Prosthodontic Rehabilitation of patients with Combination Syndrome
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Abstract

In 1972 Kelly 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. Prosthodontist try overcoming this Combination syndrome by careful treatment planning, using preventive, therapeutic and functional treatment modalities which may require a multi disciplinary approach involving surgical intervention such as planned extractions followed by immediate dentures, vestibuloplasty, excision of flabby tissue followed by metallic denture base prosthesis, implant supported fixed prosthesis, implant supported over dentures 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 oral tissues for every patient.

Key Words: Combination Syndrome, Single Completely Edentulous Arch, Flabby Tissue.

Introduction

The lesions of the oral mucosa associated with removable prosthesis wearers may be acute or chronic reactions to microbial denture plaque, reaction to constituents of denture base material or mechanical denture injury. But a distinct series of destructive changes in the hard and soft tissues of the jaws have been reported particularly in the edentulous regions of the wearers of complete and partial dentures.

Kelly (1) in 1972 coined the term combination syndrome for these changes. Several authors have stated their theories regarding the sequential complicated changes in the oral cavity of these patients. 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, including loss of bone from the anterior portion of the maxillary ridge, 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 (2).

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.

History

Ellsworth Kelly in 1972 was the first person to use the term ‘Combination Syndrome’ (2). He described 5 signs or symptoms that commonly occurred in this situation. They include anterior maxillary ridge resorption, papillary hyperplasia in the hard palate, maxillary tuberosity hypertrophy,
extrusion of the mandibular anterior teeth, and bone
loss under the partial denture base. His theory stated
that this sequence was triggered due to a negative
pressure within the maxillary denture, which causes
the anterior ridge to be driven upward by the anterior
occlusion, followed by an early loss of bone from the
anterior part of the maxilla and formation of epulis
fissuratum in the maxillary sulcus. This is followed
by maxillary tuberosity hypertrophy, supra eruption
of the remaining natural lower anterior teeth and
posterior mandibular resorption.

Saunders et al (3) in 1979 added to the
description of the combination syndrome by
including destructive changes such as loss of occlusal
vertical dimension, occlusal plane discrepancy,
anterior spatial repositioning of the mandible, poor
adaptation of the prostheses, epulis fissuratum and
periodontal changes. Saunders et al (3) suggest that
the sequence of events is initiated by the loss of
mandibular posterior support, resulting in a gradual
decrease of occlusal load posteriorly; an increased
occlusal load anteriorly and eventually increased
pressure resulting in resorption of the maxillary
anterior residual ridge.

Shen and Gongloff (4) investigated the
prevalence of the combination syndrome in patients
who use complete maxillary dentures and found the
above changes most consequential to denture using
occurred in 24% of patients who had natural
mandibular anterior teeth opposing complete
maxillary dentures. This prevalence was five times
greater than in patients who use maxillary and
mandibular complete dentures. The rate did not
significantly differ between patients who use or do
not use a mandibular RPD. Their study also stated
that 5% of their subjects with an edentulous mandible
developed combination syndrome. Those patients
who had even one mandibular molar present did not
show the combination syndrome. This supports the
opinion of Saunders et al (3) that the lack of posterior
occlusal support is the key factor in the development
of this phenomenon.

In 2003 a study by Palmqvist et al (2)
concluded that combination syndrome does not
qualify to be a medical syndrome and that there was
no evidence to believe that resorption of anterior
maxilla was related to the presence of natural anterior
teeth in the opposing arch.

Treatment planning: The primary factor considered
in the treatment planning of any edentulous span is
the progression of residual ridge resorption. There is
no uniformity in the process between sites,
individuals, sexes and age groups. The main risk
factors for the continuous ridge resorption both in
partially and completely edentulous older subjects are
the rate of previous bone loss, excessive occlusal
forces during mastication and bruxism.

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 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 tuberosities.

Kelly (1) advises reducing enlarged
tuberosities to allow the lower removable partial
denture to extend over the retromolar pad and buccal
shelf area. Saunders et al(3) advocate splinting the
remaining mandibular anterior teeth to provide the
RPD with positive occlusal support, rigidity and stability, while minimizing excessive stress on the anterior natural teeth. Therefore, prosthetic treatment is designed to provide posterior occlusal support and to minimize occlusal pressures in the anterior maxilla. Clinical reports show that, in the absence of natural posterior tooth support, an occlusal table cannot be stabilized effectively on distal extension bases. The mucoperiosteal foundation yields under occlusal loads, rendering such sophisticated occlusal schemes palliative (4).

Koper (5) developed a bilateral balanced occlusion of the posterior teeth using pantographic recordings transferred to a fully adjustable articulator to stabilize the maxillary denture. The posterior occlusal table was formed by cast metal chewing platforms or hard resin posterior teeth. Schniitt SM (6) used a generated wax occlusal path to create the occlusal surfaces of the posterior teeth that were cast in metal. Acrylic teeth were used to replace the maxillary anterior teeth because they abrade rapidly and tend to reduce stress concentration on the maxillary anterior ridge. Keltjens et al (7) advocated placing implants beneath the distal extension base of a mandibular removable partial denture to provide a stable posterior support.

Thiel et al (8) supported the above theory and stated that mandibular implant-supported overdenture offers significant improvement in retention, stability, function and comfort of the patient. It also provides a more stable and durable occlusion. Wennerberg et al (9) in 2001 reported excellent long term results with mandibular implant supported fixed prostheses, opposing maxillary complete dentures.

Treatment planning for the completely edentulous Maxillary Arch: Treatment modality should be using the principle of restoring a stable posterior occlusion, while minimizing occlusal pressures on the anterior maxilla. Prevention of the combination syndrome must be our primary objective.

Planned extractions followed by immediate dentures or preservation of a few of the remaining teeth for the fabrication of overdenture prosthesis with a metallic denture base for one arch are preferred treatment modalities. This decreases the risk for occurrence of combination syndrome by preventing a completely edentulous arch from opposing natural teeth. For those patients in which combination syndrome has already occurred, conventional prosthodontic techniques with special consideration for flabby tissues must be followed or else a multidisciplinary approach may be followed. Surgical intervention (vestibuloplasty and excision of flabby tissue) followed by a metallic denture base prosthesis is the treatment of choice. Different patients with particular clinical findings should be treated specifically to prosthodontically rehabilitate them and prevent combination syndrome.

Treatment Option 1: Planned Extractions Followed By Immediate Dentures: This treatment option is considered when arch relationship negates an overdenture and requires an alveolectomy along with extraction of the anterior teeth for patients reporting with severe prognathic maxilla, periodontally compromised proclined anterior teeth present in the maxillary arch and missing mandibular posterior teeth (Fig 1).

The extractions of the maxillary anterior teeth were planned along with the alveolectomy in the maxillary anterior region. Hence conventional immediate denture fabrication steps were followed during primary and secondary impression making, jaw relation recording, posterior try-in and mock
surgery of the casts followed by denture fabrication and insertion (Fig 2).

Figure 1 Preoperative intra oral view

Figure 2 Insertion of maxillary immediate denture and mandibular interim removable partial denture

After the mock surgery of the casts a template was fabricated by the prosthodontist in clear acrylic to help the surgeon in the surgery and guide him in removing the correct amount of tissue (Fig 3).

Figure 3 Surgical template before immediate denture placement

The main advantage in using this technique was the decrease in the resorption rate of the maxillary anterior residual ridge because ridges are subjected to early function coupled with improved aesthetics of the patient. It prevents formation of flabby tissues which could also arise as a result of unplanned or uncontrolled dental extractions (10).

Treatment Option 2: 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 contemplated, endodontic and periodontic techniques are used to preserve roots in order to maintain the bony architecture of the anterior maxilla (Fig 4).

Figure 4 over denture coping

At the same time, retained anterior maxillary roots will absorb occlusal forces exerted by anterior mandibular teeth. Long rooted maxillary canines strategically placed at the corners of the maxillary arch are favored. Because the abutments may act as fulcrum points after ridge resorption, fracture of a fatigued denture base may occur. Cutting away or relieving the labial flange from undercut areas may render the denture base even more prone to fracture. Reinforcing the denture base with a cast metal framework has been shown to reduce fracture rates.

Treatment Option 3: 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 (10). The maxillary impression is made in a specially designed tray using a combination of green stick compound border molding and zinc oxide eugenol impression paste along with impression plaster without distorting the anterior residual ridge and the flabby tissue (Fig 5).

Figure 5 Special Impression Technique for flabby tissue in the anterior region

Elastomeric impression material can be used instead of green stick compound and zinc oxide eugenol impression paste for making the secondary impression.

Treatment Option 4: 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 (Fig 6).

Vestibuloplasty and excision of flabby tissue was planned. Impression of the maxillary arch was made followed by a mock surgery on the cast obtained. A heat cured surgical template is fabricated on this cast as which is to be screwed in situ for 3 weeks for the tissues to heal to an adequate vestibular depth after vestibuloplasty, soft tissue contouring of the maxillary ridge and excision of the flabby tissues and hyperplastic tuberosities (Fig 7).

Figure 6 Epulis fissuratum and flabby tissue present in the maxillary anterior region

After 3 weeks the surgical template is removed and the tissues allowed healing for another 3 weeks.

Figure 7 Surgical template screwed to the palate for 3 weeks after vestibuloplasty and excision of flabby tissue

Following this conventional procedures are followed to fabricate a maxillary complete denture and a mandibular distal extension cast partial denture. After ridge resorption, fracture of a fatigued denture base occurs along with cutting away of the labial flange from undercut areas during function. This renders the denture base even more prone to fracture. Patients reporting with a history of a previous denture with a similar fracture pattern, require the maxillary denture base to be reinforced with a cast metal framework. This has been shown to reduce fracture rates (Fig 8 & Fig 9).

The occlusal scheme given to this patient consists of maximum occlusal support posteriorly with no anterior contacts in centric occlusion and a
balanced articulation in eccentric movements, in order to further reduce pressure on the anterior maxillary ridge.

Figure 8 Maxillary prosthesis with metallic denture base and mandibular distal extension cast partial denture

Figure 9 Metallic denture base for the maxillary prosthesis

Treatment Option 5: 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 (11).

Treatment planning for the Distal extension partially edentulous Mandibular Arch. The main aim of prosthetic therapy is to restore stable occlusion with good facial height. The main risk factors to consider in the partial edentulous patients are associated with the progression of periodontal disease, caries activity, residual ridge resorption and functional problems. It is often possible to stop progression of periodontal disease in the elderly with conservative and surgical periodontal therapy; and by instituting adequate hygiene measures. In this way stable periodontal conditions can normally be established, which are essential for an acceptable long term prognosis of reconstructive prosthodontic therapy. Different treatment approaches have been advocated for the low-risk patients who have not yet developed the combination syndrome and with well preserved mandibular anterior teeth and the high-risk patients with destructive changes or supraerupted or periodontally involved mandibular anterior teeth.

The spatial position of the mandibular anterior teeth is important to the treatment plan.

Treatment Option 1: Overdenture: Teeth that are considerably supraerupted would require alteration by shortening, crowning or placing them under an overdenture to obtain a harmonious occlusion. The spatial position of the mandibular anterior teeth is important to the treatment plan. The level of the incisal edges of the mandibular anterior teeth should be assessed in comparison to the proposed posterior occlusal plane.

Treatment Option 2: A Removable Cast Partial Denture: Mouth preparation is done to support a removable cast partial denture with an occlusal plane conducive to a bilateral balanced articulation. The lingual plate delays the eruption of the mandibular teeth, preventing undesirable anterior pressure on the anterior part of the maxillary denture. Optimum fit of the denture base of the removable cast partial denture is achieved using the altered cast technique. Posterior occlusal contact must be maintained by constant relining of the distal
extension denture base to compensate for its resorption.

Treatment Option 3: Implant Supported Fixed Prosthesis: In Distal extension partially edentulous situations implant supported fixed prosthesis may be used in case there is adequate bone height and width, no anatomic structures that could interfere with implant placement and visual inspection and palpation do not show presence of any flabby excess tissue, bony ridges and sharp underlying osseous formations or undercuts.

Either an implant can be placed distal to the most posterior natural abutment and a fixed prosthesis connecting the implant with the natural teeth can be fabricated or two or more implants can be placed posterior to the most distal natural tooth in order to fabricate a completely implant supported restoration.

Discussion

Different treatment approaches have been suggested for patients with an edentulous maxilla and some remaining anterior mandibular teeth. The choice of treatment ultimately depends on the patient, the amount of time and money he is willing to spend for the treatment, his oral condition and his desire for fixed or removable prosthesis. Some patients demand implants and some refuse them. Advantages of implants compared to the conventional prosthodontics are that implants stimulate the bone and maintain its dimension similar to natural teeth (12). Maxson et al (13) reports similarities between patients with over dentures constructed on transmandibular implants that oppose complete maxillary dentures hence only endosseous implants must be used.

Implants provide a predictable method of tooth replacement offering excellent functional and esthetic benefits. Following the same prosthetic concepts for the maxilla as existed in the mandible is not feasible. The long term prognosis for implants in the maxilla is less secure than that of the edentulous mandible. Following tooth extraction in the anterior part of the maxilla, horizontal bone resorption is almost twice as pronounced as vertical resorption. The reduced quantity and quality of bone in the maxilla together with increased aesthetic demands makes treatment planning more complex. A different approach based on the ultimate aesthetic outcome is required compared to that of the edentulous mandible where function is the more critical factor.

Conclusion

The evaluation of the risk of developing the combination syndrome is based on past dental history and the condition of the remaining mandibular anterior teeth. High risk patients showing changes associated with the syndrome are more likely to be those who stress the maxillary ridge such as in angle class III jaw relationships, parafunctional habits and in patients who have functioned mainly with mandibular anterior teeth for long periods. The degenerative changes that develop in the edentulous regions of wearers of complete upper and partial lower dentures are almost inevitable

The dentist must carefully plan the treatment of these patients in order to maintain the health of the oral tissues of these patients provide them with prosthesis that provide function but do not contribute to the combination syndrome. Thorough diagnosis, planning, and implementation of treatment will result in an outstanding outcome for both the patient and dentist.

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