Dental erosion caused by Chromic Acid – Full mouth rehabilitation: A Rare Case Report

Smita Govila* MDS, Vivek Govila* MDS
* BBD College of Dental Sciences, Lucknow, Uttar Pradesh, India

Address for correspondence: Dr. Smita Govila, D-3 Sector H, Near Purania Chauraha Aliganj, Lucknow-226024 Uttar Pradesh, India
E mail: govila_smita@yahoo.com

Abstract: This article reports a case of occupational dental erosion which was reported in a chemical engineer who had worked in the chemical industry for sixteen years. His occupation involved daily, (at least 6 hours) inhalation of chromic acid being used for cleaning of barrel guns and cannons. The erosion manifested initially as dental sensitivity which led to severe cervical erosion and pulp exposure in anterior teeth. Due to the adverse effect of the chemical to gingival and/or periodontal tissues, the lesions led to the exposure of root-cementum. After thorough oral prophylaxis, cervical lesions were restored conservatively with a compomer based restorative material without cavity preparation.

Keywords: Chromic acid, Compomer restorative material, Cervical lesion, Erosion

INTRODUCTION

Dental erosion is defined as the loss of tooth substance by a chemical process that does not involve bacteria. It is an irreversible lesion leading to altered appearance and function and eventually tooth loss. It can involve any tooth surface, but it is commonly seen on the facial, occlusal, and lingual surfaces.

The etiology of dental erosion can either be intrinsic or extrinsic: the former is due to hydrochloric acid from the stomach; the latter originates from the acidic foodstuffs, beverages, and snacks and exposure to acidic contaminants in the workplace, particularly in certain occupations,(1–3) workers in the battery factory and in the lead sealing industry have routinely been reported for the risk of dental erosion due to industrial acids exposed to the atmosphere.(4,5) Generally, those involved in the chemical industry workers often complain of sensitivity and harmful wear in their teeth. Although the pattern of damage depends on the exposure time and intensity, the reviewed literature data showed that specific corrosion cases do rarely occur, especially concerning industrial harmful agents.(6) Also, current industrial safety standards have lessened the occurrence of erosion associated with environmental hazards in the work area.

Chromic acid (CrO3–chromium chromite) is usually categorized as metal, and often used in an aqueous solution. Chromite, a compound of chromium, and crocoite, a lead chromate mineral, are the two principal forms of naturally occurring chromium. The former mineral is used commercially for the production of chromium containing materials. It is a highly stronger oxidizer agent, can
This is a report of a patient with dental erosion as a consequence of working in a special industrial environment causing extreme tooth-wear due to chromium containing materials.

CASE REPORT

A 47-year-old male patient reported to U.P. Dental College and Research Centre, Lucknow with a request for the elimination of the pain resulting from the upper right canine, and also treatment of his defective teeth. From his history, it was understood that he was a chemical engineer, and had been working in a chromium-plate-workshop for 18 years. The patient had no history of smoking, did not drink fruit juices nor consume a high quantity of fruit or confectionery. He had good health and there were no symptoms to suggest salivary gland hypofunction.

Intra oral examination revealed that oral mucosa appeared moist and healthy with clear saliva flowing freely from all major duct orifices. No carious lesions were present. A vast destruction of the upper jaw teeth was obvious at first sight, particularly on the buccal aspect. On detailed examination, abrasion of the anterior teeth and premolars on both sides up to the marginal gingiva was visible in the upper jaw (Fig.1). As a part of the dental examination, saliva from the patient was collected by expectoration over a 10-minute period in the basal state and after stimulation by chewing on paraffin. Samples were immediately analyzed for buffering capacity using the Dentobuff Strip (Orion Diagnostica, Finland), and were found to be “medium level”.

In the first stage, panoramic X-ray examination revealed a profound caries with pulpal involvement in tooth 14,15,22,23,24,25,31,32,33,34,35,41,42,43, 44,45. These teeth were endodontically treated, using a root canal sealer (Sealapex, Kerr, USA) and the access cavity was sealed with temporary filling material (3M-ESPE, Germany). In the second stage, through oral prophylaxis was carried out and the patient was instructed and trained to be able to maintain proper oral hygiene.

Further patient was advised to use a 0.05% sodium fluoride rinse at least twice daily and to use a soft nylon toothbrush. Depending on the degree of tooth wear, restorative treatment was performed, using a compomer restorative material. The quadrant to be restored was isolated with cotton rolls, and dried with airspray. After color selection, a single bond (Prime & Bond NT, Dentsply, DeTrey, Germany) was applied without cavity preparation. A compomer material (Dyract Extra, Dentsply, DeTrey, Germany) was used incrementally and light-cured. The restorations were polished in the same appointment, using Soflex Disks (3m/ESPE, USA) (Fig.2).

DISCUSSION

In this case, severe and extensive industrial erosion from chromic acid was treated by a compomer restorative material. Chromic acid has a biohazardous effect by not only direct exposure but also occupational exposure via airborne fumes.
Fig. 1: Clinical appearance of the erosive-abrasive defect in upper and lower jaw involving all teeth.

Fig. 2: Restored with Compomer and were polished using Soflex Disks and/or elements. Certain effects such as contact dermatitis, skin ulcer, (9) irritation and ulceration of the nasal mucosa, (10) perforation of the nasal septum, (11) and occasionally erosion and discoloration of the teeth have been reported. Further, studies relating exposure to chromium compounds and incidence of dental caries indicated a low degree of correlation, but there was an increased incidence of gingivitis and periodontitis.

Actually, erosion causes significant tooth wear and thereby dentine exposure at all sites on the anatomical crowns of the teeth and, particularly, in the cervical areas, where the enamel is very thin.

Moreover, if toothbrush and acid from an occupational environment are combined, such as seen in this case, tooth wear escalates dramatically.

For this case, to restore cervical lesions a hybrid (compomer) material was selected due to its favorable clinical characteristics which are (i) color stability, (ii) biocompatibility, (iii) less plaque accumulation, (iv) fluoride releasing. (13) From various studies, it has been clearly understood that when compared to composite and/or amalgam restorations adjacent to the gingiva, hybrid materials show less adverse effect on gingival margin, clinical attachment level, pocket depth, width and thickness of the keratinized gingival; (14) possess significantly lower plaque-gingival index, bleeding scores; (15) and produce fewer crevicular fluid. (16) Also, in an in vivo study, Dragoo (17) aimed the clinical and histological responses of the subgingivally placed hybrid-ionomer restorations in 50 cases, and concluded that these restorations could successfully be used to restore subgingival defects in where periodontal health is crucial, yielding an ideal epithelial and connective tissue adherence to these materials. Shortly, in view of all these studies, it can be concluded that if the restoration have to be placed subgingivally due to the localization of the tooth-defect, the suggested material should be hybrid-ionomer, having good biologic effect on marginal gingiva and periodontal tissue. (18)

REFERENCES


11. Health of Workers in Chromate Producing Industry—A Study, Public Health Service


