FUNCTIONAL AND ESTHETIC REHABILITATION OF SEVERELY WORN DENTITION WITH SHORTENED DENTAL ARCH CONCEPT

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ABSTRACT

In the twenty-first century, patterns of dental disease in adults are changing. Surveys of adult dental health indicate that more people are keeping their teeth for longer in life. In many cases, the ravages of dental disease and the cumulative effect of a lifetime of restorative dentistry lead to gradual tooth loss. For many of these patients, restoration of a complete dentition may neither be feasible nor desirable. In recent years, functionally oriented treatment planning has become acceptable in light of recent research findings. Using this approach, treatment efforts and resources are directed principally at retaining the 'strategic' part of the dentition in the long term, ie, the anterior and premolar teeth.

KEYWORDS: Rehabilitation, Worn dentition, Interocclusal splint, Shortened Dental arch

INTRODUCTION

Increasing numbers of older adults are retaining teeth into old age. . Many of these patients a high prevalence of dental disease and heavily restored teeth. Badly worn teeth that have drifted into an end-to-end relationship present a real restorative challenge. In general severe occlusal wear can be attributed to [1]: Congenital abnormalities (where tooth structure is weak), attrition, abrasion, erosion and parafunctional habit. Aggravating factors that exemplify the problem can be enlisted as: loss of posterior support, wear from opposing restorative material and stress. [1]

Turner and Missirlian [1] classified the patients with occlusal wear as follows:

1. Excessive occlusal wear with loss of vertical dimension but with space available to restore the vertical height
2. Excessive occlusal wear without loss of vertical dimension but space available
3. Excessive wear without loss of occlusal vertical dimension but with limited space.

Full mouth rehabilitation is re-establishing a state of functional efficiency in which the teeth and their periodontal structures, the muscles of mastication, and the temporomandibular joint mechanisms all function together in synchronous harmony. The object of complete mouth rehabilitation must be the reconstruction, restoration, and maintenance of the health of the entire oral mechanism. [2]

The World Health Organization indicates that a functional, esthetic, natural dentition has at least 20 teeth, while the literature indicates that dental arches comprising the anterior and premolar regions meet the requirements of a functional dentition. The shortened dental arch (SDA) concept is a potentially cost-effective way of managing older, partially dentate adults. [3]

Shortened dental arches comprising anterior and premolar teeth in general fulfill the requirements of a functional dentition. [4-8] Reduction in food trituration caused by shortening of the dental arch does not significantly affect gastrointestinal digestive function.[4] Shortened dental arches had similar prevalence, severity, and fluctuation of signs and symptoms related to TMD compared to subjects with complete dental arches.[5] No evidence was found that shortened dental arches provoke signs and symptoms associated with TMD. [6] There is no evidence that SDA causes overloading of the joints and the teeth, which suggests that neuromuscular regulatory systems are controlling maximum clenching strength under various occlusal conditions.[7] Shortened dental arches can providelong-term occlusal stability. Occlusal changes were self-limiting, indicating a new occlusal equilibrium. [8]

The clinical report presented here demonstrates successful multidisciplinary approach to a full mouth rehabilitation of a patient whose dentition had been esthetically and functionally compromised.

Case report:

The patient, a 56-year-old man, presented with a chief complaint of generalized sensitivity with a desire to improve his dental appearance and replace his missing teeth. Patient was aware of his bruxing habit, which was the chief cause of the occlusal wear. Patient's job involved working in a stressful atmosphere.

Extraoral examination revealed characteristic feature of a reduced vertical dimension like drooping of commissure, deepened mentolabial fold and decreased facial height of the lower third of face. Patient complained of intermittent pain over the TMJ, especially experienced only in the morning. On examination of the TMJ, slight clicking was evident bilaterally.

Intraoral examination revealed generalized advanced attrition on the incisal and occlusal surfaces of the teeth in both arches [Fig. 1]. Abrasion was observed with #16, 14, 13, 23, 35and 45. Teeth 17, 15, 25, 26, 27, 46 and 47 were missing. Centric occlusion did not coincide with maximum intercuspation. The patient presented with end-to-end bite.

The probing depths in both arches were between 2 and 3 mm with minimal bleeding; however, a generalized mild marginal gingivitis was present. No abnormal tooth mobility was noted. Oral hygiene was acceptable. Radiographically, the trabecular bone pattern was generally normal with a finely woven pattern. The crown-to-root ratios with the mandibular anterior were unfavorable, all being at least 1:2.5. Evaluation of the vertical dimension revealed a Silverman's closest speaking space about 3mm and a freeway space of 5mm.

The patient characteristically came under category I of the Turner and Missirlian classification of patients with severe loss of teeth, where patients present following features: -

1. unstable posterior occlusion
2. excessive wear of anterior teeth
3. a closest speaking space of 3mm and interocclusal distance of 6mm
4. some loss of facial contour which includes drooping of the corners of the mouth.

It was planned to restore the out dentition by increasing the vertical dimension of occlusion by 2mm. Maxillary and mandibular impressions were made using irreversible hydrocolloid (Neocolloid, Zhermack, Badia Polesine,Italy) and diagnostic casts were obtained. Maxillary cast was mounted using Hanau fascia face bow on a Hanau H2 articulator. Mandibular cast was mounted using interocclusal aluwax record. Vertical dimension of occlusion was increased by 2mm. Anterior wax up was done to proper size shape and contour. Mandibular posterior occlusal plane was established using Broadrick flag (Simplified occlusal plane analyzer). [9] (Fig. 2) Maxillary occlusal wax up was done to achieve maximum intercuspation. Mutually protected occlusion was developed. (Fig. 3)

Treatment

The treatment plan was presented to the patient. The type of restorations, restorative materials, esthetic expectations, complications, limitations and oral hygiene requirements were discussed. The patient appeared to understand and provided his consent.

Multidisciplinary approach involving the use of combined skills of Prosthodontist, Periodontist and the Endodontist was necessary to rehabilitate the mutilated condition.

1. Thorough oral prophylaxis was done initially
2. To stop the bruxing habit and simultaneously evaluate the patient's acceptance of the increased vertical dimension, a hard bite splint in acrylic was fabricated such that it also increased the patient's vertical dimension of occlusal by 2mm.
3. Endodontic treatment was then done in teeth 14, 23, 34, 33, 32, 31, 41, 42, 43, 44.
4. Gingivectomy was carried out in the lower anterior region to surgically increase the crown length.

Following gingival healing, preparation of teeth was commenced. Custom made post was fabricated with teeth 34,33, 32, 31, 41, 42, 43 and 44 using pattern resin(Pattern Resin, GC Corporation, Tokyo,

Fig.1: Pre-Operative Intra-Oral View

Fig.2:Broadrick flag to establish mandibular occlusalplane

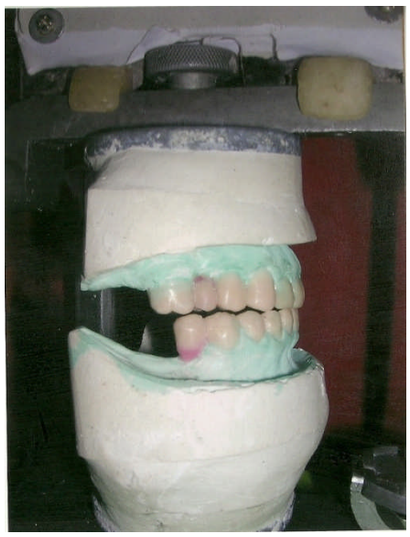

Fig.3: Diagnostic wax up showing Mutually protected occlusion

Fig.4: Post and core built-up with Pattern Resin

Fig.5: Cemented cast post and core

Fig.6: Final restoration inocclusion

Japan). (Fig. 4 & 5) The teeth were prepared for metal-ceramic restorations in the maxilla and mandible. This allowed for provisional restoration of all teeth at an increased vertical dimension with a stable occlusion. Heat-cured acrylic resin provisional shells (DPI-Heat Cure Tooth Moulding Powder; Dental Product of India, Mumbai, India) were fabricated and cemented with zinc oxide without eugenol interim cement (Templute; Prime Dental Products Pvt. Ltd., Mumbai, India). To avoid the insertion of a unilateral removable partial denture, caniilever fixed partial dentures was used to replace the teeth 46 utilizing the teeth 44 and 45 as abutment. [10] To minimize the leverage effect, the pontic was kept as small as possible, more nearly representing a premolar than a molar. [10] The pontic had light occlusal contact with absolutely no contact in any excursion. The pontic was given maximum occlusogingival height to ensure a rigid prosthesis.

The patient was kept under observation with periodic recalls for approximately 4 weeks to evaluate patient's comfort with regards to teeth, muscles, TMJ and esthetics and phonetic acceptance. After 4 weeks of comfortable functioning in the provisional restorations, preparations were refined for definitive impressions. At the time of the impression, all soft tissues were healthy. Maxillary and mandibular full arch impressions were prepared using vinyl polysiloxane impression material (Affinis, Coltene Whaledent AG, Switzerland). Gingival retraction was obtained using plain braided cord moistened in aluminum chloride solution. Each impression was poured twice with Type IV Die Stone (Heraeus kulzer).

The metal frameworks were tried intraorally for adequate position and tightness of the proximal contacts, acceptable marginal adaptation, stability and internal adaptation. The castings were returned to the laboratory for the application of porcelain. Bisque trials for verification of the fit, interproximal contacts and occlusion were accomplished. Definite restoration with porcelain fused to metal crowns exhibiting a vital and natural appearance with proper contour, shade and optimal incisal transulency were cemented. (Fig. 6) A mutually protected occlusion was achieved and verified intraorally using articulating paper.

CONCLUSION

Discussion

Increasing numbers of older adults are retaining teeth into old age. Many of these patients refuse to wear removable partial dentures, and have a high prevalence of dental disease and heavily restored teeth. Every patient has unique treatment requirements. Proper diagnosis and treatment plan are an important aspect of rehabilitation. It is not always possible to restore an extremely worn occlusion without some increase in vertical dimension. The decision whether to increase the vertical dimension or not is crucial and requires careful monitoring at intermediate stage. It is permissible to alter the vertical dimension when necessary for achieving an improved occlusal relationship as long as teeth are properly intercuspated at a correct centric relation. [11] Before increasing the vertical dimension, one should evaluate the alveolar bone. Dense sclerotic bone with numerous exostoses does not have the same capacity to remodel as alveolar bone with normal trabeculae. [11] In some cases esthethic needs of the patient cannot be satisfied without surgical crown lengthening

The functional demands of patients are highly variable and individual, requiring dental treatment to be tailored to the individual's needs and adaptive capability. In general, occlusion of a complete dental arch is preferable. However, this goal might be neither attainable, for general, dental or financial reasons, nor necessary. Most studies agree that individuals were more concerned about missing anterior teeth and having anterior rather than posterior teeth replaced. Aesthetics is more important than function for a great majority of individuals. The shortened dental arch (SDA) concept is a potentially cost-effective way of managing older, partially dentate adults. However, case selection is critical and long term preservation of a functional dentition may not be possible in certain patients. The shortened dental arch concept is based on circumstantial evidence: it does not contradict current theories of occlusion and fits well with a problem-solving approach. The concept offers some important advantages and may be considered a strategy to reduce the need for complex restorative treatment in the posterior regions of the mouth.

A large portion of patients are partially dentate adults with complex socio-demographic, medical and dental factors. Patients needs and demands vary much and should be individually assessed and should also take into account social and psychological impacts on oral health status. Shortened dental arches in general fulfill the requirements of a functional dentition. The shortened dental arch concept requires continuing research, evaluation and discussion but this concept deserves serious consideration in treatment planning for partially edentulous patients.

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