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Review Article

Patterns of Hard Tissue Dental Abfractions as Indicators of Extrinsic Etiologies

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Abstract

Background: Dental abfractions includes attrition, abrasion and erosion: Erosion is related to dental attrition and abrasion, but is different from these dental ravages. Dentists are often the first to notice dental erosion, but many are not aware of the implications of their observations.

Aim: This appraisal examines common patterns and causes of dental erosion and focuses on clinical manifestations of tooth erosion, derived from extrinsic etiologies (like abusive diets, chronic emesis and selected mental aberrations).

Discussion: Dentists and health care workers need to be more vigilant and advise patients about destructive habits relating to chronic damage to teeth. Not only dietary advice but also social and psychological counseling is often indicated.

Keywords: Acids; Attrition; Abrasion; Anorexia; Bulimia; Carboxylic; Dental; Erosion

Introduction

Dental ravages, as abfractions, from food and drink result from acid softening of the dental hard tissues. Chronic micro-physical removal of softened tooth material, by mastication and/or brushing, produces attrition on the occlusal and incisal edges, or abrasion on the buccal and lingual sides of teeth. Chemical dissolution of teeth material, without bacteria or cavitation is called erosion [1,10]. Initial decalcification may re-calcify with appropriate chemical addition of calcium and phosphorous ions, but if bacteria become seeded into the niches of softened material and metabolize there, progressive tooth decay will develop with eventual carious cavitation [2]. The mechanism of how stagnant dental microbial plaque acts a dynamic, ionic exchange gradient, which accelerates decalcification in an acid medium, is clarified elsewhere [3]. It has long been known that the critical pH (measure of acidity) for acids to start decalcifying calcified dental hard tissue is pH 5.5 and experimental evidence, and clinical presentations, confirms this [1,3-6].

Aim of the Study

This appraisal examines common causes of dental erosion and focuses on clinical patterns of teeth erosions, derived from abusive diets, chronic emesis and mental aberrations.

Discussion

Hydroxyapatite, (the major. crystalline structure of teeth) will be decalcified by many prevalent carboxylic fruit acids in acidic foods and drinks. Acid preserved pickled cucumbers (and other vegetables like turnips, beets or onions) and fresh fruit juices are ubiquitously available, cheap and consumed regularly. Fresh

Figure 1A: *Eroded teeth from an excess of acidic imbibing of acidulated drinks. Note hard tooth material is lost. The patients main complaint was dental pain.*

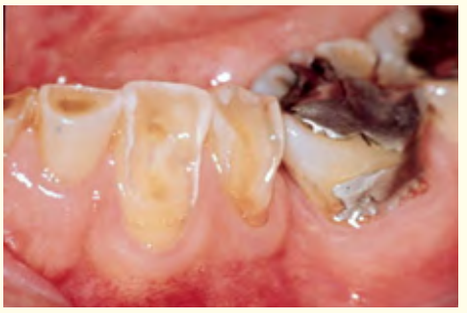

Figure 1B: *Severe (enamel, dentine and secondary dentine loss) dental erosion and abrasion from highly acidic diet. Note how the old restoration bulges out.*

fruit juices, which often are often concentrated to boost flavor, are strongly implicated in dental erosion formation. Acetic (in small quantities) but mainly malic in apple, citric in citrus and tartaric in grapes all will decalcify tooth material. Drinking liters of fresh juice as a daily habit is not uncommon, and these people are prone to show dental erosion. Also imbibing of fizzy drinks, made effervescent by dissolving CO2 in water, yields carbonic acidic sodas, and increased consumption of these, up to six or more cans per day, will also erode teeth [7,8]. Alcoholic drinks per se, contribute to the erosion, as most are acidic and frequently served with fruit juices as mixers [9,10]. Undiluted gastric contents is mainly hydrochloric acid, and situations in which chronic emesis occurs will soften the teeth, and create classic erosive patterns. For example chronic alcoholics who vomit daily show palatal erosion of their incisors [11]. Also people, mainly women but increasingly men, who suffer from the eating disorders bulimia or bulimia nervosa, which are both mentally dictated conditions, often develop odd cravings for acid foods [12]. With these conditions ingested food is regularly regurgitated, renders the acidic gastric contents against the teeth, softens the calcified tissue, and results in chronic erosion and abrasion [13,14]. These conditions are often assumed to be "white peoples" afflictions, but are increasingly becoming prevalent among people of color. Besides dysfunctional social influences deriving from misinterpreting influences of Western Culture which venerates thin body image as an ideal body type, other potent forces are at play. For example psychological, physical and/or sexual abuse, racism and poverty may be powerful contributing factors to these situations. Although rare among people of color, and unique psychological dispositions and demands arise from being deemed a 'black' person, warped ideas about gender perfection and body image regularly induce these pathological behaviors. Yet the dental manifestations consistently occur when these narratives occur in all of society. With bulimia, besides showing erosive loss on the palatal sides of incisors, the tongue thrusts concomitant with emesis, will also abrade against the softened lingual sides of the posterior teeth [11,14]. Dental erosions from Gastro Esophageal Regurgitation (GERD) and bulimia are difficult to differentiate, but clues as to the exact etiology can be determined from detailed in depth anamnesis of patients [11].

This will be noticed on close clinical examination, when the teeth appear smooth, shiny and with reduced anatomical form. Tooth sensitivity to both osmotic, thermal and physical stimuli, is often a presenting complaint frequently in combination with dental erosion [15]. Poor brushing habits, particularly the Horizontal Scrub Technique, is responsible in combination with a high acidic diets for producing buccal cervical sensitivity and abrasion; alternate methods, like Circular Scrub with soft fibred brushes and a fluoridated paste, will mitigate this [15]. Destructive brushing may be indicated by assessing the side on which abrasion is located.

Figure 2A: *Dentition of an 18year old female suffering from bulimia.*

Figure 2B: *Palatal view of incisors, canines and premolars, showing erosion from repeated emesis in this 18year old female suffering from bulimia.*

Figure 3A: *Advanced dental abrasion on upper incisors.*

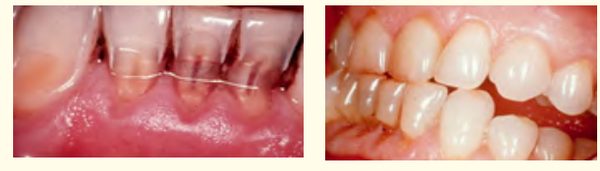

Figure 3B and 3C: *Erosion and abrasion on the buccal side of lower incisors: this resulted from an acidic diet combined with abusive horizontal scrub method of tooth brushing. Dentine being less dense than enamel allows more rapid decalcification erosion and subsequent abrasion.*

Natural arm-articulation allows right-handed individuals to cause more abrasion on the facial surface of the left maxillary premolars with tooth-brushing.

Other beverages like *Camellia sinensis* tea infusion has been shown experimentally and epidemiologically to moderate caries formation; this is explained by the fact that tea contains fluoride and inhibits the growth on *Streptococcus mutans*, which has been causally related to initiating caries [16]. Dietary advice about eating acidic apples is spurious, as apple juice is also been proven to erode teeth [5,17]. Attrition manifests when a high acidic diet is combined with a tough fibrous diet; loss of vertical height of the dentition will be noted from the occlusal grinding down of softened tooth material. Also experimentally eating dried apple is cariogenic in mice [18].

Figure 4: *Attrition of dentition from a high acidic diet combined with hard fibrous foods. The vertical loss of height affected the entire dentition.*

Dietary advice counsels that the frequency of imbibing, and the amount of acidic drinks should be reduced; drinking before retiring at night in not encouraged as neutralizing saliva is switched off during sleep; less acidogenic drafts like water, tea, milk or soups can replace acid drinks [10]. Fruit juices like grape and apple, although widely promoted a 'health drinks', are both deleterious to teeth and will cause erosion if imbibed frequently over prolonged periods [5,19]. Eating disorders are most challenging to treat and demands psychological, social and cognitive modification therapies by specialist counselors to gain improvement, resolution and success.

Concluding Remarks

Often dental erosion is the first indication of dietary abuse among health freaks, and silent alcoholics, with cryptic behavior, so typically encountered among bulimic and bulimic-nervosa sufferers. Many people indulge in acidic food and drinks as they are blatantly promoted as healthy habits. All dental health care workers, but also nurses, primary health care workers and medical clinicians should scrutinize teeth as part of their examination, and discuss the causes to ensure appropriate counseling, advice and therapies are secured.

Author's Statement

The authors have no conflict of interests to declare.

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