Research Paper

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Designing Smile of a Worn Out Dentition - a Clinical Case Report

Medical Science

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ABSTRACT

Every individual, at some point in his life, develops regressive changes like attrition and abrasion. Although, to some extent, it is considered physiologically normal and does not require treatment, severe attrition of the dentition may be detrimental to the patient. It may lead to pulpal injury, occlusal disharmony, subsequent difficulty in mastication and muscular pain, along with it being highly unaesthetic. The restoration of function and aesthetics of such a dentition requires a multi-disciplinary approach. This clinical report highlights the use of surgical clinical crown lengthening procedure along with endodontic and prosthodontic procedures to rehabilitate a severely attrided dentition.

Introduction:
Regressive changes such as attrition, abrasion and erosion, which lead to wear of tooth structure, are commonly seen in all individuals. Attrition is defined as the physiologic wearing away of a tooth as a result of tooth-to-tooth contact, as in mastication. It occurs only on the occlusal, incisal and proximal surfaces. While all occlusions wear to some degree over the lifetime of the patient, normal physiological wear usually does not require correction.[1]

Clinical crown of the tooth is the distance from gingival margin to the incisal edge or occlusal surface of the tooth. Severe attrition of teeth leads to great reduction in the length of the clinical crown. This eventually leads to altered vertical dimension of occlusion. Due to posterior prematurities, the muscles of mastication are in a state of imbalance and will close the mandible in a position that is not in alignment with centric relation, due to accommodation of the teeth.[2] This leads to difficulty in mastication and subsequently pain in the muscles. Restoration of this dentition is essential to establish a harmonious occlusion. Excessive wear of tooth structure can also result in pulpal injury and aesthetic deformity.[3]

Thus it becomes a challenge to restore a severely worn out dentition to its functional and aesthetic form. The following case report highlights the use of surgical clinical crown lengthening procedure along with endodontic and prosthodontic procedures to rehabilitate a severely attrided dentition.

Case Report:
A 33- year old patient reported to the Department of Periodontics with the chief complaint of severe tooth wear and desired aesthetic enhancement of the same. The patient did not present with any significant medical history. Extraoral examination showed no muscle tenderness or temporomandibular joint disorder.

Intraoral examination showed generalised severe attrition of dentition in both the arches. Severe abrasion was seen in some anterior teeth. 28 teeth were present with mild spacing between the anterior teeth. The gingiva was pale pink, firm and resilient and showed no periodontal pockets or loss of clinical attachment. (Fig.1)

Figure 1 about here
An orthopantomograph was also taken which depicted no significant bone loss in any area.

Figure 1- Pre-operative view of the dentition

Treatment Procedure:
Oral prophylaxis was first carried out and oral hygiene instructions were given.

A bite guard was fabricated and given to the patient to be used to prevent any further loss of tooth structure.(Fig.2)
Figure 2 about here

Figure 2- Bite guard

Endodontic treatment was carried out for the entire dentition using the step-back technique for biomechanical preparation. (Fig.3)
Figure 3 about here

Figure 3- Endodontic treatment

Obturation was done with gutta percha points. The post obturation restoration of the teeth was done using composite.

Impressions were made using irreversible hydrocolloid impression material and diagnostic models were prepared. Facebow transfer of the maxillary cast was done(Fig.4)

Figure 4 about here

Figure 4- Face bow transfer of maxillary cast

and mounted on a semiadjustable articulator (Whip Mix) and mandibular cast was mounted with a Lucia Jig in the anterior region and interocclusal records in the posterior region. (Fig.5)

Figure 5- Casts mounted on Whip Mix articulator

An occlusal splint was provided to the patient as part of reversible interventional modalities to evaluate adaptation of the patient to altered vertical dimension of occlusion(VDO). The patient was kept on a diagnostic and observational period of 6 weeks before the definitive restorative phase of rehabilitation was started to ensure that the patient was adapted to this new vertical dimension and changes were made through this period as required.

As the clinical crown length was deemed insufficient for adequate retention of the prosthetic crowns, crown lengthening procedure of the entire dentition was advised. It was carried out in various appointments.

Figure 6 about here

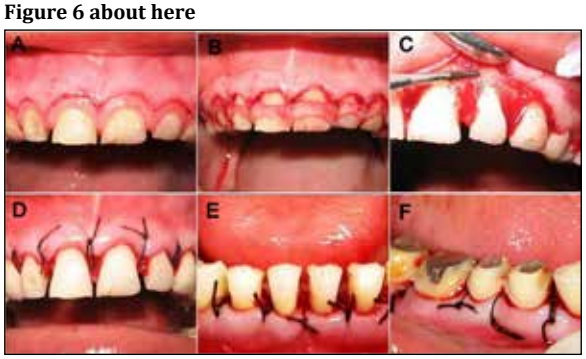

Fig.6- Crown lengthening procedure
A- Internal bevel and sulcular incisions given. B- Wedge of tissue removed. C- Flap raised and alveolar bone reduction done. D- Sutures placed. E,F- Procedure performed in remaining areas of dentition.

The bleeding points were marked on the gingiva according to the required length of the crowns. Using Bard-Parker knives #12 and #15, the incision, called the internal bevel incision, was started from the marked points on the gingiva and was directed to an area at or near the crest of the bone. (Fig.6-A) Sulcular or crevicular incision was given from the base of the sulcus to the crest of the bone. This incision along with the internal bevel incision formed a V-shaped wedge of tissue at the crestal bone which was removed. (Fig.6-B) A periosteal elevator was inserted into the internal bevel incision and a full-thickness mucoperiosteal flap was seperated from the bone. Following this, the interdental incision was made to seperate the collar of gingiva around the tooth. Ostectomy was performed to obtain sufficient tooth structure above the crestal bone. Recontouring of the bone was done both buccally and lingually. (Fig.6-C) The surgical site was irrigated with saline. The flap was closed in the same position with the help of interrupted sutures using 3-0 non-absorbable silk sutures(Fig.6-D) and a periodontal pack was given. The patient was called after one week of surgery for suture removal. Similarly, crown lengthening was done for the remaining teeth. (Fig.6-E,F) Healing of periodontal tissues was evaluated by regular follow-up. (Fig.7)

Figure 7 about here

Figure7- Post healing

After healing of the gingiva, tooth preparation was done to receive the crowns.

Impressions were made and working models were prepared. Wax patterns were then fabricated in accordance with the new established VDO(Fig.8),

Figure 8 about here

Figure 8- Wax build-up of crowns

and were casted. The metal copings were tried in the patient's mouth. Definite restorations with porcelain-fused-to-metal crowns exhibiting a vital and natural appearance with proper contour and desired shade were fabricated.

Permanent restorations were cemented using Type I GIC luting cement. (Fig.9)

Figure 9 about here

Figure 9- Final restorations

Thus, the masticatory efficiency, with the help of increased vertical dimension of occlusion, as well as the aesthetics were established.

Discussion:
The concept of tooth lengthening was first introduced by D. W. Cohen in 1962 and has been used ever since to provide retention form to allow for proper tooth preparation, impression procedures[4], placement of restorative margins[4] and to adjust levels for aesthetics[5,6].

The method of crown lengthening is chosen according to the biotype of periodontium[7]:

– in case of thin periodontium with sufficient width of attached gingiva: gingivectomy;
– in case of thin periodontium with short width of attached gingiva: apically positioned flap;
– in case of thick periodontium: apically positioned flap with osteoplasty.

While carrying out crown lengthening procedures and placing crowns, it is important to ensure that the biologic width is maintained to retain a healthy periodontium. Gingival biological width (biologic membrane, dentogingival attachment) is the area of gingiva attached to the surface of the tooth coronary from the alveolar bone. Based on a study8 done on dentogingival junction of cadavers by Garguilo and Orban, it is calculated by adding widths of connective tissue attachment(1.07 mm) and epithelial attachment(0.97 mm) and is established as 2.04 mm.

From a periodontal viewpoint, both supragingival and equigingival margins of restorative crowns are well tolerated. The greatest biologic risk occurs when placing subgingival margins for finishing procedures, and in addition, if the margin is placed too far below the gingival tissue crest, it violates the gingival attachment apparatus. Bone loss of an unpredictable nature and gingival tissue recession occur as the body attempts to recreate room between the alveolar bone and the margin to allow space for tissue reattachment. This is more likely to occur in areas where the alveolar bone surrounding the tooth is very thin.10 Thus it becomes very essential to maintain the biological width when planning a restoration.

The first step in using sulcus depth as a guide in margins placement is to manage gingival health. Once the tissue is healthy, the following three rules can be used to place intracrevicular margins.[9,10]

1. If the sulcus probes 1.5mm or less, place the restoration margin 0.5mm below the gingival tissue crest.
2. If the sulcus probes more than 1.5mm, place the margin one half the depth of the sulcus below the tissue crest. This places the margin far enough below tissue so that it still is covered if the patient is at higher risk of recession.
3. If a sulcus greater than 2mm is found, especially on the facial aspect of the tooth, then evaluate to see whether a gingivectomy could be performed to lengthen the teeth and create a 1.5mm sulcus. Then the patient can be treated using Rule 1.

In this case, the crowns were placed subgingivally 0.5-1 mm into the gingival sulcus in the anterior teeth and equigingivally for posterior teeth, where aesthetics wasn't a major concern. A minimum biologic width of 2 mm was maintained throughout to ensure a healthy state of the periodontium.

Conclusion:
Severely attrided cases may pose a challenge to the dentist to gain space, in order to create restorations that rehabilitate the occlusion and function, along with satisfactorily enhancing aesthetics. The case presented demonstrates the use of surgical crown lengthening procedure to gain adequate space required to provide suitable restorations. The maintenance of biologic width ensures greater long-term predictability of the definitive restorations and better prognosis for the periodontal health of the patient.

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