

Review Article

Combination Syndrome – A Review

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Abstract

Combination Syndrome is a dental condition that is seen in patients wearing a maxillary complete denture opposing a mandibular distal extension prosthesis with preserved anterior teeth. The characteristic feature 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 the mandibular teeth and loss of alveolar bone and ridge height beneath the mandibular removable partial denture bases. This was identified and coined by Ellsworth Kelly in 1972 as 'Combination Syndrome'. Combination Syndrome is best managed by prevention. If it does occur there are various treatment options that can be considered.

Key Words

Edentulous, hypofunction, combination syndrome, distal extension, papillary hyperplasia, flabby tissue, resorbed maxilla.

Introduction

Combination syndrome was identified by Ellsworth Kelly in 1972 in patients wearing a maxillary complete denture opposing a mandibular distal extension partial denture 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 the mandible leading to posterior open bite. The lack of posterior occlusal contacts causes an eventual and progressive shift of masticatory function to anterior segments resulting in excessive forces in the anterior segments especially in the maxilla.1 Glossary of Prosthodontic terms 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.2 Kelly (1972) proposed the term combination syndrome for this oral condition and its resultant clinical features. He observed 20 patients equipped with complete maxillary dentures opposing distal-extension removable partial dentures (RPD). After three years of follow-up, six of these patients showed a reduction of the anterior bony ridge height on lateral cephalometric radiography. Meanwhile, an increasing bone level of the tuberosities was noted in five patients.3

Features

There may be seven characteristics associated with this syndrome:4

- Bone loss in the premaxilla
- Dropping of the posterior maxilla (tuberosities)
- Extrusion of the lower anterior teeth
- Posterior bone loss in the mandible under the RPD
- Papillary hyperplasia of the maxilla
- Decreased occlusal vertical dimension
- Altered facial esthetics

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.2

However, enlarged tuberosities are also seen in situations where mandibular molars have been lost, the opposing maxillary molars may supra erupt 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 patient's lip affecting 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 Kelly3 and Uçtasli et al.,6 while the former has demonstrated resorption in the edentulous

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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 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

Treatment Options In Combination Syndrome:

Saunders et al in 1979 stated that, the basic treatment objectives in treating these patients is to develop an occlusal scheme that discourages excessive occlusal pressure in maxillary anterior regions in both centric and eccentric positions.⁸

Mandibular R.P.D should provide positive occlusal support from the remaining anterior teeth and have maximum coverage of basal seat beneath distal extension bases.

The design should be rigid and should provide maximum stability while minimizing excessive stress on remaining teeth. The occlusal scheme should be at a proper vertical and centric relation position. Anterior teeth should be used for cosmetic and phonetic purpose only. Posterior teeth should be in balanced occlusion.⁸

Treatment options in the maxillary arch⁹:

Treatment Option 1: Planned Extractions Followed by Immediate Denture:

This technique enables 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.

Treatment Option 2: Overdenture Prosthesis with a Metallic Denture Base:

Maxillary overdenture placed on retained anterior maxillary roots will absorb occlusal forces exerted by anterior mandibular teeth thereby reducing the resorption of the maxillary ridge. Reinforcing the denture base with a cast metal framework has been shown to reduce fracture rates.

Treatment Option 3: Special impression techniques for flabby tissues:

Mucostatic impression techniques are used here. The material used for impression are impression plaster, zinc oxide eugenol, greenstick compound and Elastomeric material.

Treatment Option 4: Surgical Intervention

Vestibuloplasty and excision of flabby tissue followed by metallic denture base prosthesis.

Treatment Option 5: Implants

Implant treatment options like implant supported fixed ceramometal prosthesis, Implant supported over denture can be placed.

Treatment planning for the Distal extension partially edentulous Mandibular Arch:

Treatment Option 1: Overdenture

Mandibular overdenture produced better prognosis in patients who already had combination syndrome and whose mandibular teeth were structurally or periodontally compromised.

Treatment Option 2:

A removable cast partial denture.

Treatment option 3: Mandibular implant supported overdenture

It offers significant improvement in retention, stability, function and comfort for the patient and a more stable and durable occlusion.

Treatment Option 4: Implant Supported Fixed Prosthesis.

In 2001 Wennerberg et al reported excellent long term results with mandibular implant supported fixed prosthesis, opposing maxillary complete dentures.

All these treatment forms were directed towards the preservation of health of natural dentition and its masticatory function.

Discussion

Dorland's Illustrated Medical Dictionary¹⁰ defines "syndrome" as "a set of symptoms which occur together; the sum of signs of any morbid state; a symptom complex." "Combination syndrome" is not included among hundreds of syndromes listed in the dictionary. From this review of the literature it seems obvious that "combination syndrome" does not meet the criteria to be included in such a list. In a review of the literature, the authors have found no epidemiologic study of "combination syndrome." Compared with the main feature, "loss of bone from the anterior portion of the edentulous maxilla," findings such as "papillary hyperplasia of the hard palatal mucosa" seem to be rare.^{11,12} Enlarged tuberosities may also have other causes than those described by Kelly³ as part of the combination syndrome. Enlarged tuberosities are often seen together with supraerupted maxillary molars. In situations where mandibular molars have been lost, the opposing maxillary molars may supraerupt together with the alveolar process.¹³ The supraeruption may create enlarged tuberosities without influence of a denture.

Not surprisingly, no randomized controlled trials (RCTs) on combination syndrome were found. A review of U.S. prosthodontic journals showed that less than 2% of 3631 articles published over a 10-year period could be classified as RCTs. A more extensive review up to the end of year 2000 identified 92 RCTs in prosthodontics, but none related to combination syndrome.¹⁵

Perhaps somewhat more surprising, is that there seems to be no prospective study of the "combination syndrome" in spite of the fact that many people have been provided with a complete maxillary denture opposed by anterior mandibular teeth with or without a Class I mandibular RPD. A long-term 21-year study of patients wearing complete maxillary dentures provided no support for a systematic development of the "combination

syndrome.”¹⁶This does not mean that the observations made by Kelly³were false. In the title of his article, he emphasized the negative role of the mandibular RPD. The same view was expressed by Keltjens et al,¹⁷ who found the traditional treatment for an edentulous maxilla opposed by a partially edentulous mandible with a complete denture and a Class I mandibular RPD to be “fundamentally inadequate.” The authors also suggested use of implants for distal support.

Loss of established posterior occlusal contacts has been discussed as an important factor in relation to the combination syndrome.¹ However, loss of occlusal contacts can be attributed not only to bone resorption under mandibular distal extension bases but also to wear of the artificial denture teeth, as well as to changes in position of the anterior mandibular teeth. It can be speculated that such changes in occlusion facilitate parafunctional activities such as clenching and thereby increase the pressure on the maxillary anterior alveolar bone. This speculative theory fits well with the result that patients who had been provided with Class I mandibular RPDs had development of more signs and symptoms of temporomandibular disorders over a 5-year period compared with a matched group of patients treated with cantilevered fixed partial dentures.¹⁸ It is also compatible with results from in vivo measurements showing that a fixed implant supported prosthesis in the mandible opposing a complete maxillary denture improved the “chewing ability” but did not increase the levels of loads transferred to the denture base.¹⁹

Loss of alveolar bone and residual ridge height beneath the mandibular removable partial denture bases was included in the combination syndrome by Kelly.³ Reviewed articles have shown greater bone loss in the mandible associated with an RPD compared with when no RPD or a fixed prosthesis supported by anterior implants was provided.^{20,21} Compared with cantilevered fixed partial dentures, conventional Class I mandibular RPDs have been shown to cause more carious lesions, more plaque and gingivitis, as well as more signs and symptoms of temporomandibular disorders.¹⁸

The poor biologic outcome with Class I mandibular RPDs constitutes a strong indirect support for the “shortened dental arch” concept^{22,23} indicating that missing posterior teeth should not necessarily be replaced. It has been convincingly demonstrated that dentitions consisting of only anterior and premolar teeth can meet oral functional demands in most situations.²⁴ Also in patients with dentitions associated with the combination syndrome (edentulous maxilla, bilaterally missing mandibular posterior teeth) it seems reasonable to adopt the shortened dental arch concept. This view is also in agreement with the well-documented excellent long-term results with fixed mandibular prostheses supported by implants placed between the mental foramina and opposing maxillary complete dentures.^{25,26}

Summary

The evaluation of the risk of developing combination syndrome is based on 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 almost inevitable. The dentist must carefully plan the treatment of these patients in order to maintain health of the oral tissue of these patients and provide them with prosthesis that provide function but do not contribute to the combination syndrome. Thorough diagnosis, planning and implantation of treatment will result in an outstanding outcome for both the patients and the dentist.

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