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# CONTENTS

# Rugae Duplication – Different Techniques Of Customizing Palatal Rugae in Maxillary Complete Denture to Enhance Phonetics

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**ABSTRACT**

**Speech** is imperative for human communication. Therefore, phonetics must be considered , along with mechanics and esthetics as the integral factors in contributing to the success of a dental prothesis . Palatal rugae contours have a very important role in phonetics, by production of linguo-palatal sounds that involves the contact between tongue and palate. By customizing palatal contours of a maxillary denture to the tongue, the patient may easily adapt to the definitive denture contour, which in turn shortens or eliminates the adjustment period for the achievement of proper speech. This review article deals with different methods of palatine rugae duplication in complete denture prosthesis to improve phonetics, besides briefly describing its role in various other fields such as sex determination, orthodontics and forensic odontology.

**KEY WORDS**: Palatine rugae, rugae duplication, phonetics, linguopalatal sounds, forensic odontology.

## INTRODUCTION:

Speech is an integral part of human communication, which makes the human species superior to other life forms. Although every prosthodontist aims at providing excellent complete denture prosthesis in terms of esthetics, functional efficiency and comfort, a thorough evaluation of phonetics is too often neglected with greater emphasis placed on other three components.[1]

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Among the various anatomical landmarks of the oral cavity, Palatine rugae are perhaps one of the least understood or unexplored regions of the oral mucous membrane. Due to this, they have been arbitrarily associated with functions like speech, adaptation, proprioception and taste.[2]

Palatal rugae also called plicae palatinae transversae and rugae palatina, refer to the ridges on the anterior part of the palatal mucosa, each side of the median palatal raphe and behind the incisive papilla. [3,4]Palatine rugae are elevations of the mucous membrane and are very prominent in most of the animals where they help in gripping the food before tearing it with brute force.
Optimal phonetics can best be achieved by obtaining a proper occlusal vertical dimension (OVD) and occlusal plane, correctly positioning the anterior and posterior teeth to suit best the functional and esthetic requirements, as well as adequately contouring the palatal surface. Because the lack of texture on the palatal portion of a complete denture can impede proper articulation, one solution is to add palatal rugae.[1, 5]

**CLASIFICATION OF RUGAE:**

Identification of palatal rugae pattern is based on classification by Thomas *et al*. This classification includes number, length, shape and identification pattern of rugae. By determing the length of all rugae, three categories are identified.[6, 7]

1. Primary rugae (5-10 mm)
2. Secondary rugae (3-5 mm)
3. Fragmentary rugae (less than 3 mm).

The shape of individual rugae are classified into four major types

1. Straight – Runs directly from origin to termination
2. Curvy – Simple crescent shape that was curved gently
3. Circular – Definite, continuous ring formation, diameter from origin to termination is considered
4. Wavy – Serpentile form.

The unification pattern is further subdivided into diverging and converging types.[8,9]

Diverging pattern occurs when two rugae begin from the same origin but diverge transversely.[10,11]

Converging pattern occurs when two rugae arise from different regions and converge transversely.[8,9]

**METHODS OF RUGAE DUPLICATION**:

Characterization of the complete denture is necessary to give the dentures a life like appearance, to make it appear more natural.[12] Palatal rugae can be characterized and incorporated in the maxillary complete denture by different techniques.

**RUGAE DUPLICATION USING PUTTY IMPRESSION TECHNIQUE:**

The primary impression is made in impression compound using stock tray and cast is poured. Putty is adapted over rugae area of maxillary cast to record prominent rugae on the palate.Modelling wax is melted and poured over the putty impression slowly and carefully to record the imprints of rugae over the impression. Before flasking of denture, wax imprint of rugae was placed on maxillary trial denture base, adapted carefully on the palatal portion of the maxillary trial denture base.[13]

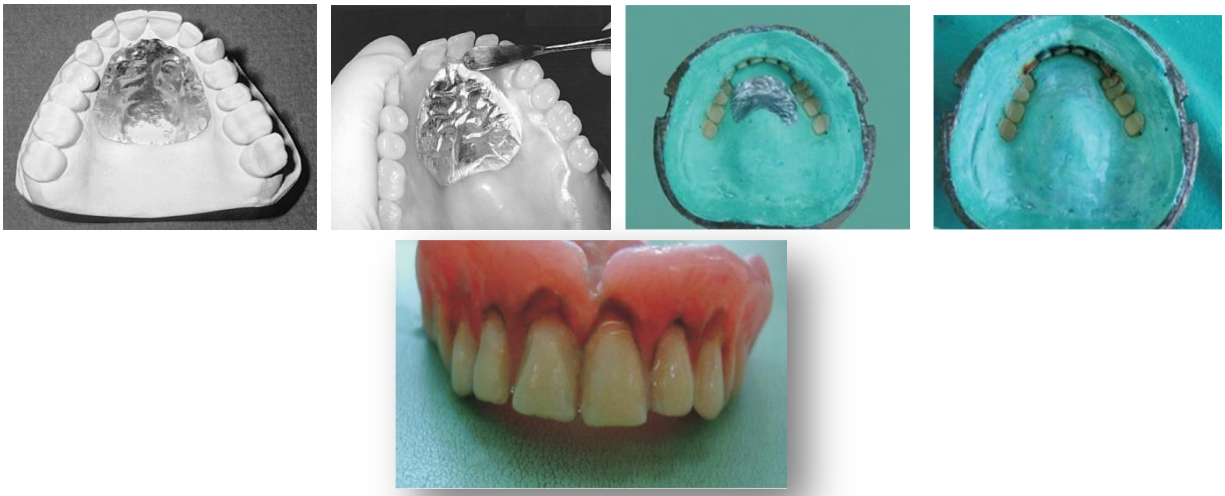
**RUGAE DUPLICATION USING DENTAL FLOSS:**

An ideal protocol for complete denture fabrication was followed till the stage of obtaining the secondary cast.Then,mark the rugae patterns in definitive maxillary cast using permanent marker. Apply auto-polymerizing resin (clear) in sprinkle on method on the rugae portion in the cast. The markings will be seen through the transparent resin in the cast. The thickness of resin added should not exceed 1 mm. Apply auto-polymerizing resin (pink) in sprinkle on method on the rest of cast and fabricate the record base in the usual manner. Proceed with the tentative jaw relation and teeth arrangement. Trial denture verification is done Demount the maxillary cast from articulator. Cut dental floss as per the required lengths and lute them over the rugae marking seen through the record base using inlay casting wax. Proceed with fabrication of denture in conventional manner. The rugae pattern is duplicated in the denture.[14]

**RUGAE DUPLICATION USING TIN FOIL**:

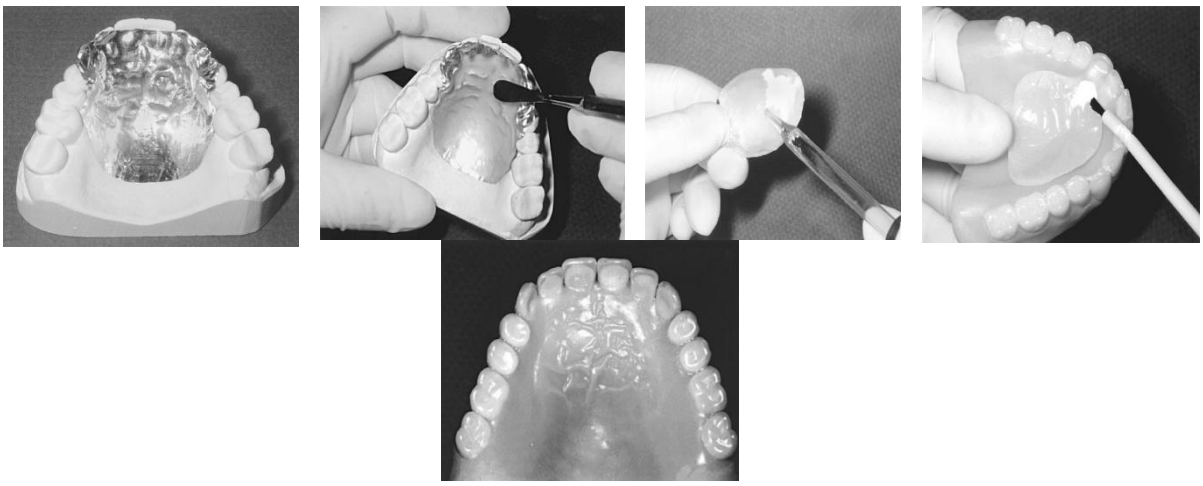
**NEW PROSTHESIS**:

Cut tinfoil (0.001 tinfoil) to the desired shape and adapt it to the rugae area on the master cast with prominent rugae. Tinfoil pattern is removed from the cast and is sealed to the palatal area of the completed wax-up with hot baseplate wax. Then it is flasked, processed, finished,and polished as usual.[15, 16]



**EXISTING PROSTHESIS:**

Adapt tinfoil on the cast with prominent rugae; flow hot baseplate wax over the surface to reinforce the tinfoil. Remove wax reinforced tinfoil from the cast and trim to desired shape.Autopolymerizing acrylic resin is applied on the underside of the tinfoil pattern to fabricate rugae. When cured, remove the tinfoil and secure acrylic rugae to the palatal area of the existing prosthesis with autopolymerizing acrylic resin. Refine, finish, and polish.[15s]



**DISCUSSION:**

The procedure of electroplating to form metal palate that duplicates patients' palate is limited in that it does not apply to dentures made of acrylic resin .[17] Another procedure uses an impression of maxillary cast to make custom acrylic resin pattern to capture patient's anatomy. But this involves making additional impression or duplication of cast. Missing lingual contours of denture teeth should be added during waxing up of trial dentures in this method .[18] Use of palatogram and acrylic resin to modify palatal portion of denture has been done.[19-21]

The production of palatolingual group of sounds involves firm contact of the tip of the tongue against the rugae. When these rugae and the hard palate are covered by the denture, proprioceptive feedback may be changed. Therefore phonetics may be affected by the presence of denture. Copying of the rugae on the palatal surface of the denture reduces this problem.'[22,23]

Accurate approximation of palatal contours of a maxillary complete denture to patient's tongue can improve intelligibility, if other factors such as tooth position, occlusal plane and vertical dimension are satisfactory.[24]A method for functionally modifying the contour of the palatal vault of maxillary complete denture can be achieved at the trail stage of denture construction and incorporated in the finished denture. [25]

Artificial duplication can be done using corrugated metal plates, plastic palate forms, free hand wax carving of anatomical palate forms etc. These artificial rugae may cause interference with speech if they are made too prominent.[22]

The use of ribbed features, when made from a significantly stiffer material and designed to mimic palatal rugae, offer an acceptable method of providing significant improvement in speech as well as rigidity to the maxillary denture.[22]

Besides phonetics the authors believe that they may play important role in biological adaptation of the tongue to the denture and important contributor in taste perception. Palatine rugae when duplicated on the denture improved patient's ability to identify flavors especially sour foods. Both responsetimes as well as qualities of perception of sour taste improved with denture that was characterized with Palatine rugae. Understanding the perception of sour taste has received less attention than sweetness and bitterness, particularly for mammals. [16] Multiple mechanisms have been proposed to explain how hydrogen ions interact with taste receptor cells to cause a response.[22,23] Although it has been widely accepted that the hydrogen ion is the chemical entity responsible for the

sour taste, many physiological studies have indicated the involvement of protonated organic acids as a stimulus for sour taste as well. Irrespective of the mechanism for the sour taste of tongue, the patient was able to perceive the sour taste soon as well as better. The denture
with palatine rugae provides an irregular surface against which the tongue is locked appropriately than with the flat surface. Once the tongue is locked in place a negative pressure is developed by it so that the flavor from the foodstuff is sucked. This is especially true for the sour taste. Another
reason for better perception would be that when the tongue touches irregular surface of the palatine rugae, the elevations and depressions on the denture open up the microvilli by stretching them away from each other. This allows the hydrogen ion from food to come in contact with the taste receptor cells that are oriented perpendicular to the surface in a parallel arrangement.[2]

## CONCLUSION:

Phonetics is one of the important factors in complete denture construction. However, this factor is neglected because of the adaptability of patients**.** It is true that most patients can learn to produce satisfactory speech in spite of an unsatisfactory denture. The need to consider phonetics is not recognized in most instances until a patient complains of inability to produce certain sounds with the dentures. Completely edentulous individuals using dental prosthesis tend to mispronounce certain sounds, pronunciation of which depends upon the rugae pattern and also the palatal contour. Thus, prosthodontists need to create the customized rugae and palatal contours in complete dentures with care for achieving speech which is much more normal and also eliminate the waiting and training period after denture insertion. To aid the dentist in minimizing these speech problems, the importance of phonetics in dental prosthesis has been discussed.

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# Rehabilitation Of A Patient With An Interim Haryngeal Obturator : A Case Report

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**ABSTRACT**:

An interim prosthesis is used to rehabilitate a patient with partial or total soft palate defect generally as soon as possible after surgery. This article describes a stage by stage technique of fabrication an interim pharyngeal obturator with a speech bulb for a patient with a partial soft palate defect.

**INTRODUCTION**:

Cancers of the mouth, tongue, oropharynx, nasopharynx and larynx comprise approximately 5% of all cancers.[1-3] Most treatment methods to eliminate the cancers would involve surgical resection and concomitant radiation resulting in incapacitating defects compromising the integrity and function of the oral cavity requiring immediate short or long term management and rehabilitation procedures. While restoration of the defect is fairly straightforward in case of the hard palate, it becomes more complicated and challenging when involving the soft palate. Among soft palate defects the complete soft palate defect is easier to trace and obturate than compared with a soft palate that has been partially resected and is dysfunctional.[4] A partial soft palate defect may result from the surgical resection of the posterior border from the medial or lateral posterior portion of the soft palate.[5] Median posterior border defects occur after the resection from the uvula and posterior soft palate. In contrast, lateral defects occur when the anterior tonsillar pillar and retromolar trigone are resected.

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Rehabilitation of such patients may be accomplished surgically or prosthetically. Surgical reconstruction includes microvascular flap techniques using vascularized or nonvascularized soft tissue flaps.[4] However in many instances, these flaps may unsuccessfully obturate the nasopharyngeal port, and patients may then be referred to the maxillofacial prosthodontist for evaluation and treatment. The presence of the flap may complicate the successful prosthetic obturation of these surgically reconstructed defects.

This article describes a stage by stage rehabilitation of an acquired lateral soft palate defect with an interim pharyngeal obturator and a speech bulb. This prosthesis made the rehabilitation comfortable and served as a transitional and training denture prior to insertion of the more definitive prosthesis. The prosthesis helped to alleviate speech problems, and assisted in the masticatory function. The speech bulb was easy to insert and remove for the patient. It was also easy to fabricate and adjust to the denture base.

## .CLINICAL REPORT:

A 29-year-old man diagnosed with adenoid cystic carcinoma of the minor palatal salivary glands had undergone a partial maxillectomy and excision of the soft palate (Fig.1) and was referred to the Department of Prosthodontics, Manipal College of Dental Sciences, Mangalore, India. Immediate surgical reconstruction was not recommended due to the need for further treatment with radiation therapy. The patient received postoperative external beam radiation therapy by anterior direct beam on a telecobalt machine with a total dose of 60 Gy in 30 fractions over a period of 6 weeks. The patient tolerated the radiation well and was subsequently referred for possible prosthetic restoration of the oral defect after radiation therapy. On examination of the defect, laterally resected and dysfunctional soft palate along with partial maxillectomy on the right side was noted. Various modalities of prosthetic reconstruction were discussed with the patient and the patient indicated a

desire for an economical solution. Hence, heat-polymerizing interim acrylic resin prosthesis was planned, and the expectations of this prosthesis were explained to the patient.

To improve patient adaptation, the speech-aid device was constructed stage by stage. In the first stage, the impression of the defect was obtained with irreversible hydrocolloid (Imprint; Dental Products of India Ltd). The impression was removed and poured in Type III dental stone (Dentstone; Pankaj Industries, Mumbai Maharashtra, India). Undercuts were blocked in Type II dental stone (Fig. 2). Maxillomandibular jaw relations were obtained and prosthesis was waxed to form. A heat polymerized clasp retained acrylic-resin maxillary prosthesis was delivered to the patient (Fig. 3). After 3 weeks an acrylic-resin extension was added to the posterior border of this prosthesis. This was extended posteriorly to the intact residual soft palate and parallel to the soft tissue in the nasopharynx, approximately 3 to 4 mm short of the adjacent tissues at the maximum level of contraction. Some pressure was exerted to slightly elevate the remaining soft palate to compensate for the thickness of the material and not to encroach on the tongue space. The contours of the defect and velopharyngeal musculature were functionally recorded with modeling compound to form the speech bulb. The bulb was placed within the nasopharynx at the plane of velopharyngeal (VP) closure. The patient was instructed in repeated swallowing so that the bulb was grossly molded but still underextended. The bulb was designed to be slightly superior to the level of the VP closure and to approximate the pharyngeal walls, so as to allow competent VP valving during speech but leave free nasal breathing and production of nasalized speech sounds. The denture base with the extension was chilled in cold water and preparations were made for conversion of the bulb into acrylic resin. Type II stone was placed around the obturator impression to include the intaglio side of the denture base (Fig 4). The impression material was replaced with heat-polymerizing acrylic resin (Fig 5). The patient was instructed to wear the prosthesis at all times during the day, including at meals, and to remove it at night. The adaptation of the patient to the prosthesis was prompt and good, although he reported impeded breathing during strenuous activities.

The patient was scheduled for the first post-insertion adjustment 3 days after the insertion. At the first post-insertion appointment the surgical wound was observed to ensure health of the tissues, to relieve the prosthesis for pressure areas on the tissues, to compensate for processing changes, and to emphasize hygiene and home care. The patient was placed on a 3-month recall for evaluation and observation of any recurrence.

## SUMMARY

This clinical report describes a multistep procedure for prosthetic rehabilitation of a soft palate defect with an interim pharyngeal obturator and speech bulb. The advantages of this prosthesis are that the technique is noninvasive, cost-effective, tissue tolerant, comfortable to use, and easy to fabricate and clean. The prosthesis coupled with the patient's compensatory phenomenon improved the quality of life and provided appropriate and effective nasopharyngeal obturation

## FIGURES:

Fig 1: Preoperative view of the defect


Fig 2: Blocked out cast

Fig 3 : Clasp retained acrylic removable

Fig 4: Cast with stone placed around the obturator impression

Fig 5: Prosthesis in situ

Fig 6: Postoperative view in occusion

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# Prosthetic Rehabilitation of a Patient with Atrophic Ridges: A Clinical Report

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**ABSTRACT**

Extreme resorption of the maxillary and mandibular denture-bearing area may lead to problems with prosthetic rehabilitation. As resorption progresses there is a resultant narrow, more constricted upper residual ridge opposed by a wider lower residual ridge, decreased supporting tissues, that results in a large restorative space between the opposing residual ridges.

This clinical report describes a method for prostheticrehabilitation of a completely edentulous patient with hollow maxillary denture and a conventional mandibular denture, contours of which are in harmony with the neutral zone.

## INTRODUCTION:

India has a large geriatric population of 77 million comprising 7.7% of its total population. In a community based study[1] planned to assess the level of edentulousness, denture need and denture wear, it was found that although level of edentulousness was high, there was a low level of denture wearing.Among the many factors elucidated for poor denture wear, one contributory factor may be the extremeresorption of the edentulous ridges, resulting in dentures functioning as oral acrobatics.Nevertheless, treatment options for prosthodontic rehabilitation of completely edentulous patients include conventional complete dentures and implant supported fixed orremovable prosthesis.

Complete dentures are mechanical devices that must function in harmony with the surrounding orofacial musculature. In addition, they must fulfillthe basic objectives of Prosthodontics including retention, stability, support, aesthetics and preservation of remaining tissues. However, extreme resorption of the maxillaryand mandibular denture-bearing area may lead to problems with prosthetic rehabilitation. As resorption progresses there is a resultant narrow, more constricted upper residual ridge opposed by a wider lower residual ridge, decreased supporting tissues, that results in a large restorative space between the opposing residualridges. This may result in heavy complete dentures that may compound to the poor denture-bearing ability of the tissues and lead to decreased retention and resistance.

The extensive volume of the denture base material in prostheses provided to patients with severe residual ridge resorption necessitates making the denture base hollow to reduce the prosthesis weight. There are numerous references in the literature that propagate the merits of dentures constructed in harmony with the neuromuscular function as well as describe various materials and methods for fabrication of hollow prostheses.[2-18]Although controversial,[19] it has been suggested that gravity and the addition of weight to the mandibular complete denture may aid in prosthesis retention.[20,21]In addition,the coordination of complete dentures with the neuromuscular function and arrangement of teeth in the neutral zone is highly effective in an atrophic mandible [2]andis the foundation of a successful, stable denture.

Previously described techniques for weight reduction include using a solid 3-dimensional spacer, including dental stone,[3-13]cellophane wrapped asbestos,[14]silicone putty,[15,16]or modelling clay[17,18]during laboratory processing to exclude denture base material from the planned hollow cavity of the prosthesis.

Mahdy[3] also presented a double flask technique that allows forthe complete fabrication of the obturator from the waxtry-in stage to completion of the prosthesis.The primary disadvantage of such techniques is that the long junction between the two previously polymerized portions of the denture that is luted with autopolymerising resinis apotential site for leakage and discolouration. The need for a lightweight, hollow maxillary denture and stable mandibular denture fabricated from a strong, durable material is quite evident.

This clinical report describes a method for prostheticrehabilitation of a completely edentulous patient with hollow maxillary denture and a conventional mandibular denture, contours of which are in harmony with the neutral zone.

**CLINICAL REPORT:**

A 69-year-old man, completely edentulous male patient (Fig. 1 & 2) with a history of denture wear for the past 10years was referred to the Departmentof Prosthodontics, of this Institution for prosthetic rehabilitation of severely resorbed ridges. Past medical history was noncontributory. Dental history revealed unstable and loose maxillary and mandibular dentures. Intraoral examination revealed severely resorbed ridges with increased interridge space (Fig.3).Variousmodalities of prosthetic reconstruction were discussedwith the patient and the patient indicated a desire for aneconomical solution. Hence, a heat-polymerized hollow maxillary denture and a weighted mandibular denture with prosthetic teeth arranged in the neutral zone was planned, and the expectations of this prosthesis were explained to the patient.

The traditional sequence of denture construction was followed till the definitive impressions were made and the master casts were constructed and indexed in the land area.Maxillary occlusal rim was constructed with modelling wax (Hindustan Modelling wax; Hindustan dental products, Hyderabad, India) The lower wax rim was constructed on a stabilized record base with low fusing compound(Pinnacle; Dental Products of India Ltd, Mumbai, India) softened at 135°F and shaped similar to a wax occlusal rim. The tray and modelling compound was placed in the mouth and the patient was instructed to swallow and purse the lips. The modelling compound was hardened in the mouth sufficiently to prevent distortion.Jaw relations were recorded and the casts were mounted on a mean value articulator(Fig. 4).The modelling compound was lubricated and encased in a templateof vinyl polysiloxane putty (Reprosil; Dentsply Caulk, Milford, Del) which serves as an index for future teeth arrangement(Fig.5).The low fusing compound was replaced with modelling wax, within the confines of the prepared index. Prosthetic teeth arrangement (Premadent; Super Dental Products, Delhi, India) was done and the denturesware fabricated in the conventional manner till the verification appointment.The mandibular denture was then processed in the conventional manner as per the manufacturer's instructions. Two identical flasks were used to fabricate a hollow maxillary denture on lines of a described article. [13.] For this the trial denture was processed in the standard manner through the wax elimination stage. Two layers of baseplate wax was thenadapted (Supernal; S.D Dental Corporation, Lucknow, India) to the definitive cast in the drag, conforming to the border extensions (Fig.6, A). A second identical flask was used to invest the baseplate wax and again the wax elimination process was completed. The cope and second drag was packed with heat-polymerized acrylic resin (DPI-heat cure; Dental Products of India Ltd).Similarly a minimal thickness of acrylic resin was processed around the teeth using a different cope(Fig.6, B). The original cope was seated on the original drag and complete closure of the flask was ascertained (Fig. 6, C). A thin feather edge margin was created along the visible junction to minimize the thickness of the autopolymerising

resin.The visiblejunction between the two previously polymerized portions was luted with autopolymerising acrylic resin (DPI-RR; Dental Products of India Ltd).The whole prosthesis was recovered and the palatal surface was luted in a similar manner. The entire junction was waxed and reprocessed so that the seam that seals the two sections is completely covered with heat-processed acrylic resin minimizing the stain and leakage around the area of the seam and increasing the durability and longevity of the prosthesis.The dentures were deflasked, equilibrated and a hollow maxillary denture and weighted mandibular denture was delivered to the patient (Fig. 7& Fig.8).The patientwas instructed on home care and prosthesis maintenance

**SUMMARY:**

This clinical reportdescribes a method for prosthetic rehabilitation of a completely edentulous patientwith resorbed ridges and excessiveinterarchspacewith a hollow maxillary denture and a weighted mandibulardenture, contours of which are in harmony with the neutral zone.Controlling the thickness of the hollowportion without the use of any three dimensional spacer, and eliminating leakage and discoloration are severaladvantages of this technique. An additional laboratory step is however required for the final culmination of the prosthesis.

**FIGURES:**

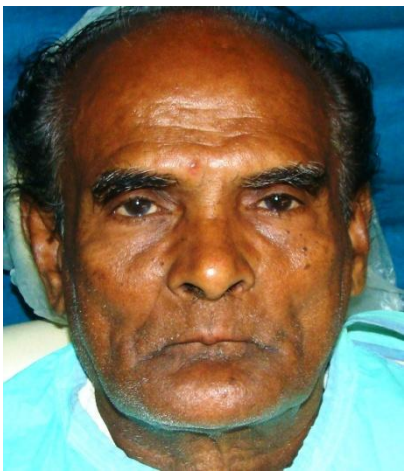

Fig. 1: Preoperative view of patient.

Fig.2: Profile of the patient.

Fig. 3: Intraoral view.

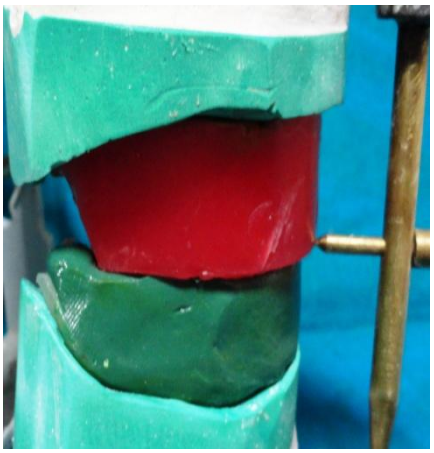

Fig. 4: Maxillomandibular jaw relations recorded

Fig. 5: Putty index for the neutral zone.

Fig.6 A: Adaptation of baseplate wax to the definitive cast.

Fig. 6 B: Acrylic resin processed around denture teeth.

Fig. 6 C: Denture processing using three identical sections of two denture flasks.

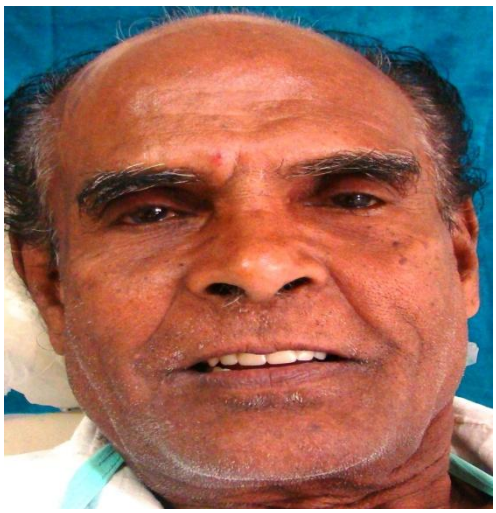

Fig. 7: Post-operative view of the patient.

Fig.8: Hollow maxillary denture and weighted mandibular denture

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# Prosthodontic Management of Marginal Hemimandibulectomy With Surgically Induced Lip Drop

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**ABSTRACT**

Loss of continuity of the mandible destroys the balance and symmetry of mandibular function, leading to altered mandibular movements and deviation of the residual fragment towards the resected side. The rehabilitation of these cases must be carefully planned and the treatment requires a denture construction in such a way to get maximum retention, support, stability, esthetics and function. This case report describes the treatment of a patient with partially resected edentulous mandible, combining functional and esthetic requirements. A removable prosthetic appliance was fabricated to maintain the lip in its normal position, thereby helping the patient to perform normal functions. All basic principles of rehabilitation are applied and interpretation was based on altered anatomic and functional situation. An esthetic configuration with ideal function was achieved and the occlusion showed a satisfactory stability.

**KEYWORDS:** Hemimandibulectomy, maxillofacial rehabilitation, esthetics

**INTRODUCTION:**

One of the most challenging and demanding maxillofacial endeavours is the construction of functional, complete dentures for the edentulous patient who has undergone a mandibular resection. Loss of continuity of the mandible destroys the balance of the mandibular movement and function, leading to altered mandibular movement and deviation of the residual fragment towards the surgical side. The greater the loss of tissues, greater will be the deviation of the mandible to the resected side, thus compromising the prognosis of the prosthetic rehabilitation to a greater extent.

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Apart from deviation, other dysfunctions in such patients are observed in swallowing, speech, control of saliva, mandibular movements, mastication, respiration and psychic functioning[1].

Based on the nature of resection, Cantor and Curtis (1971) devised a prosthetic classification that is as follows[2].

Class I: Radical alveolectomy with preservation of mandibular continuity.

Class II: Lateral resection of the mandible distal to the cuspid

Class III: Lateral resection of the mandible and maxilla.

Class IV: Lateral bone graft surgical reconstruction

Class V: Anterior bone graft surgical reconstruction

Class VI: Resection of the anterior portion of the mandible without reconstructive surgery to unite the lateral fragments.

In cases with class II, III, IV, V guide flange prosthesis would be a treatment modality. One of the basic objectives in rehabilitation is to retrain the muscles for mandibular denture control and repeated occlusal approximation.

This article highlights prosthetic rehabilitation of a class I hemimandibulectomy patient for whom a mandibular prosthesis is fabricated with loop on corner of mouth for lip support.

**CASE REPORT:**

A 74 year-old, completely edentulous, female patient was referred to the Department of Prosthodontics after extraction of remaining natural teeth which were periodontally compromised for maxillofacial rehabilitation with a chief complaint of difficulty in eating and speaking. Her medical history revealed that she was diagnosed for squamous cell carcinoma on the right side of the mandible, for which she had undergone marginal resection of mandible on right side 3 years back. The patient's history indicated that she had a tobacco-chewing habit since 40 years .An extra oral examination revealed asymmetrical face, and a convex profile. There was a deviation of the mouth to the right side that is toward resected side.

On intraoral examination it was found that the maxillary and mandibular arches were completely edentulous. On palpation the mandibular ridge was present till first premolar region. On evaluation of pre extraction diagnostic ortho-pantamogram, segmental absence of the mandible distal to the first premolar to the last molar on the same side was noted. This particular case represents to class I Cantor and Curtis classification.

**CLINICAL PROCEDURE:**

Preliminary impressions were made with irreversible hydrocolloid material (Zelgan Plus, Dentsply, Gurgaon, India) using stock trays. Casts were prepared (Fig. 1) and self-cure clear acrylic resin (RR, Dentsply, India) custom trays were constructed. The tray was border-molded with modeling plastic (DPI Tracing stick, Dental products of India, Mumbai, India), taking care to avoid overextension. Final impressions were made with light-body vinyl polysiloxane (Aquasil,Dentsply/ Caulk, Milford, DE). While in case of mandibular final impression tray handle was extended with autopolymerizing resin and a cylindrical mandibular rest is fabricated in the posterior region with an increased vertical height. Then softened impression compound was placed on the top of the mandibular rests and inserted in the patient's mouth. Patient was advised to close her mouth, so that the mandibular rest fit against the maxillary alveolar ridge.

This was done to stabilize the tray in position by preventing anterioposterior and mediolateral displacement of the tray during final impression, and which was made using the light body material and the patient was asked to close the mouth such that cylindrical rest will fit over maxillary ridge. For recording the functional state, patient was instructed to run his tongue along her lips, suck in her cheeks, pull in her lips, and swallow by keeping her mouth closed till the impression material hardened

Master casts were poured with Type III dental stone (DPI, Mumbai, India). Stabilized record bases were made with self-cure acrylic (DPI, Mumbai, India) using the sprinkle-on technique. Wax rims were adjusted until a tentative occlusal vertical dimension was established. Face bow transfer was made to orient the maxillary cast to the semi-adjustable articulator (Artexsemiadjustable articulator, rotofix face bow). Maxillomandibular relations were recorded with wax interocclusal records. The patient tactile sense and sense of comfort was used to assess the vertical dimension of occlusion. The patient was asked to move her mandible as far possible to the untreated side and then, gently close her jaw into position to record a functional maxillomandibular relationship.

The teeth were arranged in the usual manner, semi-anatomic posterior teeth (Acryrock, Pyrax polymers, Roorkee, India) were used. Maxillary and mandibular teeth were arranged to achieve balanced occlusion. Occlusal table on resected side was up to the second premolar, just to establish the cross arch stability and balance in the right lateral excursive movements. A wax set-up was tried in the mouth and was checked for esthetics, phonetics, occlusal vertical dimension and balanced occlusion. The basic objective is to achieve an occlusal scheme which will have a multiplicity of occlusal contacts in centric position. Long centric concept and to a slightly decreased vertical

dimension of occlusion in an attempt to decrease occlusal force is given. The level of the occlusal plane, especially in edentulous patients, should be acceptable to the remaining portion of the tongue to permit easier distribution and control of food on the occlusal table and control of complete denture prosthesis[3]. A posterior palatal seal was recorded and the dentures were waxed, processed (DPI RR heat cure, DPI, India) and remounted and the occlusion was refined. Freedom of movement and lack of cuspalintercuspation was checked before denture insertion. The dentures were evaluated intraorally and the mandible was manipulated to the static centric position area[4]. Any interference in normal movements was corrected. During insertion to improve the tissue contact situation, resilient liner (Ufigel;VOCO, gmbh ) was used to reline the mandibular denture by keeping the mandible into the maximum intercuspation position. The sealer was applied once over the polymerized surface of the resilient liner, which prevents water sorption by the liner and helps in maintaining the softness for a longer period of time. The dentures were removed, repolished and then reinserted.

The prosthesis design is composed of snapfit buttons (Fig. 2) which includes male and female component in which male component is attached to lower mandibular denture in premolar region and female component in removable segment (Fig. 3) to which stainless steel wire is attached, curving out at the anterior end to form a loop supporting the lip extraorally. The removable component of prosthesis was fabricated with self-cure acrylic resin and it was designed such that patient can easily remove the removal component during mastication.

Addition of a 21-gauge stainless steel wire in the form of a J-shaped buccal loop to engage the corner of the mouth of the unaffected side in order to pull the corner of the mouth and achieve an esthetically pleasing appearance. The wire loop was embedded in the acrylic of the buccal flange of the removal segment of the denture[5] (Fig. 4). It was adjusted to ensure that its position provided circumoral symmetry and esthetics without compromising comfort and simulated functional jaw movements. The extraoral wire components were relined with permanent tissue conditioner to reduce the shine so as to blend with the skin. Follow-up appointments were carried out routinely to ensure patient comfort and satisfaction. No discomfort or any problems in mouth opening or mastication were noted resulting from the J-shaped loop, and the patient was quite happy with the prosthesis.

The patient was instructed to chew only on the non-resected side, to avoid denture instability. It may be necessary to accept an occlusion that is not bilaterally balanced in eccentric occluding positions for an edentulous resected maxilla or mandible. The patient was given routine post insertion instructions and was motivated to make efforts to learn to adapt to the new dentures. Simple exercises were suggested to the patient such as repeated opening and closing of mandible. This helped the patient learn to manipulate the lower prosthesis into the proper position. Initially, retention of the

dentures, especially of the lower one was a problem but this improved with constant use. Within a week, the patient expressed satisfaction in mastication, phonetics and esthetics and drastic improvement is seen from initial stages of prosthesis planning (Fig. 5) and after the fit and insertion of the final prosthesis (Fig. 6).

**DISCUSSION:**

The prosthetic rehabilitation of a hemimandibulectomy subject is a difficult task for a prosthodontist as the normal physiological functions like swallowing, speech, mandibular movements, mastication, control of saliva and respiration are adversely affected by radical mandibular surgery. These dysfunctions radically alter the prosthetic prognosis. Surgical reconstruction by implants and grafts of various types is the ideal treatment when feasible.

In the present case the OPG (Fig.7) and intra oral pictures (Fig.8) revealed the absence of mandibular segment. As the surgical reconstruction is not always feasible in every patient, prosthodontic approach has to be considered to restore the esthetic and function in such subject. Because of the loss of the normal anatomy and physiology of the oral cavity many principles of complete denture prosthesis must be compromised. Since the mandibulectomypatients have reduced masticatory strength and little soft and hard tissue support, it is important to record and utilize as broad denture base as possible within the physiological limits.

Closed-mouth impression techniques have been suggested but these were designed for making accurate static impressions[6]. The column trays described in this article are similar in form, but they are used to record the muscular dynamics of the postsurgical lower denture space. The reasons for increasing the height of the lateral columns of the custom trays are as follows:-

1. To reduce the amount of force exerted by the remaining muscles of mastication.

2. To make swallowing more difficult.

This type of “stress swallowing” will cause extreme muscular activity of the residual tongue and floor of the mouth. An impression of this functional activity should help prevent future denture displacement. In the final denture form, the tissue conditioner placed on the dentures when they are first inserted provides comfort during the adjustment period, corrects any tissue surface discrepancies resulting from the impression material, and refines the final denture form during function.

Lott and Levin stated that retention will increase in proportion to an increase in the area covered by the denture. Boucher states that the amount of biting force tolerated by a denture is proportional to the size of the tissue-bearing area. Since hemimandibulectomy patients have markedly

reduced masticatory strength and little soft and hard-tissue support, it is important to record and utilize as broad denture base as is possible. The use of a tissue-conditioning agent facilitates the extension of a functional denture form to the maximum size tolerated by the oral tissues. This form should enhance the patient's ability to manipulate the prosthesis and to realize maximal masticatory potential[2].

Facial symmetry could be improved with the use of removable prostheses. Esthetics has to be compromised, however, because labial commissural sag is necessary if a functional seal is to be maintained between the lips. Without this seal, drinking and speaking appear to be much more difficult[7]. In this particular case, an effort was made to restore the patient's appearance and comfort by repositioning and supporting the lip in a natural position with the described prosthesis. Since the J-hook was lined with permanent tissue conditioner which does not cause any irritation and it has to be changed every 6 month, patient has to wear for full time except during mastication of hard food.

**CONCLUSION:**

The described technique offers an inexpensive, simple, and expedient approach to manage the hemimandibulectomy patient. The availability of well-formed edentulous ridges and an excellent peripheral seal permitted excellent retention and stability of the dentures, and the presence of the loop to support oral commisure. The philosophical approach to the treatment and rehabilitation of edentulous patients with resected mandibles is not in concentrating on what has been sacrificed in the eradication of the disease, but rather in taking full advantage of the remaining structures.

**FIGURES:**

Figure 1: Maxillary and mandibular diagnostic cast

Figure 2: Snapfit button include male and female component

Figure 3: Male component in the mandibular denture and female component in the removable segment

Figure 4: Prosthetic design with extroral loop

Figure 5: Preoperative photograph

Figure 6: Postoperative photograph

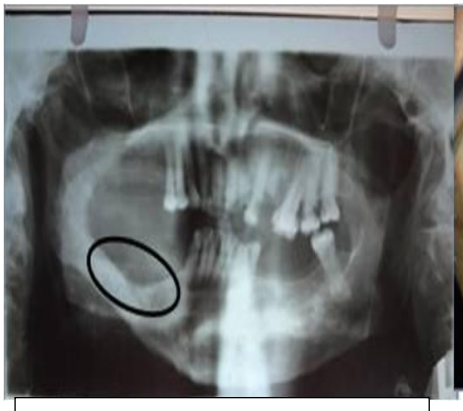

Figure 7: Pre extraction diagnostic OPG

Figure 8: Intra oral view

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# Short Dental Implants – A Review Of Clinical Performance, Biomechanical Aspects And Risk Factors For Survival

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## INTRODUCTION

Implant supported prosthesis are gradually becoming the norm for restoration of missing teeth.[1] The posterior edentulous arches are a biologically and mechanically challenging area for rehabilitation with implant supported prostheses. These regions have unfavourable bone quality and lesser bone volume as compared to anterior edentulous sites compelling the operator to place shorter implants. The poor bone quality limits the number of implants placed thus increasing bending forces on individual implants. Furthermore, occluding force increases the closer the teeth are placed to the temporomandibular joint.[2]

The obsolete protocol of placing the longest possible implant within anatomical limitations has lead authors to employ procedures like distraction osteogenesis, bone grafting, guided bone regeneration, sinus floor elevation and mandibular nerve repositioning to gain adequate residual ridge height at these sites. These techniques have a variable degree of success and require considerable dexterity and skill from the operator. Short dental implants open up an exciting portal out of complicated surgical procedures involved in implant site preparation in posterior atrophic arches.

Short Dental implants (SDI) are a more cost-effective alternative that reduces treatment time and rules out complications related to surgical and grafting procedures. Authors in their studies have quoted different lengths, however considering 10mm as the standard length; an implant less than 10mm in length is considered a Short Dental Implant and is usually applied in alveolar ridges with decreased bone height[3]

The biomechanical rationale in support of SDIs is that loading bearing forces are concentrated on the crestal portion of the implant and an increase of implant length from 7 to 10mm does not significantly improve its anchorage. [4] Instead with an increase of every 1mm in the implant diameter, the functional surface area increases by 30-200% thus improving the load dissipation ability of the implant.[5] Recent Finite Element Analyses has demonstrated that implant length had no effect on stress concentration on crestal bone around an implant, hence a SDI may be a sound choice.[6]

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Friberg and Jemt [2,7] were among the early authors to note high failure rates in both arches with short fixtures (7mm). Early failure rate was pronounced in resorbed arches with poor bone quality. However, the implants used in this study were of narrow diameter and had a smooth machined surface. SDIs are designed to provide an increased Bone-to-implant contact by virtue of an increased diameter. Newer SDIs overcome such limitations by incorporation of surface modifications like acid-etching that increase the surface area for osseointegration.

This article is a review of the many aspects of risk factors for success and performance of SDIs under various clinical scenarios.

## RISK FACTORS

The risk factors for failure of SDIs may be broadly divided into endogenous (systemic or local) and exogenous (operator or biomaterial-related) factors.[8]

### Endogenous factors-

### SMOKING

Mezzomo et al[9] in a meta-analysis on success rate of single crowns found a higher failure percentage in studies wherein smokers were included as compared to studies that excluded them. Strietzel & Reichert found a significant association between heavy smoking (>10 cigarettes/day) and frequency of implant loss.[10]

### SYSTEMIC DISEASES

Most studies exclude pregnant women, immunocompromised patients and those under medication from their sample size. This impairs the assessment of implant survival in such patients. For single crowns supported by SDIs no statistically significant difference was found in the failure percentage in systemically compromised patients.[9]

### BRUXISM

Twail et al.[11] found more incidences of prosthetic failures like veneer fractures and screw loosening in bruxer groups, however no statistically significant difference was found on inter group comparison between buxer, non-bruxer and occasional bruxer groups.

### PERIODONTAL DISEASE

The biological failure proportion of studies that included periodontal patients did not show a statistically significant upward trend as compared to studies that did not include periodontal patients. Marginal bone loss in periodontal groups however, was found to be significantly higher. Perimplantitis and persistent periodontal disease are major risk factors for the loss of integration of SDIs.[9]

### BONE QUALITY

Studies have failed to find an association between high failure rates and low quality bone.[10,12,18] On the other hand, higher failure rates were associated with machines surface implants as compared to rough surface implants in poor quality bone.[11] The density of the bone directly correlates to the strength of the bone, with less density demonstrating strength reduction of 50 -80% compared

to high density bone types.[13] Weng et al.[14] noted a 25% failure rate of SDI (machined surface) supported prostheses in the posterior maxilla, failures occurring within 18 months of loading. Hence rougher surfaces for implants are preferred in poor bone quality. Finite element analysis has found that maximum Von-Mises stress variability was minimal when the diameter of SDIs was within 5.5 and 7.1mm. Peak stress on the implant-bone interface is seen to increase with reduction in bone density.[3] Osteopenic bone has thin cortices and reduced spongiosa hence needs larger diameters for optimal load bearing capacity. Implant diameter in excess of 4mm and length more than 9mm are optimal properties for screwed implants in type IV bone[15]

## OPERATOR RELATED RISK FACTORS

Operator related risk factors include the surgical technique, prosthetic design and loading protocol undertaken in the placement of the implant.

## SURGICAL TECHNIQUE

Misch et al[16] proposed employing a one stage approach in D2 bone by adding a permucosal extension at the time of surgery and a two-stage approach in D4 bone. While, a two-stage implant placement approach has been suggested by some authors[17], no significant difference has been found in failure rates between single-stage and two-stage implants. Also, in fully edentulous patients two-stage implants are preferred.[4,9,18] Esposito et al [19] concluded that a submerged approach may be preferable in implants that do not achieve optimal primary stability and in completely edentulous cases.

## CROWN/IMPLANT RATIO

The crown height is a vertical cantilever and when increased from 10 to 20mm, the force on the implant is increased by 100%. An angled prosthetic load is also a force magnifier on the implant. Hence, detrimental effects of non-axial forces on crestal bone increase with increase in crown height.[16] A high crown- to- implant ratio was assumed to have a negative biological effect on crestal bone loss.[20] Peri-implant bone resorption is similar in all implant-to-crown ratio groups, even when increased by 2 to 3 times, provided non axial forces were controlled.[11] Rossi, Tawil, Mertens and Deporter et al. claimed that increased C/I ratio placed no deterimental effects on the health of the implant.[11,20,21,22] Nedir and Birdi et al.[23,24] evaluated crown-implant ratios ranging from 1.05 to 1.80 and 0.9 to 3.2 respectively to find no detrimental effects on surrounding bone. Current research has rejected crown-implant ratio as a major biomechanical risk factor as long as occlusal contacts are placed as close as possible to the long axis of the implant and favourable force orientation and load distribution is maintained.[11]

Crown height space on the other hand, is a more reliable indicator of detrimental effects on marginal bone when crown height spaces exceed 15-mm length.[25] For each additional millimeter of crown height, stress concentration at the implant neck may increase by 20%.[26] Hof et al [27] observed greater bone loss in the anterior maxilla with increased crown-to-implant ratio than the posterior areas. This may be possibly explained by off-axis loading at the implant-bone interface.

## PLATFORM SWITCHING

Platform switching shifts the stress concentration zone from the crest bone-implant interface to the axis of the implant, thus reducing stress levels at the cervical bone area.[28] Telleman et al.[29] from the results of a randomized control trial found that 1 year post loading inter proximal bone levels were better maintained at implants restored according to the platform switching concept.

## IMPLANT NUMBER AND SPLINTING

Factors contributing to marginal bone loss around dental implants include surgical trauma, faulty implant positioning, occlusal overloading or non-axial loading.[30-32] Stress level in bone around splinted implants is found to be lower than bone around unsplinted implants by a factor of 9.[33] A positive influence of splinting and number of splinted implants has been observed on success rate of SDIs in atrophic posterior arches up to a 10 year follow up period.[16,20,27,34,35] Placement of additional implants increases the effective surface area for stress distribution. Hence, one implant for each missing premolar and two for each missing molar were suggested.[16] To further capitalize on functional area, these must be splinted.

## WIDTH OF OCCLUSAL TABLE AND TYPE OF OCCLUSION-

Within 5.4 and 8.3mm the width of the occlusal table did not significantly affect peri implant bone loss.[11] Axial forces distribute stress more evenly throughout the implant as compared to bending moments. Occlusion should be mutually protected and prostheses should be free of non axial loading.[11,16]

## CANTILEVER FORCES

The length of the posterior cantilever in the mandible is directly related to complications and/or failure of the prosthesis.[36,37] Romeo et al [38] found no detrimental effects of cantilevers, provided cantilever length was appropriate and occlusal function was under control. Mesial and distal cantilever lengths limited to 2.75 +/-1.65 and 2.24+/-1.60mm respectively have found to cause marginal bone loss within acceptable limits.[11]

## LOADING PROTOCOL

Most authors follow and recommend a delayed loading protocol for SDIs. Rossi et al[21] conducted a study using SLActive straumann 6mm implants that were early loaded (6 weeks after insertion). These implants yielded high survival rates and moderate loss of bone after two years of loading. However, long-term follow-up, larger sample size and randomized trials are required to provide concrete evidence for incorporation of early loading protocols into clinical use.

## BIOMATERIAL RELATED FACTORS

Implant length, implant diameter, surface topography and implant thread pitch are important parameters that influence the selection of the most fitting implant in a given clinical situation.

**IMPLANT LENGTH-**

Implant length is defined as the length between the implant neck and the implant apex. Increase in implant length has found to have minimal beneficial effect on load distribution around the crestal portion of the implant.[6] Mezzemo et al[9] in a meta-analysis stated that short implants supporting single crowns obtained similar if not superior survival rates as compared to standard length implants. Few studies exist on implants of 5 and 6mm length, thus limiting the data obtained from systematic reviews. A two year trial of implants of four millimeter length with SLActive surfaces has yielded survival rates of 95.7% after 1 year and 92.3% at the end of the trial. [34] Ling Sun et al.[18] have reported highest survival rate for implant lengths of 7.5 and 9mm. But no statistically significant difference exists based on length.

**IMPLANT DIAMETER**

For every 1mm increase in diameter, functional SA is increased by 30 – 200% along with BIC.[5] Sato et al[39] on the basis of an in vitro study stated that wide implants are capable of bearing larger loads and perform better than implants of smaller diameter under tensile forces. Wider diameters of implants are hence referred for reduced bone density. This however, is limited by the bucco-lingual width of the residual ridge.

**IMPLANT SURFACE**

Griffin and Cheung[40] suggested "the implant maximized surface area as the main contributing factor to the high success rate". Rougher surfaces offer extensive area for osseointegration and have better bone-implant-contact as compared to machined or acid – etched surfaces.[16-18] Various surface modified implants like SLActive surfaces[21,34,41], TiOblast implants, Astra Tech[20] and bioabsorbable HA blasted implants [16] have shown better results as compared to the poor results seen with machined surface implants[7].

**IMPLANT THREAD PITCH-**

Thread pitch is defined as the distance between adjacent threads or the number of threads per unit length in the same axial plane and on the same side of the axis.[5] Hence, the greater the implant pitch, the greater the surface area available for osseointegration and load dissipation. Another implant thread geometry parameter worth consideration in this context is thread depth.[16]

Misch[16] has suggested a protocol for the reduction of stress at the bone-implant interface for SDIs, they include-

1) no cantilevers on the prostheses
2) no angled forces to the posterior restorations
3) splinting multiple implants together
4) implant surface modification
5) increase implant thread pitch

## INDICATIONS

Annibali et al.[4] in a systematic review reported successful results for short dental implants, with a pooled survival rate of 99.1% and a low incidence of biological and biomechanical complications after a mean follow-up period of 3.2+/- 1.7 years.

Studies have evaluated the efficiency of 6mm v/s 10mm implants supporting fixed partial dentures in augmented bone[41], 6mm v/s 11mm implants combined with sinus floor elevation supporting single crowns[42] and 6, 5mm implants rehabilitating bilateral atrophic posterior arches v/s longer implants in augmented bone [43,44] to find similar if not better performance of SDIs with fewer post-operative complications in comparsion to conventional implants in augmented bone. Based on the results of randomized control trials and clinical studies the following indications of SDIs in atrophic arches can be put forth[41-44]:

1) implant supported single crowns
2) implant supported fixed partial dentures
3) implant supported overdentures

The need for long term follow-up studies is quintessential to evaluate the effect of bone loss on the survival of the SDIs. While the loss of 2mm of crestal bone has minimal impact on the stability of a 10 mm or longer implant, a similar bone loss pattern on a 7mm implant for example leaves behind a considerably lesser bone volume for load dissipation.

The assessment of failure rates of SDIs should consider the poor quality of bone that is commonly observed in atrophic arches indicated for SDIs, in comparison to bone found in regions indicated for conventional implants and rather be compared to the outcome of implants placed in grafted sites.[5]

## ADVANTAGES OF SDIs-[16]

- Lack of bone grafting reduces cost and duration of treatment.
- Surgical risk of sinus perforation, mandibular paresthesia is eliminated along with decreased chances of overheating the osteotomy site or damage to dilacerated adjacent tooth root.
- No need for additional inventory and decreased surgical complexity
- Implant placement in smaller interarch space

## LIMITATIONS

The reversed crown to implant ratio, may not be an esthetic concern in the posterior quadrants, however, it may not be acceptable in the anterior maxilla. Here the morbidity related to an autologous bone graft for reconstruction must be considered.[20] Other than this, there is a draught of data on results of long term clinical trials of SDIs in poor quality bone. Also management of atrophic ridges that have horizontal ridge insufficiency with SDIs is a question that still remains unanswered.

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# Knowledge, Attitude and Oral Hygiene Practice Among Patients Wearing Fixed Partial Dentures In South Coastal Karnataka Region

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**ABSTRACT**

The purpose of this study was to assess the knowledge, attitude and the oral hygiene measures undertaken by the patient wearing fixed partial denture visiting the Department of Prosthodontics in A.B Shetty Memorial Institute of Dental Sciences, Deralakatte, which is located in the south coastal Karnataka region. To improve the oral hygiene practices and to impart further knowledge among the patients, it is necessary to know the current status. The sample size of the present study was 200 and a written consent form was obtained from the patients before conducting the survey using a questionnaire.

The study showed that 35% of the sample chose fixed prosthesis by their choice, 55% as it was suggested by the dentist and the rest 10% due to others' suggestions. .40% preferred fixed prosthesis due to esthetic and functional reasons whereas 36% solely because of functional benefits and 24% for esthetic reasons.61.5% of the population knew the material with which their prosthesis is fabricated which indicates that majority of the people are aware of prosthesis they have. Among this79.6% had metal-ceramic crowns, 15.4% had all metal and 4.8% have all ceramic crowns which shows that the patients are more inclined towards esthetic restorations. From the questions regarding the fit of prosthesis, colour matching and shape of prosthetic teeth 8.5% patient found the quality of prosthesis excellent,52.5 % good,35.5% average and3.7% poor. Regarding the oral hygiene practices, 72 % of the sample brushes only once a day, 27.5% twice a day and 0.5% more than twice. Also 80% were unaware of the type of bristles in their brushes.

**KEYWORDS**: Fixed partial denture, knowledge, attitude, oral hygiene practices.

## INTRODUCTION:

Teeth play an important role in the maintenance of a positive self image.[1]Loss of teeth had hampered the social life of people. But with the advancement of technology in the field of prosthetic rehabilitation, increased awareness among people and improvements in the health care system people are able to achieve better treatment for lost teeth through fixed dental prosthesis. In order to impart further knowledge among the patients and to improve the oral hygiene practices it is necessary to access the knowledge, attitude and hygiene practices among the patients wearing fixed partial dentures.

The purpose of this study was to assess the knowledge, attitude and the oral hygiene measures undertaken by the patient wearing fixed partial denture visiting the Department of Prosthodontics in A.B Shetty Memorial Institute of Dental Sciences, Deralakatte, which is located in the south coastal Karnataka region. The study was conducted to evaluate the knowledge or source of knowledge about the fixed prosthesis, to assess the level of satisfaction and efficiency of fixed prosthesis post insertion and to assess the hygiene practices and maintenance of fixed prosthesis among the patients.

## MATERIALS AND METHODS:

**SAMPLE SELECTION:** 200 patients visiting the Department of Prosthodontics in A.B Shetty Memorial Institute of Dental Sciences, Deralakatte were selected. A written informed consent was obtained from each patient prior to starting the survey.

After obtaining the consent of the patients who are having a fixed dental prosthesis to participate in the study, patients were asked to fill the questionnaire form which was later evaluated to assess the knowledge, attitude and oral hygiene practices among the patients.

## RESULTS:

Among the 200 fixed partial denture wearers 110 chose fixed prosthesis as it was suggested by the dentist and 70 by their own choice and 20 due to other reasons.(Fig 1) This indicates a lack of knowledge or decision making ability of the patient.

48/200 patients preferred fixed prosthesis due to esthetic reasons, 72/100 due to the functional benefits and 80/100 due to both(Fig 2). Among 61.5% who knew the material with which their

prosthesis is made of 79.6% have metal ceramic crowns, 15.4% have all metal and 4.8% have all ceramic crowns(Fig 3).

Evaluation of the attitude of the patients towards the fixed dental prosthesis was found to be good. 8.5% patient found the quality of prosthesis excellent, 52.5% good, 35.5% average and3.7% poor(Fig 4).

Assessment of oral hygiene practices among the fixed partial denture wearers showed that 143/200 patients brush once a day, 55/200 twice a day and 2/200 more than twice. 16/200 patients uses other aids to clean the prosthetic area whereas the remaining patients do not use any other aids(Fig 5) .Among the 8% who uses additional aids 14/16 uses floss and 2/16 uses interproximal brushes(Fig 6).

**DISCUSSION:**

Various studies have been carried out in the country and various parts of the world to determine the prevalence, prosthetic status and attitude of patients towards fixed prosthetic treatment. There has been an increased trend towards fixed prosthesis compared to removable prosthesis in recent years.

In this study, the knowledge, attitude and oral hygiene practices among the fixed prosthesis wearers in south coastal region were evaluated using a questionnaire. The sample size of the present study is 200 and a written consent form was obtained from the patients before conducting the survey. According to the survey 35% of the sample chose fixed prosthesis by their choice , 55% as it was suggested by the dentist and the rest 10% due to others suggestions. This may be due to the lack of education and decreased accessibility to the internet sources in the rural areas. Knowledge among the rural population should be improved so that patients can have better decision making skills regarding their prosthesis. 40% preferred fixed dental prosthesis due to esthetic and functional reasons whereas 36% solely because of functional benefits and 24% for esthetic reasons.61.5% of the population knew the material with which their prosthesis is fabricated which indicates that majority of the people are aware of prosthesis they have. Among this79.6% had metal-ceramic crowns, 15.4% had all metal and 4.8% have all ceramic crowns which shows that the patients are more inclined towards esthetic restorations. The cost factor was the major reason that prompted few patients to opt for all metal prosthesis. The study conducted by Napankangas et al in Finland showed overall, 12.4% of men and 12.1% of women had single crowns, while 4.8% of men and 8.0% of women had FPDs. A logistic regression analysis showed that the presence of crowns and FPDs was significantly associated with a

southern place of residence, high and middle levels of education and high frequency of dental visits.[2] The finding from the study conducted by Shigli et al in Belgaum also indicate that awareness need to be increased regarding esthetics and phonetics.[3] A higher frequency of removable restorations was present in older age groups, in subjects living in rural areas, in those from a lower socio-economic status and in subjects with less education and lower incomes according to the study by Zitzmann et al.[4]

From the questions regarding the fit of prosthesis, colour matching and shape of prosthetic teeth 8.5% patient found the quality of prosthesis excellent,52.5 % good,35.5% average and3.7% poor. This data shows a positive attitude towards the fixed prosthetic treatment. Imparting knowledge about the fixed prosthesis will allow the population to make better judgement and decision regarding their prosthetic rehabilitation.

Regarding the oral hygiene practices, 72 % of the sample brushes only once a day, 27.5% twice a day and 0.5% more than twice, also 80% were unaware of the type of bristles in their brushes. It is mainly due to the ignorance and lack of literacy among the population. Only 8% of patients use other aids to clean the prosthetic area in the oral cavity. This indicates a need to increase the awareness among the population regarding oral hygiene practices so as to increase the longevity of the prosthesis and improving oral health. Even the study by Patil V.V et al emphasized the need for improved dental health awareness and availability of dental facilities to industrial workers in Belgaum.[5]Cross sectional study by Gutshow et al also found a highly significant association between level of school education and the need of prosthetic treatment.[6]

**CONCLUSION:**

There has been a dramatic increase in the number of crowns and fixed dental prosthesis provided according to the studies conducted in Scotland and Finland.[7,8] The same trend is seen all over the world regarding the prosthetic rehabilitation.

According to the survey conducted among the patients visiting the Department of Prosthodontics in A.B Shetty memorial institute of Dental Sciences, it was found that knowledge among the patients wearing fixed partial dentures about the prosthesis were good. Majority of the patients were well satisfied with the prosthesis and was having a positive attitude towards the fixed prosthetic replacement. The awareness about oral hygiene practices were comparatively less among the conducted sample and require further reinforcement regarding the same. Though variety of cultural influences, attitudes ,beliefs, educational background and financial status determine the

treatment received by the patient; increase of awareness among the patients will definitely help in enhancing the oral health and social attitude of the patients.

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# Aesthetic And Functional Rehabilitation Of A Severely Mutilated Dentition

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**ABSTRACT**

Increased life expectancies have led to an increased demand for prosthetic rehabilitation of the elderly citizens who also are active socially. The subjects demand rehabilitation not only for function but also for aesthetics.The present case report describes treatment modality to restore a severely compromised dentition with the complete occlusal rehabilitation, in a fifty five year old male patient with missing posterior teeth and fractured anterior fixed partial denture prosthesis. The patient's aesthetic and functional expectations were fulfilled by adapting Pankey Mann Schuyler Philosophy.

**KEY WORDS**: Full mouth rehabilitation, aesthetics, severely compromised dentition,Broadricks Occlusal Plane Analyzer, Occlusal Plane,

## INTRODUCTION

Tooth surface loss may occur either as a physiological process due to ageing or due to pathological processes such as caries or non carious lesions.Occlusal disease is the loss of the anatomical parts of occluding tooth surfaces, which ultimately result in functional impairment.Physiological wear results in progressive but very slow,excessive wear refers to any level of occlusal wear that can be expected to require corrective intervention in order to preserve the dentition. The physiological wear of teeth is probably an age-related phenomenon. As the teeth continue to function and be challenged by erosive, attritive and abrasive factors, there will be change to the surfaces of teeth.

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Patients with severely worn dentition and loss of multiple posterior teeth may result in reduced vertical dimension and occlusal instability.Raising the vertical dimension is then required to correct the occlusal relationship to restore function as well as aesthetics.

Reconstruction of a worn dentition is essential. In any restorative treatment plan, the first decision to be made is whether or not the restorations are designed to harmonize with the existing occlusion or make a change towards an ideal occlusion.The treatment can be either active or passive. The passive approach involves monitoring the degree of wear and plansvarious preventive strategies. Monitoring involves taking a series of repetitive examinations and certain measurements over a period of time in order to asses if a condition is progressive. Standardized intra-oral photographs, study models and measuring lesion dimensions are all potential approaches.

Performing a successful occlusal rehabilitation is an arduous task that entails meticulous treatment planning resulting in preservation of remaining natural teeth and healthy maintenance of supporting structures.

The present case report explains a simplified multidisciplinary approach to a functional and aesthetics restoration of a severely compromised dentition by adapting Pankey Mann Schuyler (PMS) philosophy, with minor modifications.

## CASE REPORT

A 55 year old male patient who was moderately built reported to the department of prosthodontics. His chief complaint was difficulty in chewing food because of loss of posterior teeth and poor aesthetics due to loss of old fixed partial denture in relation to maxillary anterior region. Patient's personal and medical history was non contributory.

On intra oral examination, the maxillary arch showed, fractured fixed partial denture in relation to 11, 12, 13, 21, 22 and 23. Remaining teeth present were 11, 13, 14,22,23,24,25 and 27. 11, 13, 22 and 23 were subjected for root canal treatment (RCT) later followed by new fixed partial denture. Old crowns present on 14 and 25 were removed and also subjected for RCT along with 24, followed by crowns which were used as abutments for cast partial denture (CPD).

In mandibular arch 35 and 36 were missing and temporary filling in relation to 36 was seen, later subjected to RCT. All anterior teeth (31, 32, 33, 41, 42 and 43) were attrided and referred for intentional RCT in order to receive crowns.

Over all on intra oral examination there was decrease in vertical dimension due to loss of many posterior teeth and attrition of lower anterior teeth(Figure I).A diagnostic OPG(Figure II) was made andevaluated.

Diagnostic casts were mounted on a semi-adjustable articulator and wax mock up was done for the purpose of treatment planning. It was decided thereafter to adapt and modify PMS philosophy to rehabilitate the dentition and increase the vertical dimension by 2mm (Figure III).Broadrick's occlusal plane analysis was then done to establish the occlusal plane (Figure IV).

In the next appointment, the lower anteriors were prepared and temporisation was done.Simultaneously, the root canal treated upper anterior teeth were subjected to post and core treatment in order to minimise the total number of visits. In the subsequent visit permanent cementation of the lower anterior restorations and tooth preparation and temporisation of the upper anterior teeth were accomplished(Figure V). An interim removable partial denture was also provided to the patient in order to increase the vertical dimension.

After the evaluation of the patient's adaptation and tolerance to the increased VD, cementation of the upper anterior restorations was done and the incisal guidance was established. The lower posterior teeth were then prepared and restored according to Broadrick'socclusal plane analysis(FigureV).

In the next visit preparation of the upper premolar teeth, which were to be used as abutments for the upper CPD, was done.The crowns with the rest seats were then temporarily cemented onto the abutments in order to make a pick up impression. The master cast thus obtained was surveyed and metal milling was done(Figure VII). A conventional upper cast partial denture was then fabricated and inserted(FigureVIII).

## CONCLUSION

Managing full mouth rehabilitation cases are most challenging in dental practice. Several decisions have to be made concerning the occlusion. The clinician must take in to consideration not only the aesthetic and functional aspects but also ensure that the physiological restoration is in harmony with the stomatognathic system. We must also remember that not all patients can be successfully treated with a single preconceived treatment philosophy. Thus this report presents an adaptation of PMS in order to successfully rehabilitate the above severely mutilated dentition case (Figure IX).

**Figure I** Pre-operative view of maxillary and mandibular arch intra orally

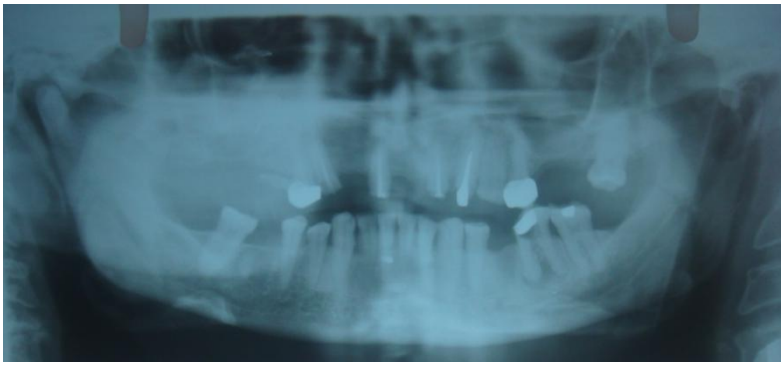


**Figure II** Pre-operative OPG

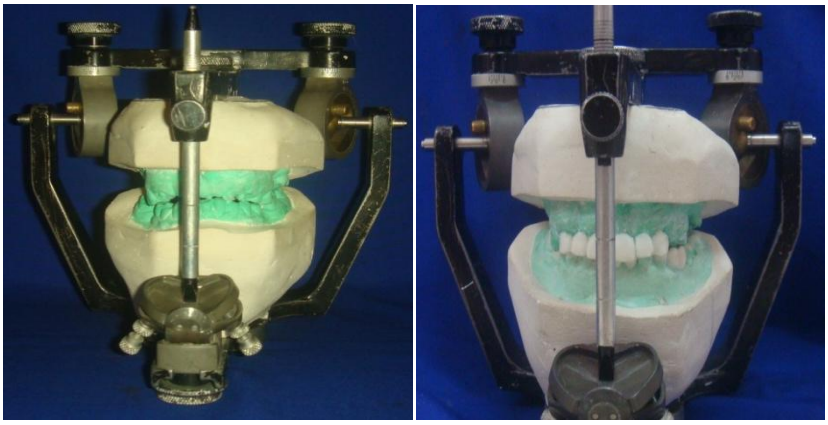


**Figure III** Diagnostic mounting and mock up done on the same according to broadricks occlusal plane analysis

**Figure IV** Mandibular arch mock up done according to Broadricks occlusal plane analysis

**Figure V** . Permanent cementation of the lower anterior restorations and tooth preparation and temporisation of the upper anterior teeth

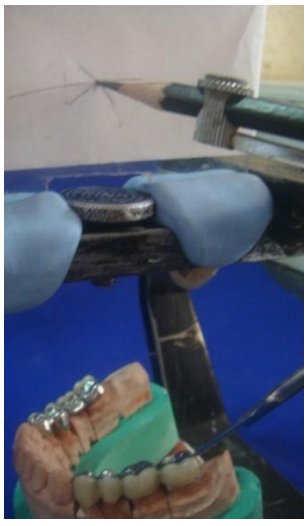
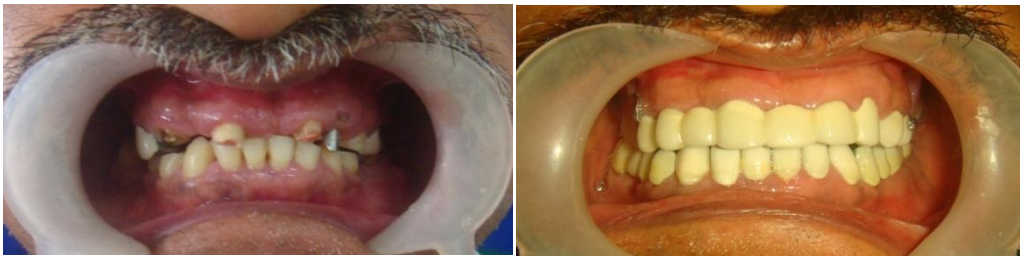


**Figure VI** Analysing Brodricks Occlusal plane before cementation of lower posterior restoration

**Figure VII** Metal milling on abutment teeth for maxillary arch CPD posteriorly cation

**Figure VIII** Post-operative view of maxillary and mandibular arch intraoraly



**FigureIX** Pre-operative and post-operative view after final

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# SynCone- A New Dimension In Implant Overdenture: A Case Report.

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**ABSTRACT**

AnkylosSynCone concept has become an emerging trend among implantologistsinorder to provide rehabilitation of edentulous ridges. With the luxury of friction fit telescoping crowns and the immediate loading concept, SynCone concept thrives to be the next big thing in the implant world.here is a case report on mandibular edentulous rehabilitation with SynConeconcept.The telescopic crown technique has benefits such as excellent three dimensional immobilization of the restoration , flexibility of design and optimum access for oral hygiene with cost effective procedures.With these features ,we can forsee a new dimension in rehabilitation of missing natural teeth.

**KEYWORDS:** SynCone, degunomes,immediateloading,telescopic copings.

**INTRODUCTION:**

Implants have now become the forefront of modern day dentistry when it comes to rehabilitation of the missing tooth or teeth.Various implant concepts provided by various implant systems gives us a wide range of options for treatment planning.

One such newly trending concept is the SynCone concept.concept is one of the recent trends in implant dentistry for the rehabilitation of edentulous ridges . This concept attributes to theplacement of implants and immediately loading the prosthesis.

The benefit of SynCone concept is its versatility.They provide fast and cost efficient restorations of edentulous ridges.Minimally invasive treatment makes it possible to load the prosthesis under Local anaesthesia on the same day.For delayed restorations it serves as a prefabricated retaining element for the maxillary and mandibular ridge.New abutment angulations provide improved parallelization.[1]

Here is a case report on rehabilitation of the edentulous mandible with implant placements interforaminally using the SynCone concept.

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**CASE REPORT:**

A 45 year old female patient(fig 1) reported at the out patient department of Prosthodontics and Implantology ,with periodontally damaged lower teeth and maxillary ridge was rehabilitated with fixed restorations.(Fig 2)

Patients chief complaint was poor esthetics and difficulty in chewing due to missinglower back teeth.Patient was in a good health condition. Blood picture showed normal values for the surgicaltreatment.Intra oral clinical examination revealed Grade II mobility with respect to all the teeth of the mandibular arch. Bone density, bone heightand bone width were analysed using the preoperative radiograph(fig 3). Implant selection was done accordingly.

**MATERIAL AND METHODS:**

**TREATMENT PLAN:**

- Extraction of all teeth and immediate implant placement.
- Placement of 4 implants in the mandibular region with immediate loading-AnkylosSynCone Concept.

The treatment plan was explained to the patient and the consent was taken.

Pre surgical antibiotic prophylaxis was commenced one day before surgery, and 1hour before the surgery.The patient was prescribed (Cap Amox 500Mg ,Thrice daily )

**THE SURGICAL PHASE:**

The patient was prepared and sterilized surgical instruments were arranged.(fig 4)Atruatmatic extraction was carried out with respect to mandibular anterior teeth under local anaesthesia.(fig 5)

Implant osteotomies were carried out with recommended sequence of drills with copious irrigation. Lindermandrill was used to prepare the osteotomy site(Fig 6a). Trispadedrill(3.5mm) was used to extend the osteotomy site(fig 6b) .Paralleling pins were placed in each osteotomy indicating their parallelism.(fig 7)Bone reamer was then used and implants (ankylos A9.5,A11,A11,A9.5 wrt 34,33,43,44 ) were placed avoiding the mental foramen.(fig 8)

Prefabricated $4^{o}$ SynCone abutments were then placed.(fig 9)The correct positions of the implant and the SynCone abutments were then checked with four paralleling pins.Vicryl 3.0 sutures were then placed.

**THE PROSTHETIC PHASE:**

The abutments were then isolated with rubberdam.(fig 10) petroleum jelly was applied to the mandibular ridge inorder to protect the mucosa.

SynCone gold degunomeswere then inserted (fig 11)

A window was prepared in the mandibular denture that involved the areas with the degunomes which was later picked up by self cure acrylic resin.(fig 12)The denture was then trimmed of the excess material, polished and loaded immediately in the patient.(fig 13)

The post op radiograph confirmed ideal placement of the implants.(fig 14)

**POST SURGICAL TREATMENT:**

The patient was adviced to follow the prescription below.

Cap Amox (500mg)---------- 15

Three times daily for 5 days.

Tab Imol Plus ----------10

Two times daily for 5 days.

Chlorhexidine mouthwash was adviced to be gargled twice daily for 15 days.

Patient was given instructions on maintenance of oral hygiene and recalled after one week, one month and three months.(fig 15)

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**DISCUSSION:**

SynCone Concept has become an emerging trend in implant dentistry. Mostly because of its unique abutment retainer system.Because the implants have morse taper connection the SynConeabutment retains a full degree of rotational movement. [1]In this system , pre machined titanium abutment is used which is available in a 4 ,5 or a 6 taper. The abutments are also fabricated in a 15 and 22.5 and 30 angulations when correction of angulations is needed especially in the maxillary arch.The SynCone abutments are available with sulcus heights of 1.5mm , 3 mm, 4.5mm to accommodate variability in sulcus heights and also to subcrestally place implants.[1]

The long term retentive characteristics of the abutments was assessed by Zhang et al .Authors concluded that inspite of the removal and cleaning pf the denture, a constant retentive force was expected for 5yrs. [3]Huan and jhu reported no adverse effects on 12 -24 month follow up of immediately replaced mandibular overdenture [5]Marco et al in his studies showed a 98.9 % success rate of implant supported overdenture using SynCone concept.

The precision fit provided by the gold copings and the SynCone abutments in the denture , prevents excessive horizontal forces on the implant which may alter the course of an otherwise uneventful osseointegration. This treatment concept can be applied in significantly non parallel divergent implant placement due to 4 and 6 degree SynCone abutment taper and the use of angled abutments

The AnkylosSyncone provides an immediately functional overdenture , chair side, while the patient is still anesthetized. This is one of the most important characteristics of using Syncone abutments, that the patient can leave the clinic with a fully functional and esthetically pleasing prosthesis .

The AnkylosSyncone Concept is gaining popularity because of the possibility of immediately loading and a new system of telescopic crown technique.The friction fit of the degunomes and the abutments gives it a high end retention. The telescopic design of the coping and its ability to be attached to the SynCone abutment without the use of any cement or a screw gives it a cutting edge among other treatments. These two features enable the prosthodontist to fabricate a restoration that is extremely stable and performs as well as a fixed restoration yet at the same time can be removed by the patient for daily maintenance.

The concept of immediate loading provides this concept its efficiency.[6]The telescopic crown technique has benefits such as excellent three dimensional immobilization of the restoration , flexibility of design and optimum access for oral hygiene with cost effective procedures.With these features ,we can forsee a new dimension in rehabilitation of missing natural teeth.

**CONCLUSION :**

The rapid technological advances in the field of dentistry have resulted in the wide use of implants to support and retain fixed and removable prosthesis .One of the options in implant – supported removable prosthesis within the Ankylos Dental Implant system is the Syncone overdenture concept.Theexcellent immediate functional and esthetic result of SynCone concept marks a turning point in the future of implant dentisty.

**FIGURES:**

Fig 1: Showing the patient

Fig 2a: Showing the mandibular teeth

Fig 2b: Showing the maxillary restorations

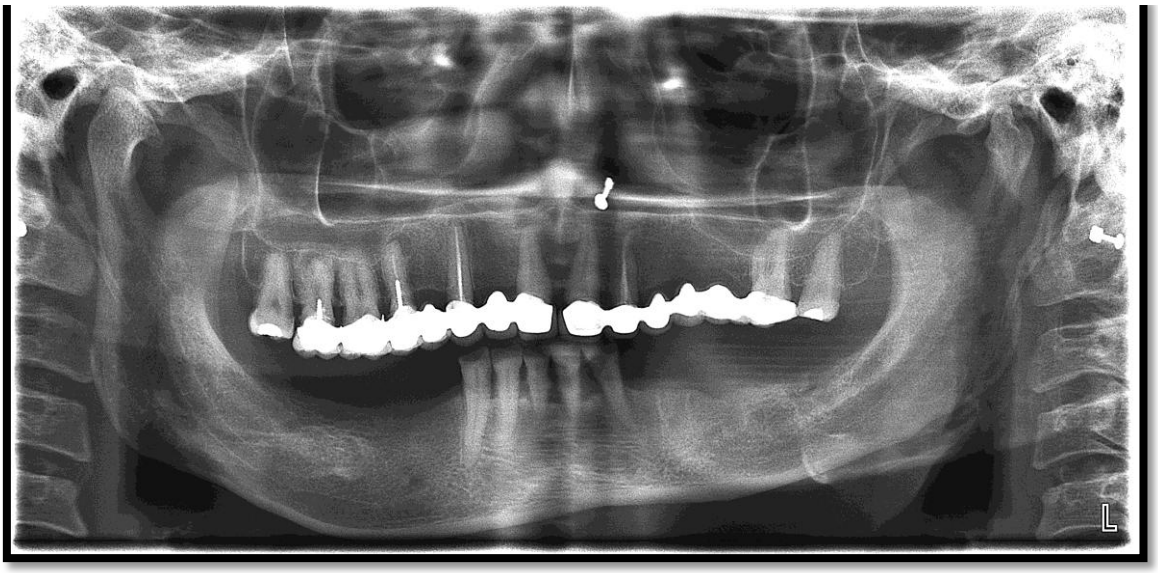

Fig 3 : Showing the pre-op Radiograph

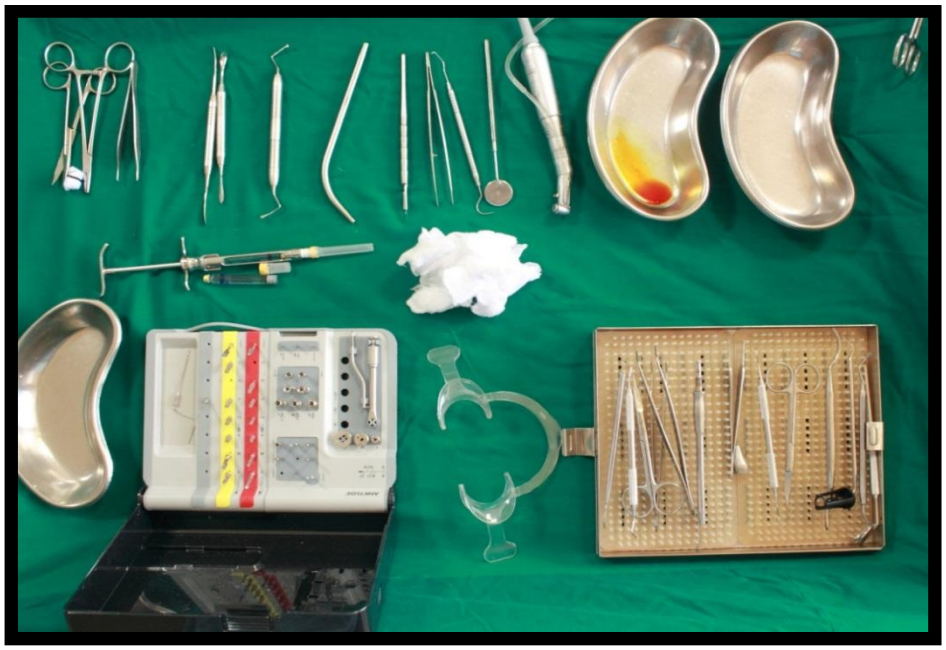

Fig 4: Showing the sterilized armamentarium.

Fig 5a: Showing atruamatic extraction of mandibular anterior teeth

Fig 5b: Showing the extracted teeth

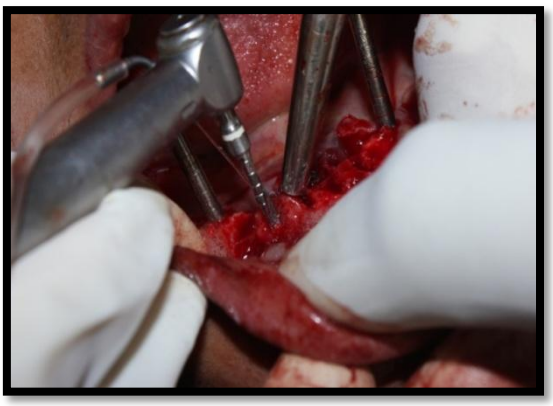

Fig 6a

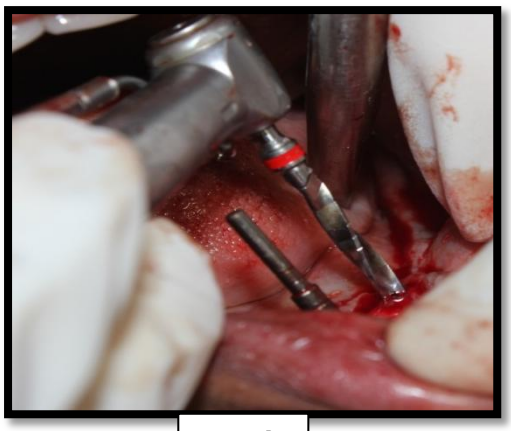

Fig 6b

Fig 6 : Osteotomy site showing pilot drill(a) and trispade drill(b)

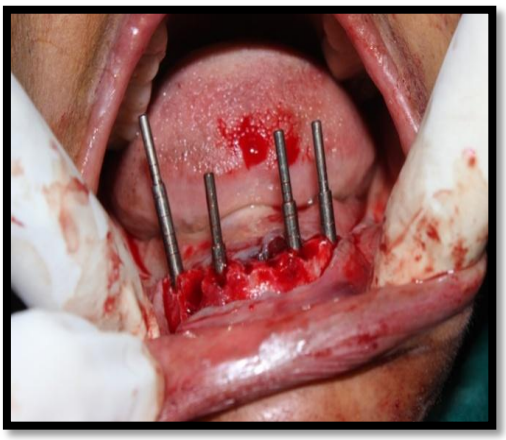

Fig 7: Placement of paralleling pins.

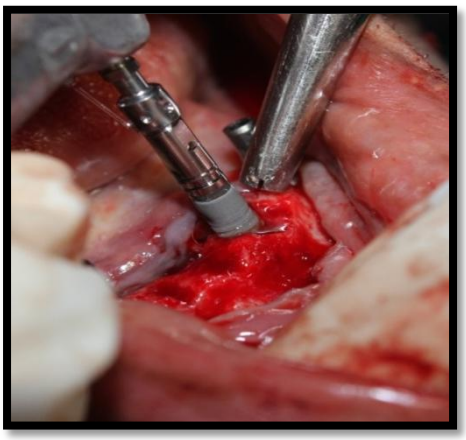

Fig 8 Showing :ankylos implant being placed.

Fig 9: Showing the SynCone abutments in placed.

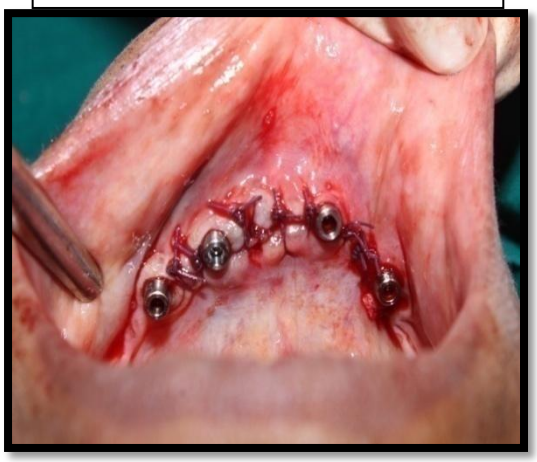

Fig 10: Showing the placement of sutures.

Fig 11: Showing rubber dam placement.

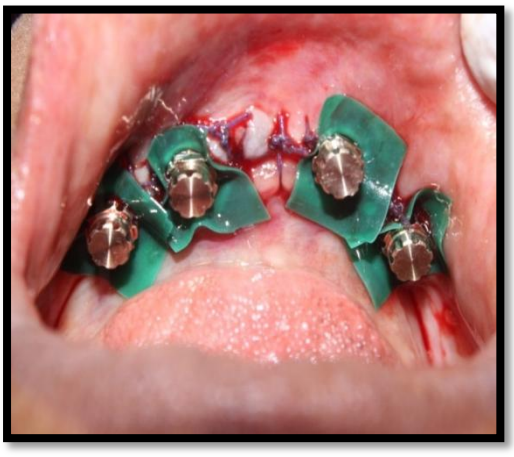

Fig 12: Showing the inserted gold degunomes.

Fig 13: Showing the pick up impression with cold cure acrylic resin.

Fig 14: Showing the finished and polished overdenture.

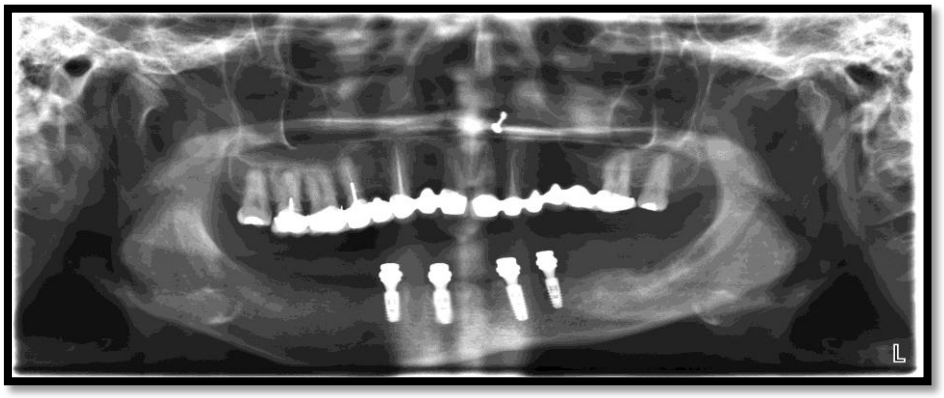

Fig 14: Post op radiograph showing the fit of the abutments and degunomes

Fig 14: Patient after treatment

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