

# Complications of Medical Management of Dental Erosion

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**Abstract:** This article reports the case of a patient presenting with dental erosion as a result of asymptomatic gastro-oesophageal reflux disease (GORD). The management of this patient is discussed, in particular the use of proton pump inhibitors. The advantages and disadvantages of the use of medication are discussed, especially in the light of the symptoms of GORD, which developed after taking omeprazole.

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**Clinical Relevance:** The management of dental erosion in patients with asymptomatic GORD with anti-reflux medication needs to be considered carefully.

The main sources of acids causing dental erosion are the diet<sup>1,2</sup> or the stomach.<sup>3,4</sup> Gastro-oesophageal reflux is the retrograde movement of gastric contents through the lower oesophageal sphincter into the oesophagus. It is a very common condition: about 60% of the population of the UK suffer from symptoms at some time.<sup>5</sup> In most healthy individuals occasional discomfort can occur following dietary excesses and alcohol,<sup>6</sup> consumption of fatty or spicy meals<sup>7</sup> (especially late at night or shortly before sleep) due to temporary symptomatic reflux. This is usually transient and not part of a disease

process. However, in patients suffering from gastro-oesophageal reflux disease (GORD) the frequency of reflux and the symptomatic response to the refluxate become exaggerated.

The typical symptoms of GORD are heartburn, epigastric pain, dysphagia (difficulty in swallowing) and regurgitation. Atypical symptoms include chest pain, asthma, sore throat, globus (feeling of a lump in the throat) and dental erosion. Bartlett *et al.*<sup>8</sup> reported a study on 36 patients presenting to a dental hospital with undiagnosed dental erosion on the palatal surfaces of their anterior teeth. Distal (nearer to the stomach) and proximal (further from the stomach) oesophageal pH combined with oral pH were measured in these patients over 24 hours: 64% had pathological levels of gastro-oesophageal reflux and of these 60% had frequent reflux symptoms – but, more importantly, the remainder were asymptomatic.<sup>8</sup> This group of patients were described as ‘silent refluxers’. The concept of ‘silent reflux’ is an important one as it shows that the

presence or absence of symptoms is not a definitive predictor of the disease state and that GORD should not be ruled out as an aetiological factor for dental erosion even if symptoms are not present. More recently, Gregory-Head *et al.*<sup>9</sup> investigated 20 consecutive adult patients referred to a gastroenterology department for investigation of GORD. Of these, ten were diagnosed with GORD and ten had normal pH values. The patients with GORD had a higher toothwear index.

The link between toothwear and GORD is widely accepted. What is often a difficult clinical decision is where to refer these patients if GORD is suspected. This article reports the case of a patient presenting with dental erosion but without symptoms of GORD who later developed symptoms from a previously undiagnosed reflux disease.

## CASE STUDY

### Presentation

A 27-year-old man was referred to the conservative dental department at a teaching hospital for investigation and management of wear on the palatal surfaces of his upper anterior teeth. The patient had not seen a dentist for 7 years; he had gone to see the referring practitioner for a routine examination but did not otherwise have any complaints. He had a clear medical history. He presented some time before an audit of patients with reflux and

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**Figure 1.** Palatal view of the upper anterior teeth showing severe toothwear. The I2 has been fitted with a metal disc used for monitoring the progression of toothwear.



**Figure 2.** Thinning and chipping of the incisal edges due to toothwear.

dental erosion was published.<sup>10</sup>

The patient's oral hygiene was fair but arrested caries was identified on the upper anterior teeth. Severe erosion had exposed dentine on the incisal and palatal surfaces of the upper incisors and dentine was exposed (but to a lesser degree) on the occlusal and

palatal surfaces of the upper and lower premolars and first molars. There were no symptoms of reflux.

### Diagnosis

The pattern and type of wear suggested the cause was acid, and a provisional diagnosis of dental erosion caused by regurgitated acid was made (Figures 1 and 2). To eliminate the diet as a potential cause a dietary history was taken, paying particular attention to intake of acidic foods and drinks such as carbonated drinks, fruits and fruit juices (Table 1).

The degree of toothwear was not commensurate with the intake of dietary acids and an intrinsic source of acid was suspected, the pattern of toothwear suggesting regurgitation of gastric acid as the likely cause. There were no clinical indications that an eating disorder caused the regurgitation and so the patient was referred to a gastroenterologist for manometry and 24-hour pH testing (routine tests for GORD), the results of which were analysed for percentage time, number of episodes and longest episode of pH below 4.<sup>11</sup> These results were then further analysed to characterize the pattern of reflux and define pathological GORD. These tests,

although routine for the diagnosis of GORD, were less so for the diagnosis of dental erosion at the time this patient presented. They do, however, provide a useful diagnostic tool for patients in whom regurgitation is suspected and for whose management medication may be helpful. The results for this patient showed severe acid reflux (percentage time pH below 4, 11.9% for the distal oesophagus and 9.6% for the proximal oesophagus – see Table 2).

### Initial Management

The initial management of the patient included suggesting a decrease in the consumption of acidic foods and drinks such as citrus fruit and advice on some lifestyle changes – such as avoiding eating late at night as it could provoke supine reflux.<sup>12</sup> The patient was also advised to use pillows to raise his head while sleeping, to encourage food to return to the stomach from the oesophagus.

Rubber base impressions were taken for study models and retained for monitoring the toothwear. The carious teeth were restored but no restorations were provided for the worn surfaces.

The patient was prescribed omeprazole, a proton-pump inhibitor (PPI), to control the reflux and the level

	Thursday		Friday		Saturday		Sunday	
	Time	Item	Time	Item	Time	Item	Time	Item
Breakfast	08:00	<b>Pineapple</b> , tea with sugar	08:00	<b>Pineapple</b> , tea with sugar	10:00	Cereal, tea with sugar		
Morning	10:00	Biscuit and tea with sugar	10:00	Biscuit and tea with sugar				
Mid-day meal	12:30	Yoghurt. Sandwiches	12:30	Yoghurt	12:00	Crisps, tea with sugar	12:00	<b>Grapefruit</b> , tea with sugar
Afternoon	16:00	Cup of tea	15:30	Cup of tea			16:00	Fast food – fries, chicken burger, ice cream, water
Evening meal	19:00	Salad – <b>vinegar</b>	19:00	Chicken salad – no vinegar	19:00	Chicken curry		
Evening	22:00	Two cups of tea	21:00	Two cups of tea	21:00	Crisps	21:00	Roast chicken and potatoes, glass of white wine

Tea was not herbal; crisps were plain. Bold items notably acidic.

**Table 1.** Four-day dietary history in the form of a food diary.

	Upright (normal up to 8.15%)	Supine (normal up to 3.45%)	Total (normal up to 5.78%)
Distal oesophagus	4.6	2.0	11.9
Proximal oesophagus	11.7	7.3	9.6

**Table 2.** Percentage time pH of distal and proximal oesophagus were below 4 on initial monitoring.

	Upright (normal up to 8.15%)	Supine (normal up to 3.45%)	Total (normal up to 5.78%)
Distal oesophagus	2.0	0.0	1.2
Proximal oesophagus	0.1	0.0	0.1

**Table 3.** Percentage time pH of distal and proximal oesophagus were below 4 after taking medication.

of acid. Initial daily dose was 40 mg orally for one month, reducing to 20 mg for one year. Omeprazole works by suppressing acid production in the parietal cells of the stomach lining. The initial high dose is later titrated against the symptoms.

**Follow Up**

The patient was recalled every six months and the progression of toothwear was monitored using study models over 18 months. The study models were assessed using dividers and a periodontal probe – at present there are no reliable and accurate clinical methods of measuring wear and the method used is the most useful means available. No further wear was detected; however the patient became more conscious of the appearance of his teeth as time progressed and wanted them restored.

Over the 18-month recall period the patient attempted to stop taking the medication but could not because he now had severe heartburn and epigastric pain. He was referred for further investigations of GORD. Results of a pH test were, surprisingly, negative (i.e. pathological levels of acid were not detected; Table 3) and it was strongly suspected that the patient had not stopped taking omeprazole a week before the tests as instructed. Routine practice advises patients to stop taking medication seven days before the pH test as PPIs suppress acid production. If the patient ignored this advice before

the test the results would be invalid as very little acid would be detected. As the original pH tests had been positive and the patient now had symptoms of reflux, it was difficult to believe that, in the presence of symptoms, the 24-hour acid levels were normal.

**Further Management**

The patient’s anterior teeth were built up with resin composite palatally and incisally to improve the appearance (Figure 3), using the composite restorations as a Dahl appliance to create space. Direct-composite veneers were chosen as they provide excellent aesthetics, are adaptable for any future repair or additions and are very conservative of tooth tissue. The patient was not a smoker, which decreased the possibility of staining. The wear was monitored with the use of study models and the patient was kept on omeprazole, titrating the dose as necessary.

**DISCUSSION**

This case highlights many important points related to dental erosion. The cause of the toothwear was thought to be acid reflux; this was confirmed both by the pH tests (which were diagnostic of GORD) and the fact that omeprazole appeared to have helped prevent any further progression of toothwear. It also highlights the role of PPIs in cases of dental erosion caused by GORD. Patients managed with such drugs need

to be carefully selected because of the potential complications that may arise. In this case, the patient was initially asymptomatic but had an underlying reflux disease which manifested with symptoms only after he ceased taking the medication.

There is a suggestion in the literature that the use of antisecretory drugs can cause hypertrophy of the parietal cells in the stomach, causing rebound and excessive acid production once the medication is stopped.<sup>13,14</sup> In most patients this seems to be a temporary phenomenon and the symptoms resolve given sufficient time, but in the case reported here the patient’s symptoms prevented him stopping the medication for long enough to overcome the rebound effect.

Anxieties have been expressed about the long-term use of PPIs, especially starting at a young age:

- These drugs can lead to the development of atrophic gastritis and promotion of intestinal metaplasia.
- Patients may be committed to taking drugs for the rest of their lives.
- Omeprazole can prolong the elimination of warfarin, diazepam and drugs metabolized by the cytochrome P<sub>450</sub> system so, before extractions or other surgical procedures, the international normalized ratio (INR) levels of patients taking omeprazole should be checked.
- Absorption of drugs reliant on gastric pH (such as digoxin and



**Figure 3.** 2 | 1 | 1 have been restored with direct-composite veneers.

ampicillin) will be reduced in patients taking omeprazole.

These concerns need to be balanced by the drawbacks and potential risks of anti-reflux surgery or lack of treatment. Surgery undoubtedly brings a small but significant risk of mortality and a chance of postoperative sequelae such as gas/bloat syndrome or dysphagia.<sup>15</sup> If untreated GORD can in some patients lead to Barrett's oesophagus, which is a premalignant change in the oesophageal lining increasing the risk of malignancy 30–125 fold that in the normal population.<sup>16</sup>

### Dental Management

Dental management of this patient would involve future monitoring of the toothwear, further composite restorations as necessary and – as a last resort – provision of crowns.

### Medical Management

Medical management could involve lifestyle changes and long-term use of PPIs or antireflux surgery.

- Common lifestyle changes include reduced intake of fatty and spicy foods, avoidance of eating late at night, the elevation of the bed head, weight loss and cessation of smoking.
- Some commonly used drugs are antacids and H<sub>2</sub>-atagonists. Use of PPIs has revolutionized the management of GORD and substantially decreased the indications for surgery.
- The most commonly carried out surgical procedure is a Nissen fundoplication (in simple terms, wrapping the stomach around the oesophagus). The aim is to mechanically tighten the lower oesophageal sphincter to avoid acid reflux from the stomach into the oesophagus. Indications for surgery are the persistence of typical symptoms of reflux (confirmed by pH monitoring) in a patient for whom medical treatment

has failed, or in whom vomiting predominates thereby making antisecretory medication ineffective.

### Referral Criteria

Bartlett *et al.*<sup>10</sup> recently published a list of criteria for referral of dental patients to gastroenterologists for oesophageal investigations.

1. Patients with palatal erosion whose symptoms are interfering with their normal life and who are willing to take medication.
2. Patients who wish to know the cause of their erosion, irrespective of the presence of symptoms and the potential for medication.
3. Patients whose toothwear has been reviewed with study casts over a period of years and where erosion has progressed despite restriction of dietary acids.

### SUMMARY

Caution should be exercised before recommending asymptomatic patients for oesophageal investigations as this might lead to more problems with the drug therapy than might have occurred if no medication had been prescribed to begin with. However, such considerations should be balanced against the possibility of long-term reflux continuing undetected and the risk of developing Barrett's oesophagus.

Symptoms are an unreliable indicator of the presence of GORD and people have differing thresholds for pain. A sensible pragmatic approach might be initially to monitor such patients and if the toothwear increases despite dietary advice refer them to a gastroenterologist.

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## JANUARY/FEBRUARY CPD Answers

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|---------------|---------------|
| 1. A, C, D    | 6. A, B, C,   |
| 2. A, B, C, D | 7. A, C, D    |
| 3. B, C, D    | 8. A, C       |
| 4. B          | 9. A, B, C, D |
| 5. A, B, D    | 10. A, C, D   |