

A Conservative Approach to Treatment of Dental Erosion: Case Report

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Abstract

Tooth surface loss is a common condition with nearly three-quarter of the population in Trinidad & Tobago exhibiting signs and about one-fifth of those persons have moderate or severe wear. These patients become difficult to treat due mainly to loss of clinical crown height and also loss of occlusal vertical dimension. This case depicts the use of a conservative approach to treating a patient with moderate tooth surface loss, as assessed via the tooth wear index, with aetiology of acid erosion. The poor appearance of the dentition was the patient's chief presenting complaint. With the use of 3M Filtek™ Z 250 Universal Restorative Composite (St Paul, MN, USA), temporary posterior build-ups were placed to increase the patient's Occlusal Vertical Dimension (OVD) and were subsequently replaced with metal onlays. Anterior composite veneers were placed to achieve an aesthetically pleasing result at the increased OVD. The combined use of composite and metal onlays allowed for an economical and more conservative treatment modality for dental erosion rather than full coverage posterior and anterior crowns.

Keywords

Erosion, Tooth Wear, Onlays, Veneers

1. Introduction

Tooth surface loss (TSL) or tooth wear has been increasing in prevalence in industrialized countries. The same holds true for the country of Trinidad and Tobago, where it has been found that 72% of the population have some degree of tooth surface loss. Of the 72%, 20% of individuals exhibited moderate or severe TSL [1] partially associated with dietary constituents causing dental erosion. Apart from eliciting a patient's diet and medical history, TSL with an etiology of erosion can be clinically determined as it has a classical intraoral presentation.

Erosion characteristically presents with the most affected areas being on the maxillary palatal surfaces and occlusal surfaces of mandibular first molars. The distinct appearance of erosion is seen as smooth, flat wear facets palatally or facially and dimpling of the occlusal surfaces which progress to large cupped out lesions exposing underlying dentine [2]. The high prevalence of TSL necessitates the demand for appropriate dental treatment. Traditionally, full mouth rehabilitation has been the approach for restoring a worn dentition; however, the focus has changed to conserving and protecting the remaining tooth structure [3]. Treatment of dental erosion via placement of direct adhesive restorations has been widely and successfully been studied [4]. This conservative approach has been used in restoring the worn dentition in patients with a variety of medical conditions including gastric reflux disease [5], anorexia/bulimia [6] and also in patients with dentinogenesis imperfect [7]. As such, this case shows conservative management that is feasible for any general dental practitioner and economical for the patient.

2. Case Report

A 52-year old Indo-Trinidadian male patient was referred to the Restorative Department of the UWI Dental School Polyclinic in Trinidad for treatment as he was unable to afford full mouth rehabilitation treatment at a private practice. The patient who has a clear medical history presented with moderate generalized wear on the occlusal, incisal and labial and palatal surfaces as seen in **Figure 1(a)-(g)**. The patient's classic presentation of tooth wear due to erosion was confirmed as the patient admitted to the excessive use of apple cider vinegar. The patient was unaware of any parafunctional habits and had no complaints of pain; however the patient was unhappy with the appearance of his dentition. Due to the patient's financial constraints, a conservative approach was agreed upon by the patient and clinicians versus full mouth rehabilitation utilizing full coverage crowns. The accepted treatment plan was outlined as follows:

- Diet modification via a reduction in amount of apple cider vinegar being consumed and advised to use straws for consumption;
- Increase the Occlusal Vertical Dimension (OVD) by 1 - 2 mms with temporary posterior composite build-ups;
- Placement of anterior composite veneer restorations for aesthetics and re-establish canine guidance;
- Monitor stability of patient's new occlusal scheme (3 to 6 months);
- Placement of posterior metal onlays on lower 1st molars (with considerations for onlays on lower 2nd premolars and/or lower 2nd molars);
- Monitor for stability of occlusion with onlays (6 months);
- Consideration for placement of fixed anterior prostheses (porcelain veneers/full coverage crowns), if patient is willing.

Diagnostic wax ups were placed on study models and posterior silicone stents were fabricated using Dreve Dentamid GMBH Regofix® (Germany) transparent



Figure 1. Pre-operative pictures. (a) Facial view: showing the worn anterior teeth, discolored with thinned out incisal edges; (b) Right lateral view: showing the eroded and discolored buccal surfaces; (c) Left lateral view: showing eroded and discolored buccal surfaces; (d) Upper Occlusal view: shows the palatal surfaces worn down and cupped out; (e) Lower occlusal view: shows the heavily eroded first and second molars; (f) Right bitewing; and (g) Left bitewing: show the moderate loss of enamel and dentine but with good bone levels.

silicone material. Teeth underwent minimal preparation, etchant, primer and adhesive placed and cured, and were restored using 3M Filtek™ Z 250 Universal Restorative Composite (St. Paul, MN, USA). The composite filled stents were seated on the posterior teeth and cured increasing the OVD. The stents allowed for replication of the diagnostic wax up, and also aided in ease of placement of composite. The use of the transparent Regofix® facilitated the ability to light cure the composite through the stent [Figures 2(a), Figures 2(b)]. The restorations were polished and morphology recontoured. Aesthetics was addressed via placement of composite veneers on the labial and buccal surfaces as well as palatal surfaces and building in canine guidance [Figures 3(a)-(c)]. The patient was advised that his bite would be uncomfortable initially, after which his neuromuscular feedback will adapt to the new OVD of his dentition. Prior to placement of the anterior composites, the patient experienced difficulty in biting anteriorly. Once the posterior and anterior composite restorations were in place, the patient adapted well to the new occlusal scheme and was able to function comfortably. Over a period of 3 months, the patient remained at the increased OVD. During this continued stabilization period, the patient returned for monthly reviews requiring minor repairs of chipped composite restorations.

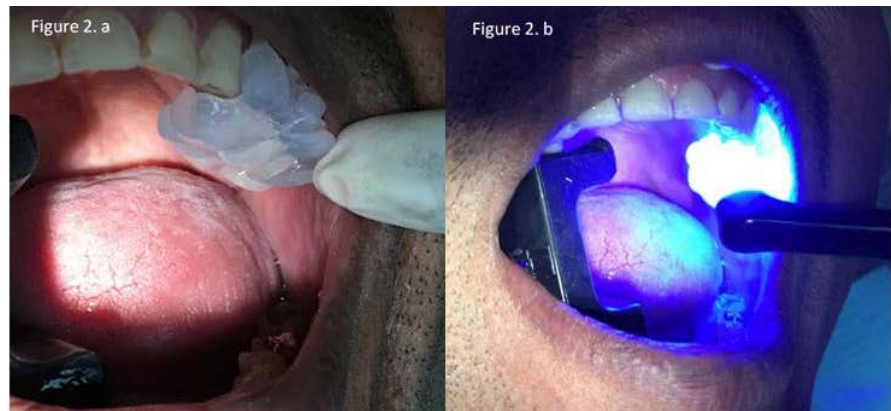


Figure 2. Use of regifix transparent. (a) Stent placement; (b) Light curing through stent.



Figure 3. Composite veneer restorations of labial/buccal surfaces to restore aesthetics and canine guidance. (a) Facial view; (b) Right lateral view; (c) Left lateral view.

Six months after initial placement of the composite restorations, preparation and temporization of the lower 1st and 2nd molars were carried out with subsequent secondary impressions taken for laboratory fabrication of metal onlays. The lower first and second molars were selected for metal coverage as they were mostly extensively worn down exposing dentine. Interim provisional onlays were temporarily cemented while the laboratory fabricated the permanent posterior metal onlays. These were then tried in and cemented with adhesive resin cement Panavia F 2.0 (Kuraray America Inc. NY, USA) in June, 2018.

Upon the 6-month review after final cementation, the patient returned with intact metal onlays and some minor chips in the composite restorations that required repair with reestablishment of canine guidance [Figures 4(a)-(j)].

At the one-year post-operative review of placement of posterior onlays and anterior composite veneers the patient has been functioning comfortably with no repairs required. The patient was offered the options of either anterior porcelain veneers or ceramic crowns but has opted to wait longer as he is comfortable.



Figure 4. Post Operative Pictures. (a) Facial view; (b) Right lateral view, (c) Left lateral View: showing composite veneers with improved aesthetics in the position of maximum intercuspation; (d) Lower occlusal view: showing the cemented metal onlays on the first and second molars; (e) Right lateral excursion and (f) Left lateral excursion: show the canine guidance restored to the patient (g) & (h) Right bitewings, (i) & (j) Left bitewings: these bitewings show the metal onlays cemented with no defective margins and the composite restorations intact.

A maxillary occlusal splint was fabricated for nightly wear to help protect and increase the longevity of the restorations.

3. Discussion

With the advent of naturopathic medicine, there has been an increase in the prophylactic use of herbs, essential oils and tonics. Research has shown that daily vinegar consumption has reduced serum triglyceride levels and body fat mass in individuals [8]. However, due to the low pH, there has been a strong association between TSL and the consumption of vinegar [9]. Consequently, the patient's frequent apple cider vinegar consumption resulted in erosive wear from the extrinsic source. According to the tooth wear index in the 1998 UK Adult

Dental Health Survey, the patient has a score of 2 and is thus classified as having moderate TSL. **Figure 1** depicts the patient's TSL score of 2 as there is loss of enamel on more than 1/3 of the surface area on the buccal/lingual/palatal surfaces and more than 2 mm of exposed dentine on the incisal edge without pulpal exposure or exposure of secondary dentine [10].

The patient's treatment of moderate TSL began with diet modification to first reduce the amount of apple cider vinegar that was consumed and the method of consumption was changed via use of a straw to minimize contact with the teeth. The treatment of choice involved use of adhesive resin composite restorations as they are more advantageous in managing tooth wear than using full coverage crowns. The main advantage is that it allows for preservation of the remaining tooth structure after already having significant TSL due to erosion. Taking into consideration that when composite restorations are used to treat anterior wear, they have a short to medium term survival, with a median survival rate of approximately 4.5 years [11], they are still more financially economical at both its initial placement and for any future repairs. This technique of direct application of resin composite is also advantageous as it allows for rehabilitation without the need for multiple laboratory steps which may not be feasible due to the laboratory cost or lack of experienced lab technicians [12].

A diagnostic wax-up was performed which gave the patient a visual representation of what to expect, but also aided the clinician with placement of composite restorations using the "index technique" [13]. Placement of direct composite restorations at the increased OVD, was done as a temporary measure to first assess the patient's ability to tolerate the new OVD and secondly to provide an immediate aesthetically pleasing result. Changing a patient's occlusal scheme has been deemed as a daunting procedure as it is thought that it can precipitate tempero-mandibular dysfunction (TMD). However, studies show that there seems to be no TMD once there is a reasonable increase in OVD [14] [15]. It has also been shown that patients can readily adapt to a change in their occlusion [16] and it was subsequently proven in a 30 year follow up study, that there were minimal to no adverse effects from an increase in OVD [17]. As such, the patient successfully adapted to the increased OVD, expressing at all visits that he was comfortable at the new height. Other cases have shown the use of direct composite resins in the management of tooth wear and their durability at an increased vertical dimension [18] [19] [20]. Patients have been followed up with satisfactory performance for 8 years [18] and also other cases with high patient acceptance and restorations showing good clinical performance [19]. Direct composite resins provide a conservative approach to worn teeth rather than the conventional indirect method of porcelain fused to metal (PFM) or all ceramic crowns which is more destructive.

Considerations for patient availability and clinic availability at the UWI Dental Polyclinic resulted in metal onlays to be fabricated after 6 months. The metal onlays served as the definitive restorations on the posterior teeth. They mini-

mized the amount of tooth preparation required thus abiding by the concept to preserve the maximum amount of remaining tooth structure [3]. The patient has been reviewed after one year and is very happy with his appearance and his function.

This case report highlights that in an economically conscious society, a conservative, minimally invasive approach can successfully be taken to treat a patient with moderate erosive wear. The main consideration is to preserve the remaining tooth structure by restoring with direct resin composite and minimize tooth preparation by fabrication of metal onlays at a tolerated increased OVD.

Consent

The patient has given his consent for this report to be published and it is in his chart at the UWI School of Dentistry

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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