

REVIEW ARTICLE



Combination syndrome: An update

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Abstract

Destructive changes in the hard and soft tissues have been reported in patients with maxillary complete denture opposed by natural anterior teeth and a bilateral distal extension removable partial denture. The characteristic features of these changes include loss of bone from anterior portion of the maxillary ridge, overgrowth of the tuberosities, papillary hyperplasia of hard palatal mucosa, extrusion of mandibular anterior teeth and loss of alveolar bone and ridge height beneath the mandibular removable partial denture bases, which is termed as combination syndrome as described by Kelly. This article reviews about sequelae of combination syndrome and recent treatment modalities in treating combination syndrome.

Keywords: Epulis fissuratum, papillary hyperplasia, pseudomandibular prognathism, vertical dimension

Introduction

Completely edentulous maxilla and mandible with only anterior teeth remaining are a common clinical situations causing progressive loss of bone in the posterior aspect of the mandible. If the bilateral distal extension mandible and completely edentulous maxilla are rehabilitated with removable partial dentures, there are chances that mandibular denture base sink gradually because of resorption of alveolar bone in the posterior aspect of mandible leading to posterior open bite. The lack of posterior occlusal contacts causes an eventual and progressive shift of masticatory function to anterior segments.^[1] This syndrome associated with resorption of the residual alveolar ridge is termed as combination syndrome.

Glossary of prosthodontic terms^[2] defines combination syndrome as "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 tuberosities, 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 hyperfunction syndrome. Kelly^[3] was the first person to apply the term combination syndrome.

Additional changes occurring in clinical situations with the completely edentulous maxilla and partially edentulous

mandible with only anterior teeth remaining include loss of occlusal vertical dimension, occlusal plane discrepancy, anterior spatial repositioning of the mandible, and poor adaptation of the prosthesis, epulis fissuratum and periodontal changes.^[4]

Combination syndrome occurs among 25% of individuals who wear both complete denture opposing mandibular anterior teeth and a bilateral distal extension removable partial denture.^[1]

Sequelae of Combination Syndrome

Early loss of bone from the posterior part of the mandible leads to increase in function in the anterior region as a result of posterior hypofunction. Hypertrophy of the anterior mandible with anterior hyperfunction develops. Forces originating from the lower anterior teeth are directed toward the anterior portion of the unsupported maxillary denture leading to loss of bone and ridge height anteriorly, the posterior residual ridge becomes larger with the development of enlarged tuberosity.^[3]

However, enlarged tuberosities are also seen in situations where mandibular molars have been lost, the opposing maxillary molars may supraerupt together with the alveolar process.^[5] Enlarged tuberosities along with an increase in bone height causes the occlusal plane to migrate up in the maxillary anterior region and down in the maxillary posterior region, eventually the natural anterior mandibular teeth migrate upward

with simultaneous mandibular alveolar hypertrophy. Anterior teeth on the complete denture disappear under patients lip effecting the aesthetic, showing none of the maxillary anterior teeth and too much of the lower natural anterior teeth.^[3]

With the lack of posterior palatal seal, a negative pressure develops leading to papillary hyperplasia.^[3] Along with negative pressure, chronic occlusal trauma from incisal edges of mandibular anterior teeth causes flabby tissues in the anterior palate termed as papillary hyperplasia. Contradictory findings have been reported by Kelly^[3] and Uçtasli *et al.*,^[6] while the former has demonstrated resorption in the edentulous maxilla with no resorption in the distal edentulous area of the mandible, its vice versa is true in case of the latter, especially in distal extensions retained by anterior bar.

Another paramount aspect of the combination syndrome as a repercussion of ridge resorption is impairment in established posterior occlusal contact^[1] leading to the progressive collapse of vertical dimension of occlusion causing the mandible to move forward resulting in pseudomandibular prognathism. The Bone resorption beneath the mandibular distal extension, wearing of artificial teeth, positional changes in anterior teeth instigate parafunctional activities, thereby augmenting the force per unit area on the maxillary alveolar bone.^[7,8]

Histopathological Changes

Histopathology of hyperplastic anterior ridge tissue and fibrous tissue over tuberosities are indistinguishable with mature, dense fibrous connective tissue consisting of bundles of collagen fibers, few cellular elements, and a very few inflammatory cells.^[3] This is also similar to the histopathology of mature epulis fissuratum. Similarity of histopathology of all three conditions (hyperplastic tissue, fibrous tissue, epulis fissuratum) may be attributed to similar tissue response to prolonged trauma from denture base.

Management of Combination Syndrome

Ill-fitting dentures have been blamed for all of the lesions of edentulous tissues, but the most perfect denture will be ill fitting after bone is lost from the anterior part of the ridge. Removable dentures need periodic attention to check for any tissue changes. Frequent relining of ill-fitting dentures slows down but does not stop the development of combination syndrome.

Preventing the degenerative changes that complete maxillary denture opposing Kennedy's Class I partial dentures can be best accomplished by avoiding extraction of lower anterior teeth and retaining weak posterior teeth as abutments by means of endodontic and periodontic technique.^[3] Also over denture can be considered as a treatment option of retaining the roots of anterior mandibular teeth to support an overdenture.

According to Langer *et al.*^[9] both well designed removable partial dentures and over denture can be suggested for patients with an edentulous maxilla and some remaining anterior mandibular teeth. Well-designed mandibular removable partial denture is suggested for low-risk patients who have not developed

combination syndrome and whose mandibular anterior teeth are well preserved and have not supraerupted. However, the restoration of the posterior occlusion with removable partial denture will not entirely delay a progressing combination syndrome. The removable partial denture is advocated for situations that may eventually develop combination syndrome, but nevertheless have shown stable occlusion. In the past because of limitations of removable partial denture a more predictable outcome can be expected by use of over denture, especially for patients who already have combination syndrome or whose mandibular anterior teeth are structurally or periodontally compromised.^[9] Additional retention for mandible may be provided by stud attachment. Patients elapsed dental history, and the predicament of the remaining lower anteriors helps in the appraisal of an individual's fortuity of developing combination syndrome.

Apportion of mechanical forces over the larger basal seat area along with minimal displacement over its basal seat area can obviate bony resorption. Commodious coverage of basal seat area by complete denture or removable partial denture, thereby prorating the forces per unit area is elemental to abate ridge resorption and preclude combination syndrome.^[10] Covering the retromolar pad and the buccal shelf with a denture base retards bone loss.^[10]

The destructive changes on the soft tissues brought about by Class I mandibular removable partial dentures constitutes a strong support for "shortened dental arch" concept.^[11] Dentures with only anterior and premolar teeth can meet oral functional demands in most situations.^[12] Surgical options can be considered in treating undesirable conditions associated with combination syndrome.^[13,14] The flabby hyperplastic tissue can be surgically removed, the papillary hyperplasia can be eliminated and enlarged tuberosities can be reduced,^[3] which allows the distal end of occlusal plane to be raised to proper level and allows the lower partial denture bases to be fully extended over the retromolar pad. Correction of premaxillary bone atrophy with bone grafting can be successful in treating combination syndrome.

Traditional occlusal schemes and posterior occlusal forms incorporate a vertical overlap of anterior teeth. Over time, this overlap results in anterior contact or hyperfunction due to the forward and upward movement of the mandible leading to bone loss caused by the anterior hyperfunction syndrome. An alternative option to prevent contact of anterior teeth involves noninterceptive linear occlusion combined with the bilateral fulcrum of protrusive stability.^[15] Linear occlusion consists of masticatory surfaces in the form of a straight, long occlusal ridge in contact with flat monoplane opposing surfaces, there are no cusp inclines with which to make contact during the envelope of function. For this reason, linear occlusion is defined as a non interceptive type of occlusion requiring minimal interocclusal rest space.^[16]

Establishing the horizontal plane of occlusion from the incisal edge of the maxillary central incisors to the top of retromolar papilla on either side in the posterior region is an

integral part of the linear concept of occlusion.^[16] Guidelines for linear occlusion includes use of an alternative tooth form with its inherent absence of anterior vertical overlap.^[17] There is no need for the traditional 2-3 mm interocclusal rest space which does not mean interocclusal clearance is not needed but less is required. For this reason, the centric relation record was made at vertical dimension of rest, allowing teeth to be arranged at a vertical height that reduced vertical overlap of anterior teeth, 0.020 of an inch of vertical clearance was provided during the arrangement of the anterior teeth.^[15]

Both implants retained and implant supported prostheses have become increasing popular and have been proven successful in prosthetic rehabilitation of partially and completely edentulous maxilla and mandible.^[18,19] The unstable occlusion in combination syndrome results in progressive posterior mandibular atrophy. Use of a conventional denture in restoring the mandibular dentition provides the least patient satisfaction as compared with the fixed prostheses.^[20] For this reason, the patient usually elects to have mandibular rehabilitation with implant retained prosthesis.

A fixed implant-supported prosthesis of the same design produced bone apposition in the posterior parts of the mandible, whereas an overdenture supported by two implants resulted in a continuous resorption of the same areas.^[8] A well-documented long-term results were found in fixed mandibular prostheses supported by implants placed between the mental foramina and opposing maxillary complete dentures.^[21] A study has shown that in patients who received mandibular implant-supported fixed prostheses bone resorption in the posterior part of the mandible ceased.^[22]

Conclusion

Clinicians have recognized a number of characteristic features of combination syndrome, but documented observations are rare. Epidemiologic studies related to combination syndrome are yet to be conducted to reach more conclusive results in diagnosing combination syndrome. Destructive changes of hard and soft tissues can be avoided by preventing combination prosthesis by retaining mandibular posterior teeth by endodontic or periodontal treatment. Ill-fitting dentures have been blamed for all the lesions of edentulous tissues yet no matter how well the dentures are made by the denture will be ill fitting with gradual resorption of alveolar bone. Removable partial dentures require periodic recall and checkup as to maintain posterior occlusal contact by constant relining of distal extension denture base to compensate for resorption of bone. Every effort should be made to avoid the potentially destructive occlusal forces exerted on the anterior maxillary residual ridge. The linear occlusal concept can be used to fabricate functional and esthetically pleasing prosthesis. Implant rehabilitation in these patients slows down the bone resorption. However, management strategies should be tailored to suit the needs of an individual patient.

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