

Case Report

## Utilizing Dahl Concept and Composite Build-Up for Anterior Tooth Surface Loss

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**Abstract**— This case report describes the technique of composite build-up for tooth surface loss using direct composite resin restoration. This technique has the advantages of being conservative while improving aesthetics and restoring function for the patient.

**Keywords**— Aesthetic; dental erosion; Dahl concept; adhesive dentistry; tooth surface loss

### I. INTRODUCTION

The aetiology of non-carious, pathological tooth surface loss (TSL) can be caused by factors such as attrition, abrasion, erosion and abfraction, and sometimes can be multifactorial [1]. Although in some cases it is not easy to pinpoint a specific aetiological factor, signs and symptoms with the addition of patient history may provide clues for diagnosis. Each factor can be described as the following:

1) *Attrition*: mechanical wear of teeth-to-teeth contacts. The tooth wear has a distinctive matching facet which are glossy and flat. There is also presence of linea alba at the height of the occlusion, scalloped tongue, history of repetitive damage to restorations, or a habit noticed by their sleeping partner to indicate parafunctional habit [2].

2) *Abrasion*: caused by an abrasive external factor such as tooth brushing. The lesion can be seen as a wedge-shaped surface loss at the cervical area or shallow cupping at the occlusal surfaces [3].

3) *Erosion*: chemically induced TSL caused by extrinsic or intrinsic factors such as repeated regular acidic food intake or vomiting among other causes. At an advance stage of erosive TSL, there is a cupping effect, smooth silky-glazed or sometimes dull enamel and a halo-like enamel surrounding a much more affected dentine [4].

4) *Abfraction*: the flexure of the tooth causing TSL at the cervical area during function [5].

Particular attention to the aetiology of TSL is important because without removal of the causative factor, the problem will persist and result in a less than ideal oral environment and difficult restorative treatment in the future. Although TSL is also a physiological process that occur throughout life, the rate of loss which continue at a much rapid pace for some individual can result in functional or aesthetic concern that require management [6]. This case report will focus on a primarily erosive TSL.

## II. CASE REPORT

A 56-year-old gentleman came with a complaint of worn-down front teeth. He started to notice this condition a few years back and is now concerned about his appearance and functionally when he experienced pain due to accidental biting on the lower lip with the sharp anterior teeth.

Intraorally, the patient presented with tooth surface loss (TSL) on the palatal surface of the upper anterior. The palatal surface of the teeth has cupping concavity with no stain, and ring of enamel giving out halo effect of the teeth (Fig. 1). He was diagnosed with mild to moderate TSL on the upper anterior, primarily due to erosion and secondary factors of attrition and abrasion. He also presented with plaque induced gingivitis predominantly on the lower anterior.



Fig. 1 Pre-op photograph showing anterior palatal tooth surface loss



Fig. 2 Pre-op photograph

Prior to restorative treatment, stabilization of disease was done. The source of erosion needs to be identified to remove the causative factor. The patient has no history of parafunctional habit. He was supplied with diet sheet which recorded his dietary habit from two days of the week and one day on the weekend, and dietary analysis on his diet revealed extrinsic source of the erosion, in which he indulged in three to four times of beer drinking which amount to around 22 pints a week. Dietary modification was implemented to reduce acidic food intake thus lessening active erosion.

In post-stabilisation phase, intraoral impression was taken using alginate for both upper and lower arches and Lucia jig was done to position the jaw at the retruded contact position (RCP) [7]. The casts were then mounted in RCP for diagnosis and treatment planning. Diagnostic wax-up for all upper anterior teeth was requested from the laboratory on duplicated casts to assess the static and dynamic occlusion, occlusal vertical dimension (OVD) and for teeth mock-up (Fig. 3).



Fig. 3 Photograph of diagnostic wax up for the upper anterior

Treatment options were laid out, and the treatment chosen was to restore the patient's aesthetic concern conservatively as well as to remove the source of discomfort, with direct composite bonding on the palatal portion of the upper teeth. Mock-up trial was done with bis-acrylic composite (3M™ Protemp™, US) for occlusion and smile assessment. The patient was satisfied with the aesthetic of the increased anterior tooth height (Fig. 4).



Fig. 4 Mock-up using temporary material

Index made from laboratory putty (3M™ Express™, US) and the diagnostic wax-up was used to transfer the agreed mock-up by restoring the tooth using composite resin (3M™ Filtek™, US) (Fig. 5). Build-up was done in thick section while leaving the posterior teeth unopposed to get 'Dahl effect' [8]. The patient came for review weekly after the build-up. After a month post-composite build-up, the opposing occlusion has been re-established. The patient was happy with the aesthetic with no sign and symptom to the treatment (Fig. 5).

## III. DISCUSSION

In the stabilization phase, dietary modification is an integral part due to the huge impact it has to patient's dentition. Although it is a huge challenge and almost unrealistic to completely change a patient's diet, a well-presented cause and effect help in behavioural and diet modification. The patient was also advised to brush his teeth with fluoride toothpaste to increase enamel resistance to acidic challenge posed by the beer [9].

Due to the nature of the tooth surface loss (TSL) which occurs over time in which the rate of attrition is in balanced with the compensatory dentoalveolar growth, there was no space for restorations of the anterior teeth [10]. 'Dahl concept' refers to the relative axial tooth movements that occur when restorations are placed supraocclusally in a localised area and the rest of the occlusion will re-establish over a period of time. Using this concept, 'Dahl effect' was employed to create space for restorative material to restore the localised anterior TSL. It is indicated in cases where only localized restoration

space is needed with no restorative treatment indicated for the rest of the dentition.



Fig. 5 Post-treatment photographs

In this case report, a controlled posterior axial tooth movement occurred when composite restoration was placed on the palatal portion of the upper anterior teeth, creating space posteriorly. It is crucial for the patient to come for regular visits to monitor the tooth movements. After a few months, patient intercuspal tooth contact would be re-established.

Dahl concept is a combination of intrusion of the anterior teeth and eruption of the posterior teeth thus avoiding the need to increase the OVD of the patient [11]. This technique has been shown to be effective with proper maintenance visits [12]. Facebook usage is crucial for record transfer from the patient's mouth to an articulator before diagnostic wax-up can be constructed on the cast in this reorganized approach. Modification on the cast can be easily transferred to the patient's mouth using index and temporary crown material to assess patient's comfort.

Indirect restoration can be an alternative option to composite build-up, however the cost of the treatment will increase significantly. Although there is concern on the durability of the composite restoration in comparison to indirect restoration, composite restorations have been shown to have a good medium-term survival, easy maintenance and less catastrophic failure to the restoration than an indirect option [13][14][15]. Therefore, it is part of the maintenance regime that the patient is encouraged to attend review visits as prescribed by the clinician for the polishing and maintenance of the composite build-up.

The usage of composite during build-up is not only conservative but it can also be modified to suit patient's comfort should failure occurs. Due to this reason, it is pragmatic to choose bonded direct restoration as the first treatment option. However, in a case of repeated failure of the

composite restoration, indirect restoration should be considered as a definitive treatment.

#### IV. CONCLUSIONS

Where full mouth rehabilitation is needed, a conservative approach towards restoration should be applied. Direct composites build-up is a conservative technique without the need for tooth preparation, with good aesthetic outcome.

#### CONSENT TO PARTICIPATE

Informed consent was obtained from the patient for the anonymized information to be published in this article.

#### CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

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