Case history

Ms. Betty Whyte is aged 45-years who presented to the office as a new patient. The patient has not visited a dentist for more than 2 years; she was concerned that the back of her front teeth was starting to feel rough.

Medical history

The patient reported that she had experienced a 'burning type pain' in her stomach and mid chest especially at night causing interrupted sleep. She also complained that several times a week she had a sour taste in her mouth. For almost a year, these symptoms affected Ms. Whyte's quality of life. Ms. Whyte smokes half a pack of cigarettes a day and is conscious that she has 'bad breath'.

Medication

Over-the-counter antacids were taken by the patient to alleviate the 'burning sensation' which relieved the symptoms temporarily; as a result, the daily use of antacids has increased.

Dental history

Brushes more than three times a day, especially when she has the unpleasant taste in her mouth. She uses dental floss only when food is stuck between her teeth. The patient's teeth in the back of her mouth cause pain when she drinks cold beverages.

Clinical situation/mouth inspection

Extra-oral examination

- Tempromandibular joints and muscles of mastication were normal.

Intra-oral examination

- Light calculus deposits in buccal surfaces of the maxillary molars.
- Localized periodontal pocketing 4–5 mm in the posterior region.
- The maxillary incisor and canine teeth exhibited palatal erosion and chipped incisal edges.
- Smooth glazed dished out appearance of the dentin, the outline of the pulp chamber was evident on the first premolars.
- Erythema of the soft palate and uvula.

Radiographic image

- No evidence of carious lesions.
- Bitewing radiographs showed enamel loss.

Questions

1. The patient's symptoms were characteristic of which systemic condition(s)?
2. What are the contributing factors to the patient's oral health status?
3. Discuss the home care instructions you would provide to Ms. Whyte.
4. What are several of the recommended treatment options available for this patient?

Rationale

1. The patient's symptoms were characteristic of which systemic condition(s)?

Gastroesophageal reflux (GERD) or gasto-oesophageal (GORD) is a common multifactorial condition that often results in decreased quality of life with interruptions of sleep affecting the individuals' emotional well-being (1, 2). GERD occurs when the lower oesophagus sphincter, a circular band of muscles around the bottom part of the oesophagus opens spontaneously, for varying periods of time, or does not close properly and the stomach contents rise into the oesophagus (3, 4). Because of this action, there is a constant backwash of acid which can irritate the lining of the oesophagus, resulting in inflammation (oesophagitis) with a burning sensation in the chest or throat called heartburn or indigestion (3, 4). Over time, the inflammation can erode the oesophagus, producing bleeding or make the oesophagus narrow, causing difficulty of swallowing or even breathing problems (4).

Regurgitation and heartburn are the typical clinical manifestations of GERD; in addition, severe pulmonary, ear, nose and

throat and oral cavity manifestations have been linked to GERD. These have been termed extraoesophageal manifestation of GERD (5) and include symptoms such as dysphagia, odynophagia, globus (lump in the throat), sore throat, laryngitis, water brash (increased salivary flow) and cough, among others (6). Heartburn is best defined as a burning retrosternal discomfort starting in the epigastrium or lower chest and moving upwards towards the neck (1). Many patients with gastric disturbances including reflux may report an acidic taste in the mouth or gastric pain early in the morning (7). However, some patients with pathological erosion and GORD are symptomless. Patients have been known to be asymptomatic or experience symptoms that more closely resemble gastric disorders, infectious and motor disorders of the oesophagus, biliary tract disease or even coronary artery disease (1), which is an indication that the presence of symptoms is well recognized to be a poor diagnostic indicator of disease (8).

Differential diagnosis is difficult because the incidence of both GERD and coronary artery disease rises with age and body activity and these conditions may coexist and influence each other. For example, GORD can cause a drop in blood pressure and a rise in heart rate, which in turn may lead to angina pectoris and electrocardiographic changes (2). It can be squeezing or burning, substernal in location and may radiate to the back, neck, jaws or arms. It frequently worsens after meals, awakens the patient from sleep and may worsen during periods of emotional stress (9). Given the increasing prevalence of typical GERD and its association with oropharyngeal, laryngeal and pulmonary conditions, there has been renewed interest among gastroenterologists and specialists in other areas, such as otolaryngology, pulmonology, allergy, cardiology as well as dentistry in understanding this relationship better (9).

With regard to GERD-associated manifestations in the oral cavity, dental erosions, halitosis, non-specific burning sensation, mucosal ulceration/erosion, loss of taste and both xerostomia and increased salivary flow have been reported (10). Initial evaluation begins with a through medical history review, including a listing of all prescription and non-prescription medications and supplements. Items that are relevant to the problems of erosion include medications that may cause salivary hypofunction and those used to treat GERD (11). If a dentist is suspicious that a patient may have gastric reflux, the dentist should refer the patient for further medical evaluation to a gastroenterologist to be evaluated for GERD. The evaluation can include endoscopic, histological and manometric examinations to evaluate sphincter function, peristaltic efficiency, musocal erosion and swallowing function (12).

2. What are the contributing factors to the patient's oral health status?

To address the dental implications of GERD symptoms the dental professional has to conduct a thorough assessment following a diagnostic protocol, which includes data collected from the patient's medical history, dietary history, occupational/recreational history, dental history, oral hygiene methods, intra-oral examination, head and neck examination and salivary function (11). The subjective and objective information collected during the assessment phase can provide evidence of the gastric acid effect in the oral environment. GERD-related soft/hard palate erythema was defined as an area of erythema affecting the mucosa of soft palate, the uvula and/or the hard palate which could not be characterized clinically as any other disease and therefore are associated with GERD, as these lesions are caused by the direct offending action of refluxed acid (13).

Gastro-oesophageal reflux can result in dental injury by the dissolving of the inorganic material of the teeth (hydroxyapatite crystals in enamel) which occurs below the critical pH level of 5.5 depending on the concentrations of calcium and phosphate ions within the saliva (14). The extent of erosion depends on the frequency and the quality of exposure along with the duration of disease. Exposed dentin is often sensitive to temperature changes and, secondary to its lower mineral content, develops caries much more quickly (15). However, dental caries, on the other hand, involve acid production by bacteria present in plaque and present with distinctly different characteristics (16) presumably as streptococcus mutans cannot metabolize sugars at the low pH associated with erosion. Dental caries and erosion are rarely active simultaneous in the same mouth (17).

The pattern of erosion is similar to that in other conditions involving stomach juice, such as eating disorders, rumination, chronic alcoholism (8) and asthmatic younger subjects (18) when the intrinsic endogenous acid contacts the teeth during recurrent regurgitation or reflux (19). Lack of mechanical clearance and buffering of acids by saliva can increase the risk of erosion regardless of the source of acid (11). The buffering capacity of saliva refers to its ability to resist a change in pH when an acid is added to it. This property is largely due to the bicarbonates content of the saliva which is in turn dependent on salivary flow rates, thereby regulating the salivary pH (11); therefore, salivary function is an important factor in the aetiology of erosion.

In the very early stages, they are difficult to identify and the only sign may be barely noticeable loss of surface lustre evident on clean, dry enamel. The erosion may be undetectable until the underlying dentin with its characteristics yellow colour shows through the thinned overlying enamel. They can involve any surface of the teeth, but are most commonly seen on the facial, occlusal and lingual surfaces (16). While dental erosions on the lingual surfaces of anterior maxillary teeth have been noted in bulimic patients (20), those of the posterior teeth involving lingual and occlusal surface may suggest GER (21). Evidence of dental erosion can be detected on a radiographic series and a panoramic radiograph as a uniform thinning of the enamel structure (12). Erosion differs from dental caries in that it is a hard, dished-out area where enamel has dissolved and the underlying dentin is exposed. Caries reveals soft, discoloured dentin and results from the bacterial breakdown of sugars into acid, which demineralizes the surface of the teeth (21).

3. Discuss the home care instructions you would provide for Ms. Whyte.

Prophylactic measures for erosion are independent of the aetiology of the lesion. Recommendations for the individual patients may vary according to the aetiological factors. It is therefore important to determine a differential diagnosis of the origin of erosion, on the basis of careful clinical inspection and medical history (22). To halt the progression of dental erosions and prevent worsening of dental erosion, preventive strategies such as taking antacids immediately after heartburn or after sensation of acid reflux in the oropharyx, rinsing the mouth with neutral pH mouthwashes, liquid antacids, sodium, neutral sodium fluoride mouth rinses and other modalities are effective means (9).

Saliva, with its buffering capacity and its ability to form a protective enamel pellicle, can control dental decalcification (23). The reduction in loss of salivary buffering capacity would contribute to the process of enamel erosion (24). Assessing salivary parameters such as pH and buffering capacity in the dental office is possible using commercially available diagnostic kits. The buffering capacity and, if desired, the pH of the saliva are measured with the freshly collected saliva using indicator system (7). The flow rate and buffering capacity of saliva are increased by chewing (25). Saliva buffers the acid within the distal oesophagus and swallowing increases the rate of peristalis; both are recognized as major factors in oesophageal acid clearance. Chewing gum, therefore, has the potential to be used as a cheap and convenient method for controlling reflux (26). Acid neutralization may be attempted by buffering components of the diet. Patients were advised to hold some milk in the mouth for a short time after the acid attack (19).

Acid neutralization can equally be achieved by the sucking of sugar-free antacid tablets (22). Rinsing with a pinch of sodium carbonate (Na_2CO_3) or, more easily available in the household, with baking powder ($NaHCO_3$) dissolved in some water has been suggested for patients suffering from erosion (27). Another possibility of introducing buffering agents into the oral cavity is the use of bicarbonate-containing toothpastes. Alkaline toothpastes or gels, applied with the finger tip are often recommended before going to bed to protect against erosion from reflux during sleep. Many toothpaste manufactures have produced bicarbonate-containing toothpastes that are advertised for this specific neutralizing effect (22).

Patients at increased risk for dental erosion should rinse their teeth with a fluoride solution or, if not practical, at least with plain water immediately following every exposure to acid. They must be informed neither to brush their teeth immediately after an acid challenge, nor to use strongly abrasive toothpastes (7). Frequent applications of low concentration of fluoride presumably perform best. In the case of erosion, however, fluoride is applied primarily to stop the progression by reducing the acid solubility of the surface and there is no deep subsurface lesion in need of remineralization, but only a thin enamel surface layer in need of rehardening (22) depending on the extent of tooth structure loss. Fluoride lacquer is therefore recommended as a professional prophylactic measure for initial erosive lesions. Larger lesions warrant the use of composites and direct bonding. The lacquer can be expected to provide a double protective action, namely fluoride-dependent decrease in acid solubility and mechanical protection against wear (18).

4. Discuss possible treatment recommendations for this patient.

Patients suffering from chronic regurgitation with heartburn symptoms of 2 or more days a week should be referred to a physician for further investigation as the untreated condition can lead to complications including erosive oesophagitis, stricture formation, and Barrett's oesophagus, which increase the risk of oesophageal adenocarcinoma (1).

Many authorities believe that an incremental approach to the management of GERD is appropriate, beginning with lifestyle modifications and over-the-counter preparations, continuing with H_2 receptor blockers and reserving proton pump inhibitors for non-responders (1). There is a popular opinion that reflux symptoms can be controlled by lifestyle modifications alone.

Diet modifications for a patient who suffers form the GERD symptoms are: he should not consume large meals and should avoid lying down for 3–4 h after eating. Caffeinated products, peppermint, fatty foods, chocolate, spicy foods, citrus fruits and juices and tomato-based products may contribute to episodes of GERD (28), in addition to the consumption of alcohol, and smoking and overweight. A change in sleep position is suggested to assist with GERD symptoms that persist at night and upon awakening. This can be accomplished by the placement of two to three pillows to raise the head or raising the head of the bed 6–8 inches by securing wood blocks under the bedposts (3). On the other hand, lifestyle modifications plus drug treatment are the standard management for patients with GERD (2).

The diagnosis of GERD is performed adopting the 'gold standard', an ambulatory 24-h intraoesophageal pH monitoring which can help establish the presence of the condition by documenting the proportion of time during which the intraoesophageal pH is acidic (< 4) and can also establish the degree of association between patients' symptoms and episodes of oesophageal acidification (1). The results are used as part of the decision-making process for medication to control the GERD (26). If non-invasive over-the-counter medications are ineffective in alleviating the GERD symptoms, a 'step up approach' to the management of GERD could involve invasive surgical options, which can be a reasonable alternative to a lifetime of drugs and discomfort (3).

The management of GERD has to incorporate a multidisciplinary approach in addressing the medical and dental needs of the patient. The dental approach to minimize the effect of the gastric fluids is dependent on the degree of tooth wear. Dental interventions can range from non-invasive strategies to invasive restorative treatment such as placement of banding composites in a few isolated areas of erosion to full mouth reconstruction in the case of the devastated dentition (11).

Gandara and Truelove (1999) have suggested a protocol for the prevention of progression of erosion:

- Diminish the frequency and severity of the acid challenge.
- Enhance the defence mechanisms of the body (increase salivary flow and pellicle formation).
- Enhance acid resistance, remineralization and rehardening of the tooth surfaces.
- Improve chemical protection.
- Decrease abrasive forces.
- Provide mechanical protection.
- Monitor stability.

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