# Diagnosis and treatment modalities of triple fusion

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Developmental odontogenic anomalies can occur in both primary and permanent dentition leading to morphological variations in shape, size and structure, and numerical variations like anadontia, hypodontia or oligodontia. According to Kramer PF et al the most commonly reported odontogenic anomaly in primary dentition is co-joined teeth. Co-joined teeth can be due to fusion or gemination. Proper clinical and radiographic evaluation is a must to differentiate between the two. Occurrence of double fusion as an anomaly may not be rare, but triple fusion is a rare odontogenic anamoly. This paper gives a brief insight about incidence, problems associated, diagnosis and treatment modalities of triple fusion.

INTRODUCTION

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

Glossary of Prosthdontic 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 use the term combination syndrome.

Additional changes occurring in clinical situation with 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, poor adaptation of the prosthesis, epulis fissuratum and periodontal changes. [4]

Combination syndrome occurs among 25percent 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 anterior region as a result of posterior hypofunction. Hypertrophy of anterior mandible with anterior hyperfunction develops. Forces originating from the lower anterior teeth are directed towards 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 is also seen in situations where mandibular molars have been lost, the opposing maxillary molars may supraerupt together with alveolar process. [5] Enlarged tuberosities along with 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 esthetics showing none of the maxillary anterior teeth and too much of the lower natural anterior teeth. [3]

With 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 anterior palate termed as papillary hyperplasia. Kelly [3] demonstrated resorption in the edentulous maxilla but not for the posterior edentulous parts of the mandible. However it has been studied patients with a complete maxillary denture opposed by a mandibular distal extension removable partial denture and retained by an anterior bar revealed more bone resorption in the posterior mandible than in the maxilla. [6]

Loss of established posterior occlusal contacts is an important factor in relation to the combination syndrome [1] as a result of resorption of both anterior maxillary and posterior mandibular edentulous alveolar ridges leads to progressive collapse of vertical dimension of occlusion causing the mandible to move forward resulting in pseudomandibular prognathism. Loss of occlusal contacts can be attributed not only to bone resorption under

mandibular distal extension bases but also to wearing of the artificial teeth, as well as changes in position of the anterior mandibular teeth which may facilitate parafunctional activities such as clenching and thereby increasing the pressure on the maxillary anterior 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 histopathology of mature epulis fissuratum. Similarity of histopathology of all three conditions (hyper plastic 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 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 treatment option by retaining roots of anterior mandibular teeth to support an overdenture.

According to Langer [9] both well designed removable partial denture 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. 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. The evaluation of risk of developing combination syndrome is based on past dental history and the condition of remaining mandibular anterior teeth.

To prevent bony resorption mechanical forces must be distributed over as large an area of the basal seat as possible and the denture must make as little movement as possible against its basal seat. Wide coverage with the complete or partial removable denture base to minimize the force per unit area is the basic to reduce ridge resorption and would help to prevent

combination syndrome. [10] Covering the retromolar pad and buccal shelf with 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 both incorporate a vertical overlap of anterior teeth. Overtime this overlap results in anterior contact or hyperfunction due to forward and upward movement of the mandible leading to bone loss caused by anterior hyperfunction syndrome. An alternative option to prevent contact of anterior teeth involves noninterceptive linear occlusion combined with 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 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 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 arrangement of the anterior teeth. [15]

Both implant 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 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 check up 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 anterior maxillary residual ridge . Linear occlusal concept can be used to fabricate functionally 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.