

# Tooth Erosion

## An increasing problem

Raj RajaRayan OBE and Rashmi Patel MBE (photographs courtesy of Manny Vasant MBE)

### What would you do when a young adult visits the practice with evidence of tooth surface loss that is greater than expected?

The last Adult Dental Health Survey was concluded in 1998 – more than a decade ago<sup>1</sup>. It reported that two thirds of adults have some non carious tooth surface loss (TSL) into dentine on their anterior teeth, whilst 11% had extensive involvement of dentine and 1% had severe wear.

Child Dental Health Survey of seventeen years ago identified that 32% of 14 year olds had evidence of erosion affecting the palatal surfaces on their permanent incisors. The Dental Health Survey of Children and Young Adults, commissioned in 2003, reported, that for England, ‘The proportion of 5-year-olds with evidence of TSL on one or more of the buccal surfaces of the primary upper incisors was 17 per cent, and 2 per cent had TSL involving dentine or pulp. TSL of the lingual surface was more common, affecting just under half (46 per cent) of 5 year olds. TSL progressing to dentine or pulp was present on 20 per cent of lingual incisal surfaces<sup>2</sup>.

Whilst TSL is a normal physiologic process that occurs throughout life with the significance of the loss attributed to age and reasonable other factors, an increase in the rate of wear challenges the viability of the tooth or is a source of concern to the patient. Pathological tooth surface loss is defined as when ‘the teeth become so worn that they do not function effectively or seriously mar appearance before they are lost through other causes or the patient dies<sup>3</sup>. Some TSL is caused by

- attrition - produced by direct contact of occluding or proximal surfaces
- abrasion – produced by exogenous material forced over tooth surfaces
- erosion – produced by chemical dissolution of teeth by acids excluding

those produced by bacteria

- abfraction – produced by tensile forces induced by occlusal loads leading to microfractures of the cervical enamel on facial and lingual surfaces<sup>4</sup>.

Whilst there are several aetiological factors leading to pathological tooth surface loss, There has been an increasing trend in erosive tooth surface loss in young adults. This is similar whether in the USA or in the UK<sup>5</sup>. It is so important to diagnose this early as it is relatively easy to prevent the ongoing TSL of the dentition.

The patient who presented above was a young female adult. She had little concern and had no knowledge of the TSL she was undergoing. It is all too tempting for a dentist to scaremonger the patient and create an insecurity in the patient to mutilate the dentition as happens all too often. The iatrogenic tooth destruction by the professional to ‘fix’ this problem has become increasingly common with litigation, quite rightly, catching up with the profession. For those who have not already read it, I will refer you to the excellent article in ‘Guest Comment’ in the Dental Update by Martin Kelleher<sup>6</sup> titled ‘The ‘Daughter Test’ in Aesthetic (‘Esthetic’) or Cosmetic Dentistry’. In it he discusses the ‘populist, if somewhat mindless programmes like ‘Extreme Makeover’ and ‘Ten Years Younger’ giving birth to the concept of ‘hyperenamelosis’ ‘an imaginary dental condition in which patients are born with too much enamel or an imagined condition in which the enamel prisms grow following tooth eruption and, if left alone and not cut back by a dental bur, would somehow grow out of control’. He goes on to say that teeth neither suffer from ‘hyperenamelosis’ nor from ‘porcelain deficiency disease’. His daughter test reads ‘Given that competing aesthetic philosophies and various bits of dental technologies exist



and, indeed, often have enthusiastic proponents, a simple test is proposed to help clinical decision-making in this difficult and complex area. This is called the ‘Daughter Test’ in Elective Aesthetic Dentistry. At its simplest, it asks the question ‘Knowing what

I know about what this procedure would involve to the teeth in the long term, would I carry out this procedure on my own daughter? It is curious that the daughters of dentists never seem to suffer from a 'porcelain deficiency disease' or hyperenamelosis'. This article is a MUST READ for all practitioners. It is worth a subscription to Dental Update just for that reason.

With regard to erosion and TSL, other than an idiopathic diagnosis<sup>7</sup>, acids affect the teeth from external and internal sources with the sites of erosion giving an indication of the cause<sup>8</sup> as given below.

### Exogenous causes of TSL

- Diet, e.g. acidic citrus fruits, fruit juices, carbonated beverages, vinegars and pickles.
- Medicines, e.g. HCl replacement, chewable ascorbic acid or acetylsalicylic acid tablets, iron tonics.
- Occupational, e.g. acid vapors, wine tasting.
- Sports, e.g. improperly chlorinated commercial pools and heated spas

### Endogenous causes of TSL

1. Consequence of anatomic defects, e.g. hiatus hernia, gastroesophageal reflux disorder, esophageal diverticulosis.
2. Psychological problems, e.g. vomiting or regurgitation of gastric fluids into the mouth from bulimia nervosa, alcoholism, stress rumination.
3. Side effects of drugs, e.g. for chronic

asthma, or overuse of drugs irritating the gastric mucosa.

4. Medical conditions, e.g. uraemia, peptic ulcer, morning sickness during pregnancy.

The taste for acid tasting food develops in childhood with carbonated drinks containing organic and phosphoric acids<sup>9</sup>. This may evolve to drinking beers, some of which have low pH values<sup>7</sup>. With today's social pressures on slimming, there is an increasing consumption of low sugar acidic beverages, acid containing diet foods and many other food substances, including pickles of pH3.0 or less and other abrasive food products<sup>10</sup>.

Social pressures on teenagers in the Western society has led to binge drinking followed by involuntary regurgitation with chronic vomiting. Bulimia nervosa<sup>11</sup> and stress rumination<sup>12</sup> have all been documented.

So how does one manage a young adult with the classic pattern of erosive TSL due to bulimia or binge drinking with the consequence of involuntary chronic vomiting? The last thing a dentist should do is reach for the drill.

The world has changed. To quote Raj RajaRayan<sup>13</sup> 'This millennium heralded major changes in attitudes and thinking in the way staff in the NHS became accountable for patient care. 'Safeguarding Patients'<sup>14</sup> was the Government's response to the recommendations of the Shipman Inquiry's

Fifth Report<sup>15</sup> and to the recommendations of the Ayling<sup>16</sup>, Neale<sup>17</sup> and Kerr/Haslam<sup>18</sup> Inquiries (the three inquiries). The question of how Shipman was able to murder so many patients without being detected as well as the issues raised in the three inquiries led to the report. The further question was raised that if systematic murder goes undetected, what protection does the patient have to systematic maltreatment in any practice environment. 'Trust me, I am a doctor' was a cliché that now needed to be earned. It is for these and other reasons that following the advice given by the Chief Medical Officer, Sir Liam Donaldson<sup>19</sup> and the parallel review on non-medical professions by Andrew Foster<sup>20</sup> of the Department of Health, that the Government published its White Paper 'The regulation of health professionals in the 21st century – trust, assurance and safety, in February 2007.<sup>21</sup>

'Patients need to be protected. The diagnosis of such patients is to obtain good information. Getting reliable information on their dietary habits is notoriously inaccurate. Hence diagnosis is usually by the tooth wear patterns<sup>22</sup> which are well documented and relate reasonably to the matching profile of the person and presenting condition<sup>23</sup>.

Management starts with documenting the pathology. This includes high quality study casts, photographs and a contemporaneous record of the extent of the lesion, using an internationally documented tooth wear index, such as the one proposed by Smith and Knight<sup>24</sup>.

David Bartlett just published a new system for screening tooth wear<sup>25</sup>. The index is based on the BPE (Basic Periodontal Examination) and uses similar protocols. The tool is termed the Basic Erosive Wear Examination (BEWE). There is also a complexity level which is a guide to clinical management. It is 'designed to be simple to use, easily recorded in notes, and gives practitioners to record that the wear has been examined and considered. The criteria for grading erosive wear:

- 0 – no erosive tooth wear
- 1 – initial loss of tooth surface texture
- 2 – distinct defect, hard tissue loss <50% of the surface area
- 3 – hard tissue loss > 50% of the surface area

This new tool, if adopted in UK will become an index of treatment need and a guide with some justification to appropriate treatment for the different presenting TSL. Good record keeping is not only quite

Drink	Relative titratable acidity	pH	Erosive potential
Grapefruit Juice	9.3	3.2	High
Apple juice	4.5	3.3	High
Orange juice	4.8	3.8	High
Cola	0.7	2.5	Medium
Schweppes	2.6	2.6	Medium
Diet Cola	0.5	2.9	Medium
Carbonated orange drink	2.0	2.9	Medium
Red wine, Claret	3.3	3.4	Medium
White wine, Chardonay	2.2	2.7	Medium
Beer - Bitter	0.6	3.9	Low
Beer - Lager	0.5	4.4	Low
Sparkling water	0.1	5.3	Low

## Tooth wear index

Smith & Knight 1984 (Br Dent J 156,157)

Score	Surface	Criterion
0	B/L/O/I	No Loss of Enamel Surface Characteristic
	C	No Change of Contour
1	B/L/O/I	Loss of Enamel Surface Characteristic
	C	Minimal Loss of Contour
2	B/L/O	Loss of Enamel Exposing Dentine for less than one-third of the surface
	I	Loss of Enamel just exposing Dentine
	C	Defect less than 1mm deep
3	B/L/O	Loss of Enamel exposing Dentine for more than one third of the surface
	I	Loss of Enamel and substantial loss of Dentine - not exposing pulp or secondary Dentine
	C	Defect 1 - 2 mm deep
4	B/L/O	Complete loss of Enamel or Pulp exposure or exposure of Secondary Dentine
	I	Pulp Exposure or Exposure of Secondary Dentine
	C	Defect more than 2mm deep o Pulp Exposure or Exposure of Secondary Dentine

important medico legally, but one can map the progress of the pathological condition with a degree of accuracy over a period of time. Suspicion of bulimia, alcoholism, regurgitation, amongst others, requires medical confirmation and magement. A dentist should not become the whole health care profession, but must be considered a gatekeeper of the health care professions for the patients well being.

When it comes to undertaking dentistry, less is always more. Even if one places a glass particle based adhesive composite restoration, the effect of its high abrasivity on the opposing tooth should be balanced on the basis of gain versus loss.

Dentistry is no longer the craft of cut and fill. It is the ethical domain of professionalism balanced by the delicate science of understanding the consequences of poor diagnosis, inappropriate management, over ambitious treatment and the inability to predict the prognosis.

The profession has changed. Has the professional?

## References

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<sup>16</sup>Ayling Inquiry Independent investigation into how the NHS handled allegations about the conduct of Clifford Ayling, Cm 6298 (TSO, September 2004)

<sup>17</sup>Neale Inquiry Independent investigation into how the NHS handled allegations about the conduct of Richard Neale, Cm 6315 (TSO, September 2004)

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<sup>19</sup>Good doctors, safer patients: proposals to strengthen the system to assure and improve the performance of doctors and to protect the safety of patients – a report by the Chief Medical Officer (Department of Health, July 2006)

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