken with irreversible hydrocolloid impression material (Jeltrate Fast Set; Dentsply Intl, York, Pa)and poured with Type III dental stone (Castone® DentalStone; Dentsply Intl). Survey lines were drawn on the obtained working model using surveyor (Ney® Surveyor; Dentsply Intl) whichshowed alow height of contour onmaxillary right second molar.

A linear obturator framework design was chosen due to lack of adequate bone on the mesial of maxillary left central incisor. As there was a lack of adequate undercut on buccally inclined maxillary right second molar, the framework design was modified to use palatal undercuts of premolars and buccalundercuts of the molars.Alterations to the tooth contour were performed at the distopalatal area of maxillary right second molarby dimpling to increase the undercut for retention of the obturator framework (Figure 2). A round diamond bur in a high speed hand-piece was used to prepare a depression of 0.01" depth (3mm height; 4mm length) and polished with rubber point. After necessary rest preparations, the final impression was taken with the irreversible hydrocolloidand poured with Type IV dental stone (Glastone® Dental Stone; Dentsply Intl). The working modelwas surveyed and theobturator framework was designed as a complete palatal coverage with embrasure clasp on maxillary right second and first molars;maxillary right second and first premolars along with canine rest on maxillary right canine; guiding plane on the mesial of maxillary left central incisor. Loops were extended on the defect side for the retention of an acrylic bulb. The framework was casted with cobalt-chromium (Vitallium; Dentsply Intl). After the clinical try-in of the framework (Figure 3), impression cake (Impression Compound; Kerr Corp, Romulus, Mich) was softened in hot water, placed around the framework loops and adapted in the patient's defect area to act as a base for functional molding. Border molding was performed around the lateral wall of the defectusing a low fusing modelling plastic impression compound (Kerr Green Stick; Kerr Corp) and the final impression of the defect area was taken with a tissue conditionermaterial (COE-COMFORT™ Tissue conditioner; GC America Inc, Ill) (Figure 4). Altered cast technique was performed following the conventional method to obtain the master model. Maxillomandibular relationship was recorded with wax occlusal rims and the bite was registered with silicone bite registration material (Occlufast™; ZhermackSpA, Rovigo, Italy) and articulated in the semi-adjustable articulator (Hanau Wide–VueII; Whip Mix Corp, Louisville, Ky). Acrylic semi-anatomic teethwere selected and arranged to obtain a unilateral balanced occlusion. After teeth try-in, softened plasticmodeling impression compound was applied on the palatal surface and the patient was instructedto swallow so as to optimize the palatal contours and approximate palatal vault depth. On the delivery day, the selective functional impression of the bulb portion of obturator was taken with a tissue conditioner material. The tissue conditioner materialwas further changed to heat polymerized polymethyl methacrylate resin (PMMA) (Vertex™Regular; Vertex-Dental, Netherlands)by obturating the bulb portion with heavy body elastomeric impression material [11] (Figure 5). After final finishing and polishing, the obturator was delivered to the patient.

Fig. 2: Dimpling on the maxillary right second premolar

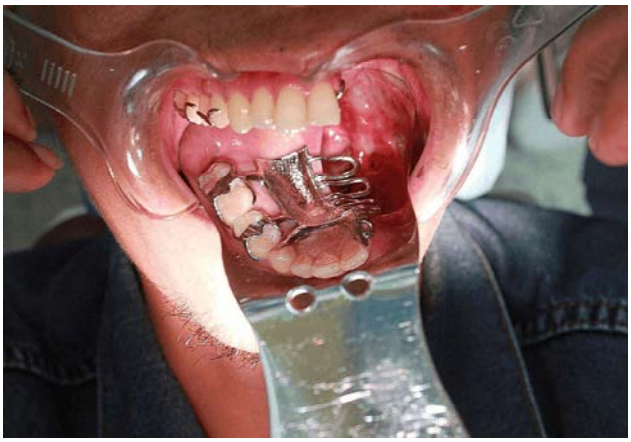

Fig. 3: Metal framework try-in

Fig. 4: Functional impression of the defect area with coe comfort

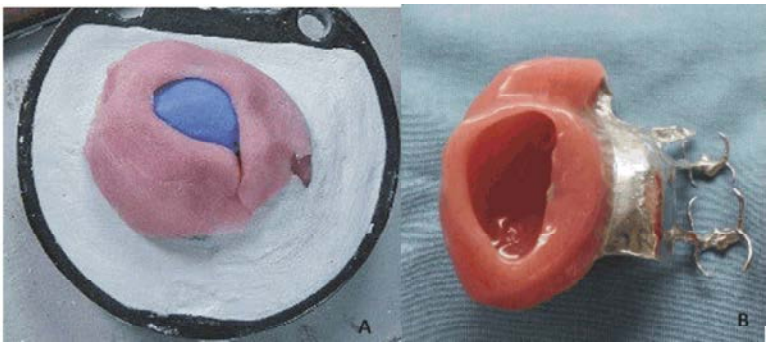

Fig. 5: A. Coe comfort changed to heat polymerized PMMA resin, B. Bulb portion of the obturator

Fig. 6: Delivery of the maxillary obturator A. Left, B. Right, C. Front

Oral hygiene instructions were given and reinforced during the follow-up visits for hygiene maintenance along with prescription of fluoride paste (GC Tooth Mousse; GC Dental Products Corp, Alchi, Japan). The maintenance and recall visits were made after 24 hours, 1 week,2weeks, 1month, 3months and 6 months.

DISCUSSION

Definitive obturator are fabricated after the complete healing of the surgical site. Therefore, during the healing phase, interim obturator are recommended as it allows the periodic addition of interim lining material according to the soft tissue changes in the defect area [4].

Aramany proposed tripodal and linear obturator framework designs forAramanyClass I maxillary defect that were later modified by Parr, *et al*. [8]. In situations where the anterior teeth are to be used, a tripodal design is chosen. However, if one does not desire to use the anterior teeth, a linear design is chosen in which, retention is achieved from the retentive arms on the buccal walls ofthe premolars and palatal walls of the molars [7, 8]. An in-vitro study revealed that lingual retention providesbetter resistance to displacement compared to buccal retention [11]. In the present case, due to buccally inclined molars and a low survey line, the combination of molar and premolar for retention were interchangedi. ebuccal molar retention and lingual premolar retention.

In situations where there is a lack or absence of undercut needed for retention, alterationof contour on abutment teeth can be performed through 1) surveyed crown 2) re-contouring of the natural tooth surface by dimpling 3) Class V amalgamrestorations, metal or porcelain veneer and 4) application of composite resin [12]. Dimpling is a form ofenameloplasty with the bur to create a dimple or a slight concavity in an enamel to engage the tip of the retentive clasp [12]. It not only acts as a direct retainer to provide retention but also aids asindirect retainer by resisting the rotational displacement of the obturator from the supporting structure. Due to absence of undercut on maxillary right second premolar, re-contouring of the tooth surface by dimpling was performed. Although surveyed crown provides ideal contours for clasping the abutment, more teeth surface removal is required. Class V amalgam restoration is preferred on the tooth with class V cavity and porcelain veneer are technique sensitive.

Although dimpling is less extensive compared to surveyed crown, care should be taken to avoid the sharply outlined depression as it causes difficulty in flexing in and out of the retentive claspresulting in unnecessary torque. Therefore, the depression should be smooth and polished with flowing contours [13].

The patient was instructed to wear the obturator prosthesis with the tissue conditioner for a week after which it was changed to heat polymerized PMMA. The viscoelastic property of tissue conditioner material, such as coe-comfort,can aid in selective functional impression of bulb portion of obturator. However, the tissue conditioner needs to be functionallyadapted for minimum period of 1 week to progress from plastic to elastic phase [14]. This results in an overall better contact between the lateral walls and superior aspects of the obturator and the defect, thus reducing the movements of the obturator [15].

CONCLUSION

The large defect created by the excision of the tumor such as ACC can compromise oral functions and esthetics. Although an obturator prosthesis is effective in

restoring the oral functions, the remaining structures should be wisely used to gain support and retention and to prolong their longevity. The simple procedure of alteration of the contour through dimpling can not only aid to gain retention and help to prevent the rotation of the prosthesis.

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