

Title: “Kelly’s Syndrome”- prevention, using Implant Supported Hybrid Denture: Clinical Considerations and Case Report with 5 year follow up.

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Abstract : The prosthetic rehabilitation of patients with an edentulous maxilla opposing mandibular anterior natural teeth is one of the most challenging situations that a clinician encounters. Occlusal forces from the opposing natural teeth may cause fractures in the maxillary prosthesis and also result in residual ridge resorption of the edentulous maxilla. Prosthodontists try overcoming this Combination syndrome by careful treatment planning, which may require a multi-disciplinary approach involving surgical intervention followed by metallic denture base prosthesis, implant supported fixed prosthesis, implant supported overdentures etc. Even conventional prosthodontic techniques with special consideration for flabby tissues, over denture prosthesis and removable cast partial denture may be used. Choice of treatment modality is made by keeping in mind that the requirement of stability and retention of the prosthesis must be balanced along with the preservation of the health of the remaining oral tissues for every patient. With the presence of extreme gagging reflex, the treatment may become even more complicated. This article describes and illustrates the two stage surgical and prosthetic treatment of a patient with an edentulous maxilla opposing mandibular anterior natural teeth. The extreme gagging reflex from maxillary conventional complete denture and the occlusal forces from the mandibular anterior natural teeth compelled the clinician to adapt a different treatment plan which included placement of 4 endosseous implants in maxilla followed by fabricating a maxillary fixed screw retained hybrid prosthesis, and 4 implants in posterior mandible for implant supported Fixed Partial Denture.

Keywords: Hybrid Denture, Implant supported FPD, Combination Syndrome

I. Introduction

In 1972 Kelly^[1] collectively called the sequential destructive changes in the hard and soft tissues of the oral cavity seen in patients requiring singular restoration of a completely edentulous arch opposing a natural dentition as Combination syndrome. The Glossary of Prosthodontic Terms defines Combination Syndrome as^[2]. The characteristic features that occur when an edentulous maxilla is opposed by natural mandibular anterior teeth are overgrowth of the tuberosity, papillary hyperplasia of the hard palatal mucosa, extrusion of mandibular anterior teeth and loss of alveolar bone and ridge height beneath the mandibular removable partial denture bases, also called anterior hyper function syndrome.^[3] These features may appear over a varied time span however factors in the oral environment related to host defenses may also determine the initiation of the symptoms like extrusion of mandibular anterior teeth, including loss of bone. When a fully edentulous maxillary arch is rehabilitated with implant supported prosthesis, we must take into account several factors:

- Anatomy of the remaining residual alveolar bone
- Quantity and quality of the residual bone
- Types of prosthetic options available
- Number of implants
- Occlusal forces
- Antagonist tooth/teeth (natural or artificial)
- Inter arch distance as well as relationship

After a thorough clinical and radiological evaluation of patient, an implant supported prosthetic option catering to the particular clinical situation and economic feasibility is given. Due to the complexed biomechanics of the oral cavity and implantology, the number and position of the implants will be determined by the type of prosthesis that the patient will be restored with.

Implant supported prosthetic options for the fully edentulous maxilla or mandible fall into two basic groups given by Misch^[4]

1. Fixed restorations and
2. Removable restorations.

The choice of type of fixed or removable implant supported prosthesis depends on:

- The maxillary bone loss in antero-posterior direction
- The distance between the residual ridge and the occlusal plane (Crown Height Space)

The most decisive factor in the choosing of the type of prosthesis is the distance from the residual ridge to the occlusal plane. This distance is increased by the vertical loss of bone and of soft tissue that occurs in edentulous patients. When a patient presents a distance greater than 15mm, the most indicated prosthesis is a removable type (overdenture), as we are able to compensate for the missing tissues using acrylic. The use of fixed restorations of metal porcelain type is compromised, because it can result in the production of elongated teeth, which are not very aesthetic and also lead to increased leverage forces.

In 1987, Zarbet al. ^[5] described a type of fixed treatment in severely reabsorbed full edentulous maxillae, with distances greater than 15mm. These authors describe the fabrication of a hybrid prosthesis using an over-contoured metal structure with acrylic and conventional denture teeth. This type of restoration can be classified, according to Misch, as FP-3, permanent prosthesis, which replaces crown, tissue and lost bone, the prosthesis uses denture teeth and acrylic gum.

One of the main advantages attributed to this type of prosthesis, is the reduction of the impact of occlusal forces, as the acrylic acts as an intermediary in between the teeth and the metal structure. In the case of fixed restorations in the maxilla, as is the case of the hybrid prosthesis, the literature suggests the placement of 4 to 8 implants distributed bilaterally in the maxillary arch. ^[6]

II. Case Report

A 58 years old, male patient reported himself to the department of prosthodontics. Clinically he presents a fully edentulous maxilla with the main complaint of missing maxillary teeth and mandibular posterior teeth due to which he was unable to chew and speak properly. Clinical examination revealed a completely edentulous maxillary arch and missing mandibular teeth distal to the left 2nd pre molar and right 1st pre molar (Figure-1 and 2). Periodontal probing and radiographs revealed that the remaining teeth were healthy. The mandibular anterior teeth were slightly proclined. Initial diagnostic cast when articulated showed up a class III maxillo-mandibular relationship. It was decided to initially restore the left and right quadrant of the mandibular arch with an interim removable partial denture, and maxillary complete denture. After completing the initial phase of rehabilitation of the upper and lower arch, it was then decided to restore the edentulous mandibular left and right quadrant by a rigid, conventional implant supported fixed partial denture, using two endo-osseous implants as the distal and mesial abutments and maxillary arch by placing 4 implants in region of 15, 12, 22 and 25 and fabrication of casted bar using UCLA (Universal Castable Long Abutments) abutments covered by acrylic crowns. The types of the implants used were the two-stage Neo IS II (Neo Bio Tech Ltd., S. Korea). Orthopantomogram (OPG) of the maxilla and mandible showed bone height of 10mm above the mandibular canal in the right posterior region and 12 -13 mm in left mandibular posterior region and maxillary canine and 1st premolar regions.

III. Surgical and prosthetic procedure

Prophylactic antibiotic Augmentin (Amoxicillin & Clavulanic Acid) was administered prior to surgery. A mucoperiosteal flap was raised by placing an incision at the crest of the edentulous ridge to expose the crest of the bone. The patient's denture was used as a surgical template creating a pathway for the drill, each along the axis of the first premolar and the first molar region in the maxilla. The pathway for insertion of each implant was prepared at the sites which were determined by pre surgical radiographic analysis using Cone Beam Computer Tomography.

After drilling with Point Lindemann Drill osteotomy site were prepared using twist drills from 2.2 mm to 3.9 mm. in diameter depending on the diameter of implant used. A Twist Drill Ø 2.9 and Ø 3.4 were used to finally prepare the site for 3.5mm and 4.0 mm diameter implant respectively. Each fixture hole was covered with cover screw and OPG was taken to ensure the desired placement of implants and the flap was then closed and sutured (Figure -3). During the healing period of approximately 16 weeks the tissue conditioner in the maxillary interim denture was changed every 4 weeks to ensure a soft interfacing contact to the healing of the maxillary implants. After successful implant integration as confirmed by radiographic and reverse torque application of all implants, final impressions were made using a custom tray with poly vinyl siloxane impression material of heavy and light consistency for the maxilla and stock tray for the mandible. In this case open tray technique was used because of the non-parallel position of the implants in the maxilla and closed tray technique in case of mandible where the implants placed were more or less parallel. Occlusal rims were fabricated, bite registration, and facebow registration was done. Since the accuracy of the master cast is crucial for the fabrication of the precision casted framework and bar, the utilization of a verification index is mandatory. The verification index is fabricated on the master cast in the laboratory with GC pattern resin® (GC America) with the UCLA abutments and the bar for the abutments (Figure -4). The verification index was checked intraorally.

If there are any discrepancies, the index is sectioned and luted back together intraorally with the GC pattern resin. The laboratory then sends the master cast with the casted framework on UCLA abutments and the wax set ups for the design and fabrication of the maxillary fixed hybrid framework. Trial of framework was done and bite records were taken using Jet Bite™ (Coltène/WhaledentAG), a bite registration paste to confirm the earlier recorded jaw relation. After esthetics, occlusion and phonetics were evaluated; the denture was processed in heat-cured acrylic and delivered with the finished fixed mandibular bridges. Insertion of finished hybrid prosthesis was done and abutment screw was tightened to manufactured recommended torque. (Figure -5, 6, 7)

The openings of the holes were closed using Filtek™ Z250 Universal Restorative (3M ESPE Dental Products US). Final occlusion was adjusted and patient was recalled for checkup after one week. Post-operative OPG was taken to ensure proper fit of the prosthesis (Figure -8). 6 month and 18 months follow up was done to check working of the prosthesis and bone levels around the implants using radiographic methods.

IV. DISCUSSION

Shen K, Gongloff RK documented the prevalence of symptoms associated with "combination syndrome" in 150 maxillary complete denture wearers. The five alveolar ridge changes that are most consequential to denture wearing and most difficult to correct surgically were found in 7% of the population studied. However, these changes were found in 24% of patients who have natural mandibular anterior teeth opposing complete maxillary dentures. This rate did not differ significantly between patients who do and do not wear a mandibular removable partial denture.^[7]

There are many authors who hold different opinions about the treatment procedures to prevent occurrence and further degenerative changes in the oral cavity in patients whose occlusal scheme comprise of a complete maxillary denture opposed by natural anterior teeth and a bilateral distal extension removable partial denture (RPD). Kelly^[1] said that before proceeding with the prosthetic treatment, gross changes that have already taken place should be surgically treated. These include conditions like flabby (hyperplastic) tissues, papillary hyperplasia and enlarged tuberosity's.

Various treatment modalities for the completely edentulous Maxillary Arch: *Planned Extractions followed by Immediate Dentures*: This treatment option is considered when arch relationship is such that arch requires alveolectomy along with extraction of the anterior teeth for patients with severe prognathic maxilla, periodontally compromised proclined anterior teeth present in the maxillary arch and missing mandibular posterior teeth.

Overdenture Prosthesis with a Metallic Denture Base: Every effort should be made to avoid the potentially destructive occlusal forces exerted on the anterior maxillary residual ridge. Therefore, when a maxillary complete denture is planned, endodontic and periodontic techniques are used to preserve roots in order to maintain the bony architecture of the anterior maxilla. The retained anterior maxillary roots will absorb occlusal forces exerted by anterior mandibular teeth.

Conventional prosthodontic techniques with special consideration for flabby tissues: A variety of techniques have been suggested to circumvent the difficulties of making a denture rest on flabby ridge. It has been stated that while the flabby ridge may provide poor retention for a denture, it is better than no ridge-as could occur following surgical excision of the flabby tissues. A magnitude of impression techniques have been suggested in the past to help record a suitable impression of a flabby denture-bearing area^[8].

Surgical Intervention (Vestibuloplasty and Excision of Flabby Tissue) Followed by Metallic Denture Base Prosthesis: Patients reporting with a completely edentulous maxillary arch opposing anterior natural dentition in the mandibular arch along with destructive changes in the hard and soft tissues of the jaws of the combination syndrome such as severe anterior ridge resorption, epulis fissuratum and flabby tissue in the maxillary arch accompanied by loss of vertical dimension require surgical intervention

Implant Placements: Four options can be used in rehabilitating a completely edentulous maxilla using implants like implant supported fixed ceramo-metal prosthesis with gingival ceramic, implant supported fixed ceramo-metal prosthesis, Implant supported overdenture or an implant and tissue supported overdenture.^[9]

The phenomenon of residual ridge resorption (RRR) following removal of teeth has been well observed and documented in literature.^[10,11] While the bone loss following the removal of teeth is stated to be rapid, progressive, irreversible and inevitable, it is equally well observed that bone is maintained around standing teeth and implants.^[12,13] There are wide varieties of implant supported treatment options for fully edentulous patient.^[13] But the final choice of treatment depends on the patient's perception and affordability and various biomechanical factors influencing performance of prosthesis. As in our case, when there is financial limitation for additional implants, no bone to support adequate number of implants, also there is loss of supporting structures for the lips and other surrounding tissues and when bone grafting is to be avoided in such a situation, a tissue-implant supported hybrid denture may be designed as a less expensive and simple option, if bounded by certain guidelines.

V. Figures and Tables

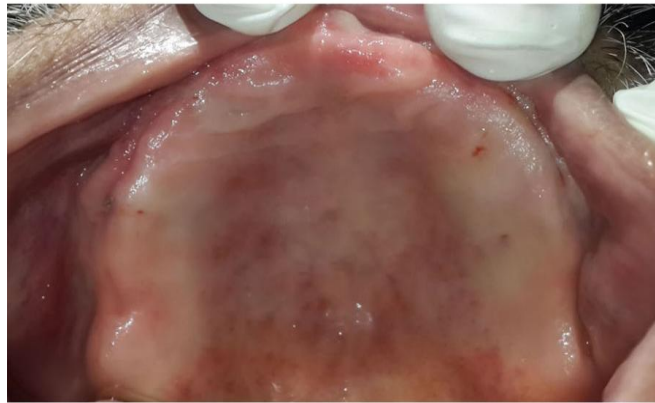


Fig 1: Pre operative complete edentulous maxilla



Fig 2: Pre Operative partially dentate mandible

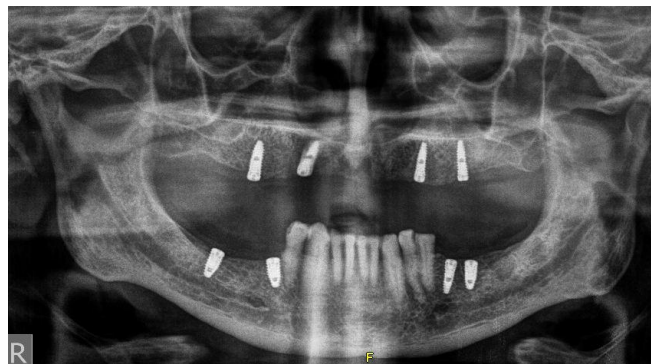


Fig 3: Post Implantation Orthopantomograph



Fig 4: Picture showing Pattern zig trial



Fig 5: Occlusal view of final maxillary prosthesis



Fig 6: Occlusal view of final mandibular prosthesis



Fig 7: Frontal view of hybrid prosthesis

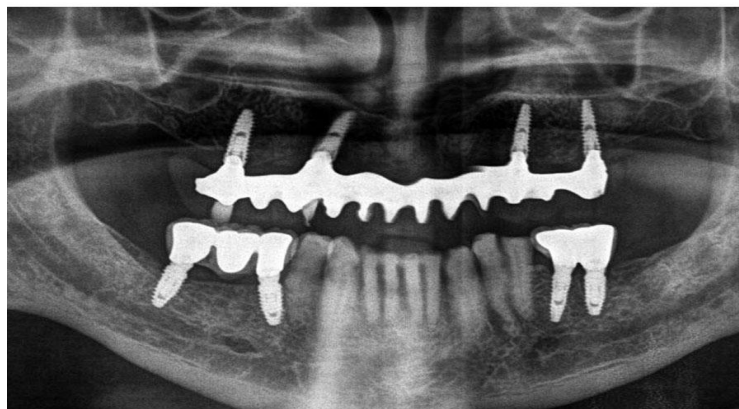


Fig 8: Postoperative orthopantomograph

VI. Conclusion

Oral implantology is growing day by day; the development of new surgical and prosthetic techniques opens a new world of options to explore, in order to offer the patient better treatment. Before proceeding for a full arch maxillary rehabilitation, we must make a detailed analysis of the anatomy of the maxilla using all tools available, including diagnostics models, x-ray images (radiographs, CBCT), etc.

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