

**Improvised Impression Method to Record Defective Maxillary Alveolar Ridge after Tumor Resection Using a Pneumatic Approach, Followed By Total Rehabilitation: a Case Report**

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**Conflicts of Interest:** Nil

**Abstract**

**Purpose:** To record maxillary alveolar ridge defect area following tumour resection using inflated balloon loaded with impression material, to achieve an improvised result.

**Method:** A case of maxillary alveolar ridge defect (Sibert's Class III) where normal impression method encounters difficulty in recording the defect area. In this technique knowledge of pneumatic mechanics and its application has been utilized. A non-inflated latex balloon has been glued over a mouldable perforated tray, this has been sandwiched to silicone based impression material. An economically feasible apparatus has been assembled to inflate the balloon under controlled pressure. This in-turn aids in recording the ridge defect area with minimal material wastage. This was followed by routine clinico-laboratory procedures and rehabilitation has been done successfully using a fixed removable prosthesis ie. Andrew's Bridge.

**Conclusion:** It is important that the dentist find to a technique that works consistently in their hands, and be

able to adapt when a clinical situation warrants a different approach. In this case report we had encountered a clinical situation that required multi-disciplinary approach. The improvised pneumatic impression technique had given a new dimension in impression making with good result along with minimal material wastage, making the clinical procedure convenient for the dentist and patient without compromising on the accuracy.

**Keywords:** Alveolar Ridge Defect, Andrew's Bridge, Cemento-Ossifying Fibroma, Hand Pump, Latex Balloon, Pneumatic Impression.

**Introduction**

*"Ideal impression must be in the mind of the dentist before it is in his hand. He must literally make the impression rather than take it"- M.M. Devan* has rightly said that regarding the negative replica of stomatognathic system. We as prosthodontists, focus on the restoration of form and function of oro-maxillofacial area. As the saying goes, "A good beginning is half done", likewise making a good impression is a key step in the prosthodontic rehabilitation

procedures. It is important to select the appropriate impression material and technique for each clinical situation. This article will discuss an impression technique using a non-inflated balloon sandwiched between mouldable perforated stock tray and polyvinyl siloxane (PVS) to record a maxillary alveolar ridge defect area, by inflating the balloon under controlled pressure.

Cementum is a specialized connective tissue, which is a hard, mineralised substance that normally covers dental root. It shares some physical and structural characteristics with compact bone, but differs in being avascular. Cemento-ossifying fibroma (COF) is considered as a benign tumor closely related to other lesions such as fibrous dysplasia, cementifying periapical dysplasia or cement-osseous dysplasia [1].

In 1992, WHO adopted a new classification this included the cement-ossifying fibroma as a benign osseous tumor. This classification is now widely accepted and includes four distinct groups:

1. Fibrous dysplasia
2. Ossifying fibroma
3. Cemento-ossifying fibroma
4. Cementifying fibroma.

These lesions resulted from the growth and development of periodontal membrane remnant, the multipotent blastic mesenchymal cells that was present in the membrane and was capable of producing new growth under certain conditions which contains various amounts of fibrous tissue, cementum and lamellar bone [2,3]. The triggering mechanism that initiates the formation of cementum outside the periodontal membrane remains unclear [4].

Although cement-ossifying fibromas are generally slow-growing and benign, the lesions may occasionally be quite large, locally aggressive and destroy the tissue barriers in the adjacent structures. Nevertheless, en-bloc resection is still possible [5].

En-bloc resection may result in loss of tooth as well as adjacent alveolar process and soft tissues. This depends on the severity of the cause. Complete surgical replacement of the lost tissue is difficult and unpredictable, especially when the degree of catastrophe is higher after surgical intervention. This can be due to trauma, congenital defects or any pathological condition. Replacement of what is lost and preservation of what is remaining should be assessed based on esthetic and functional requirement of the specific clinical situation.

In this case report it has been discussed in detail regarding maxillary ridge defect followed by en-bloc resection of cement-ossifying fibroma. An improvised impression technique has been used to record the defect which further proceeded with appropriate endodontic considerations and final prosthetic rehabilitation. The prosthetic phase is carried out by using fixed – removable prosthesis using high precision attachment.

### **Case Report**

A 40 year old male reported to outpatient department with a chief complaint of swelling in the mouth. A detailed medical and dental history has been taken. History revealed that the soft tissue mass was noticed one year ago and gradually increased in size. Patient had no complains of pain or dysphagia. There was no other significant past medical or dental history. Intraoral examination revealed a swelling which was obliterating the buccal vestibule that leads to slight displacement of molar and premolar (Figure 2). This resulted in effaced gingivo-labial sulcus. A multidisciplinary approach was planned. A surgical and prosthetic rehabilitation protocol which was acceptable for the patient as planned. Minimal catastrophe to the adjacent tissue was put on this approach during surgical phase. CBCT and biopsy had revealed that cemento-ossifying fibroma was seen over the right maxillary alveolar ridge region. Patient underwent tumour resection (Fig.3 &

Fig.4.a) and was under observation. The post-operative period was uneventful (Fig.4.b) and patient was further referred for prosthetic rehabilitation.

### **Pneumatic Impression Technique**

Knowledge of pneumatic mechanics and its application has been utilized in this technique. A non-inflated latex balloon has been adapted over a mouldable perforated tray (Fig.6.b) using cyanoacrylate glue. The balloon was connected with hand air pump with a silicone tube with manual air regulator in the midway (Fig. 6.c&d) to control air inflow while inflating impression loaded balloon tray assembly. Pneumatic impression assembly (Fig.6.a) was thus customized. Over the tray polyvinylsilicone based impression material was loaded sufficient enough to cover the area to be recorded as well as dentate area. Tray placement was done intraorally passively with no pressure. After tray seating, using the hand pump, air regulator slightly opened allowing air inflow to inflate balloon. Care must be taken so as to not to displace the impression material excessively by over-inflating the balloon which may cause irritation to the patient. When balloon is adequately inflated lock the air regulator so as to prevent deflation of balloon. Let the impression material set without deflating balloon (Fig. 6.f). The assembly was detached from the regulator to prevent of air escape from the balloon. Cast should be poured in the inflated state using multiple pour technique. This reduces the flow and permanent deformation.

### **Andrew's Bridge Fabrication**

Wax-up was done for PFM retainers with 11, 12, and 17 they were connected with a prefabricated castable plastic bar attachment (CEKA PRECILINE) (Fig.7.a). The bar was positioned parallel to the ridge and was attached on the palatal aspect of the retainers [Fig.7.b]. The bar was placed such that 2-3 mm of space was left between the bar and the crest of the alveolar ridge to facilitate maintenance

of hygiene by the patient [Figure 7.b]. The assembly was casted in cobalt-chromium alloy. Metal trial was done for the prosthesis (Fig.7.b), shade selection was done for matching shade of ceramic restoration with the acrylic denture teeth. Waxed up trial denture replacing 13,14,15, and 16 was fabricated and adjusted intraorally. Wax was added to the buccal portion of denture flange for adequate support and esthetics (Fig.7.c). PFM Bridge and the fixed retainer part of the Andrews Bridge system (Fig.7.d) and was cemented over the prepared teeth with glass ionomer cement. The waxed up trial denture was processed in hot cure acrylic resin and tried in patients mouth over the fixed component of the Andrew's bridge. The undercut under the bar attachment was blocked out with wax. The clip was attached to the bar and was picked up in self cure acrylic resin into the removable prosthesis (Fig.7.e). The denture was removed, finished, polished and checked for retention of the bar and clip as well as esthetics and phonetics of the patient (Fig. 8.a &b).

### **Discussion**

Prosthodontics focuses on the restoration of form and function of the stomatognathic system. Due to the confined space within the oral cavity and the materials used, it is necessary to fabricate restorations through indirect techniques. When using an indirect technique, making a good impression is a key step in the production of a quality fixed restoration. It is important to select the appropriate impression material and technique for each clinical situation [6]. Among all the technique the question is which is the best. The answer is; '*It depends!!!*'

This impression technique plays a vital role in recording altered morphology of ridge or palate, in case of neurological conditions, or limited mouth opening conditions. In this case ridge defect followed by tumour resection hampered regular impression making leads us to

improve the impression technique using the knowledge of pneumatic mechanics.

The technique helped in minimizing gag reflex by minimal loaded tray material. The basic principle behind this impression technique is the pneumatic mechanics which works or operated by air or gas under pressure. The hand pump used in the present technique because the inflation-deflation mechanism allows transfer of air in or out, either direction, in a controlled manner by means of regulator valve, thereby maintaining the balloon in a desirable state to adapt to the shape of the ridge defect area to be recorded [7].

### Limitations

The limitation of this technique includes, pressure application while inflating balloon is totally subjective. Over inflation may result in displacement of loaded material from tray, bulging out of balloon to throat in turn result in severe gagging. Tactile sensation of the patient also plays a major role in this technique. Operator must be an expert in managing Concerns regarding dimensional accuracy once the balloon is deflated requires further study.

### Conclusion

It is important that the dentists should practice a technique that works consistently in their hands, and be able to adapt when a clinical situation warrants a different approach. In this case report we had encountered a clinical situation that required multi-disciplinary approach. Timely intervention of surgical followed by prosthetic rehabilitation had given the patient a better prognosis. The improvised pneumatic impression technique had given a new dimension in impression making with good result along with minimal material wastage. Despite setting up a separate armamentarium for the whole assembly, the result was fruitful and aids making the clinical procedure

convenient for the dentist and patient without compromising its accuracy.

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Legends Figures



Figure 1. Pre-Operative



Fig.2 Intra-oral examination of complaint region, obliteration of right buccal vestibule.

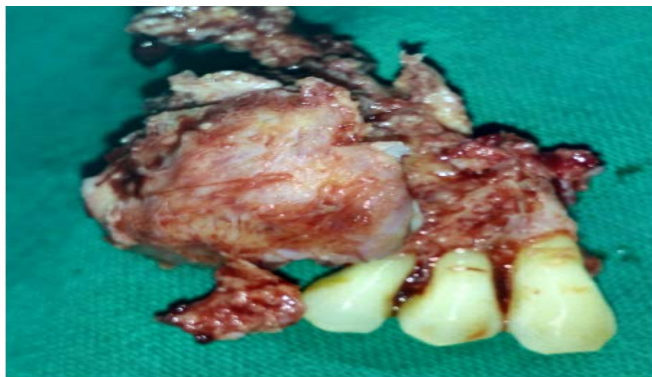


Fig.3 en-bloc resection, tumor removal done in toto

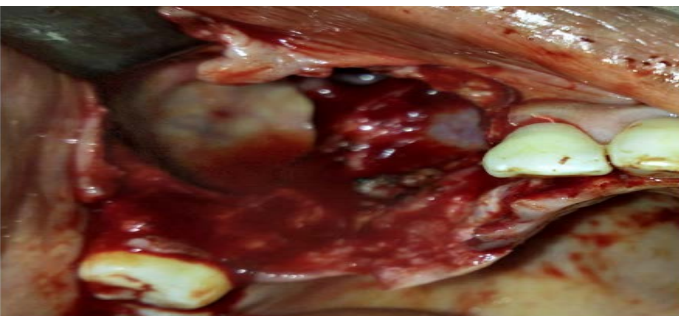


Fig.4 Intra oral view after tumor resection



Fig.4.a Sutures has been placed



Fig.4.b 7 days follow-up

Surgical phase photo credits: Deptment of Oro-Maxillofacial Surgery & Implantology, DIRDS, Faridkot, Punjab.



Fig.4.c Intra-oral examination (6 months follow-up)



Fig.5 Diagnostic impression (Extend of ridge defect not been recorded)



Fig.6.a Assorted assembly for customised pneumatic impression technique



Fig.6.b Pliable perforated tray with inflatable latex balloon glued with cyanoacrylate adhesive

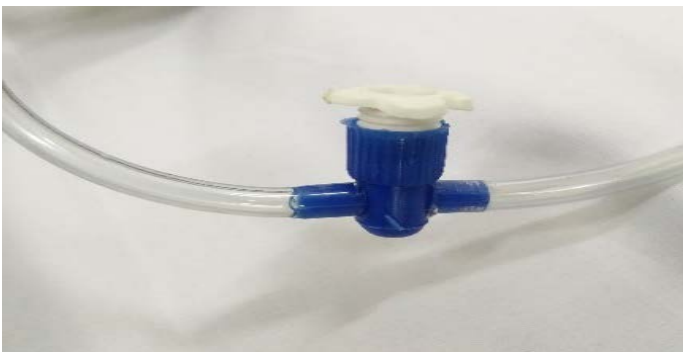


Fig.6.c Manual air valve regulator with silicone tubes attached on both sides



Fig.6.d Manual Hand air pump (with air in-let & out-let)



Fig.6.e Pneumatic impression been made using customised assorted assembly as of Fig.6.a



Fig.6.f Pneumatic impression made using polyvinylsiloxane monophase



Fig.6.g Image showing space (air) between tray and impression material



Fig.6.h Master cast obtained using pneumatic impression technique along with wax pattern and castable plastic bar attachment (CEKA PRECILINE).



Fig. 7.a Castable prefabricated plastic bar attachment with clip(CEKA PRECI-LINE).



Fig.7.b Metal try inn with casted Andrew's Bridge



Fig.7.c Wax mock trial for removable partial denture component



Fig.7.d Andrew's bridge before final cementation



Fig.7.e Finished and polished removable prosthesis with attachments after pickup



Fig.8.a Final Andrew's Bridge prosthesis after cementation.



Fig8.b Intra-oral occlusal view