



Step-By-Step Occlusal Rehabilitation for Bulimic Patient

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ABSTRACT

Tooth wear or tooth surface loss is a term used to define surface loss of dental hard tissues from causes other than developmental ones, dental caries and trauma. Often tooth wear is always presented with myriads of clinical presentation such as erosion, attrition, abrasion and abfraction. It is crucial to understand the definition of each tooth wear aetiology and identify them during clinical examination as this will affect the clinical management of the patients and their treatment outcome later. In the present article, the focus is placed on dental erosion in bulimic patient. Dental erosion is the irreversible loss of dental hard tissue caused by chemical process of acid dissolution but not involving bacterial plaque acid, and not directly associated with mechanical and traumatic factors, or even dental caries.

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Introduction

Bulimia Nervosa

Based on the World Health Organisation World Mental Health Surveys involving 14 countries, 1 percent of the population was diagnosed with bulimia nervosa². In Malaysia, the prevalence of eating disorder from 1995 to 2011 increases from 0.7% to 19.8%^{3,4}. Lack of data regarding bulimic disorder warranted the need for further studies in our society. Bulimia nervosa is an intense pre-occupation with body weight and shape, with regular episodes of overeating associated with extreme measures to counteract the feared effects of the overeating⁵.

Oral Findings

Dental erosion occurs because of purging by vomiting will only be apparent 6 months after onset⁶. The source of acid in bulimic patient comes from the gastric juice has a PH about 1.0 to 1.3. During purging, the vomit contacts the palatal surfaces of maxillary anterior teeth. At times, this chemical activity eventually undermines the palatal surfaces causing incisal fractures and chipping, further complicates with the over eruption of the mandibular teeth. Erosions involving posterior teeth may erode the tooth tissue surrounding restorations, leaving the restoration with a raised island like appearance. This is known as perimyolysis. If this is left untreated, loss of occlusal contact resulting dental hypersensitivity and loss of vertical dimension are commonly reported⁷.

Furthermore, as a result of insertion of objects to induce vomiting, traumatic lesions may be found on the palate and oropharynx of bulimic patients. Dry mouth related to dehydration; antidepressant drugs may lead to high caries risk. On the other hand, parotid enlargement, angular cheilitis, glossitis, candidiasis and oral mucosal ulceration are also commonly presented amongst bulimic patients⁸.

Dental Management of Bulimic Patients

As shown in (Figure 1), a comprehensive treatment planning depends on precise diagnoses and appropriate decision making, thus proper history taking and examinations are important prior to commencement of treatment^{9,10}. First

and foremost, present complains of the patient should be taken, very often patient's expectations of treatment are different from dental practitioners¹¹. What concern the patient the most (aesthetic, mastication, discomfort) and the expectations of patient should be evaluated and noted during this stage.



Figure 1. History taking related to tooth wears⁹

Particularly for this article, a thorough medical history regarding patient's eating disorder should be taken as bulimia nervosa is often associated with other medical problems such as electrolyte abnormalities, abnormal heart function, gastrointestinal complication and endocrine abnormalities⁹. It will be helpful if dental practitioner can liaise with patient's psychiatrist and have a list of medications taken by the patient.

Furthermore, if it is deemed relevant, any history of pain and tooth sensitivity should be taken. Previous dental treatment done will give the clinician an insight about patient's motivations level towards dental treatment. If patient has underwent preventive measurements previously, baseline records are important to check the outcome before proceeding

treatment. On top of this, oral hygiene regime such as does patient brush teeth right after vomiting, types of toothbrush, toothbrushing techniques are important in determining the aetiology of tooth wears.

Very often patient will not disclose their social history when a friend or family is present. As toothwear is often multifactorial¹², it is beneficial to probe more about other eating disorders, alcohol abuse problems, recreational drug abuse, smoking. Other than that, parafunctional habits such as bruxism, clenching, rumination will be questioned during history taking.

A diet analysis sheet (Figure 2) is essential to provide clear individualized preventive advice. Emphasis should be made on frequent intrinsic acid attacks or frequency of forced vomiting due to its extremely low pH and high titratable acidity. It is known binge eating often involves sugary food which leads to high caries rate¹³. Proper extraoral examination should be done as follows¹²:

Dietary history Questionnaire

Name: _____

Please record everything that you eat and drink with quantity (including water) for a 3 days period including at least one day in the weekend. Please also record all incidents of regurgitation (heave, throw-up or be-sick) and timing of toothbrushing.
If you take longer than normal time to finish a particular food, snack or drink, please also note the duration. For example, 2 hours to finish a glass of iced lemon tea while catching up with a friend in a café.

	Day 1 MTWTFSS Date: 10/1/15	Day 2 MTWTFSS Date: 17/1/15	Day 3 MTWTFSS Date:
Breakfast (Quantity, Time & Duration)	7:30 COFFEE x1 (no sugar) 10:00 FRUIT x1 (1/2 hr.) 10:00 BREAD (2 slices) (1/2 hr.)	7:30 COFFEE (w/s) x1 8:00 BANANA x1 8:00 BREAD x2 (1/2 hr.)	~9am BREAKFAST LUMP (NO) CHANGE DENT (1/2 hr.)
Between breakfast and lunch (Quantity, Time & Duration)	8:30 TEA (1/2 hr.) 9:00 BANANA (1/2 hr.) 9:00 QUINCE (1/2 hr.) 10:00 TEA (1/2 hr.)	8:30 TEA (w/s) x1 (1/2 hr.) 10:30 TEA (w/s) x1 (1/2 hr.) 11:30 WATER (1/2 hr.)	~10:30 (1/2 hr.) 12:00 BANANA APPLE (1/2 hr.) 12:00 WATER (1/2 hr.)
Lunch (Quantity, Time & Duration)	1pm CHICKEN SANDWICH (1/2 hr.) 1:30 BANANA (1/2 hr.) 1:30 QUINCE (1/2 hr.) 2:00 BANANA (1/2 hr.)	1pm CHICKEN SANDWICH (1/2 hr.) 1:30 BANANA (1/2 hr.) 1:30 QUINCE (1/2 hr.) 2:00 BANANA (1/2 hr.)	1pm CHICKEN SANDWICH (1/2 hr.) 1:30 BANANA (1/2 hr.) 1:30 QUINCE (1/2 hr.) 2:00 BANANA (1/2 hr.)
Between lunch & dinner (Quantity, Time & Duration)	4pm BANANA (1/2 hr.) 4:30 TEA (1/2 hr.) 5:00 BANANA (1/2 hr.)	3:45 BANANA (1/2 hr.) 5:00 BANANA (1/2 hr.)	~4:30 TEA (w/s) (1/2 hr.) ~6:00 TEA (w/s) (1/2 hr.)
Dinner (Quantity, Time & Duration)	6pm CHICKEN SANDWICH (1/2 hr.) 6:30 BANANA (1/2 hr.) 6:30 QUINCE (1/2 hr.) 7:00 BANANA (1/2 hr.)	7pm FISH & CHIPS (1/2 hr.) 7:30 BANANA (1/2 hr.) 7:30 QUINCE (1/2 hr.) 8:00 BANANA (1/2 hr.)	7:30pm CHICKEN SANDWICH (1/2 hr.) 8:00 BANANA (1/2 hr.) 8:00 QUINCE (1/2 hr.) 8:30 BANANA (1/2 hr.)
After Dinner (Quantity, Time & Duration)	8pm TEA (1/2 hr.) 9pm WATER (1/2 hr.)	8pm TEA (1/2 hr.) 9pm WATER (1/2 hr.)	~10:00 - 12:00 (1/2 hr.) 12:00 BANANA (1/2 hr.) 12:00 QUINCE (1/2 hr.) 12:30 BANANA (1/2 hr.)
Toothbrushing (Time)	7am 9:30pm	7am 9:30pm	7am 9:30pm
Incidents of regurgitation (Time)	/	/	~3:30-4:00 ~12:00-1:00 ~12:00-1:00

6 TIMES EXTRA (1/2 hr.) 7 TIMES (1/2 hr.) 5 TIMES (1/2 hr.)

Figure 2. An example of completed diet sheet to study extrinsic and intrinsic factors with brushing habits⁹.

a) Meticulous investigations on temporomandibular joints and muscles (bilateral muscle and jaw palpation, presence of any joint or muscle tenderness, clicking, crepitation, maximum jaw opening, mandibular deviation on opening or closure or any associated aches/pain should be noted).

- b) Inverted lip profile and overclosure as a result of loss of vertical dimension.
- c) Enlargement of parotid gland which often found in bulimic patient.
- d) Facial vertical proportion.
- e) Assessment of free way space with various techniques.
- f) Smile line, lip line and midline discrepancy.

Intraoral examination must include a detailed soft tissue, hard tissue examination and saliva analysis (quantity, quality, PH). Presence of buccal keratosis, scalloping of tongue or signs of xerostomia may give clue to the underlying aetiology. Level of oral hygiene should be recorded together with basic periodontal assessment¹². Good oral hygiene is the key of success for all restorations and it is a useful parameter to gauge patient's level of commitment and interest. Efficacy of plaque control should be measured by bleeding scores not by plaque scores as plaque scores inform only about performance during that visit while bleeding scores give a longer term view⁹.

Complete dental charting recording the dentition, dental caries, restorations, failed restorations, fractures, different types of tooth wear should be completed. According to Robb and friends, one of the presentation to distinguish among disordered eating patients regarding caries include a predisposition to cervical caries and/or a leathery lesion of dentine leaving large areas of enamel undermined¹⁴.

Besides recording the location of tooth wear (localized or generalized), The Tooth Wear Index of Smith and Knight (Table 1) is most commonly used to describe the severity of toothwear¹⁵. On the other hand, patient presenting with generalized wear may be assigned to three categories according to Turner and Missirlian (Table 2)¹⁶.

Table 2. Turner and Missirlian Index for Generalized Tooth Wear.¹⁶

Score	Criterion
1	Excessive wear with loss of vertical dimension of occlusion
2	Excessive wear without loss of vertical dimension of occlusion but space available
3	Excessive wear without loss of vertical dimension, but with limited space.

Overall examination of the alignment of both arches including presences (or absence) of crowding, spacing, titling, drifting, rotation, over eruption, reduced interarch space, mobility of teeth, overjet and overbite should be recorded. On top of this, a comprehensive occlusal analysis is mandatory which includes presence of stable centric occlusion (CO) and tooth contacts in intercuspal position¹⁷. If patient has difficulty getting into retruded centric position (RCP) due to protective neuromuscular reflexes, application of deprogramming devices ranging from leaf gauge, anterior deprogramming device "Lucia jig", cotton rolls or full coverage stabilisation splints would be helpful.

Table 1. Tooth Wear Index of Smith and Knight.¹⁵

Score*		Criterion
0	BLO C	No loss of enamel surface characteristics No change of contour
1	BLO C	Loss of enamel surface characteristics Minimal loss of contour
2	BLO I C	Enamel loss just exposing dentine < 1/3 of the surface Enamel loss just exposing dentine Defect less than 1 mm deep
3	BLO I C	Enamel loss just exposing dentine > 1/3 of the surface Enamel loss & substantial dentine loss but no pulp exposure Defect 1-2 mm deep
4	BLO I C	Complete enamel loss, or pulp exposure, or 2° dentine exposure Pulp exposure, or 2° dentine exposure Defect more than 2mm deep, or pulp exposure, or 2° dentine exposure

Moreover, it is important to identify the first point of tooth contact in CR, also known as the retruded contact point (RCP). Dentist should observe whether the slide from CR to CO has a larger vertical or horizontal component which is important in providing the space requirements for dental restorative materials when considering a re-organised approach⁹. Besides that, lateral and protrusive jaw record (canine guided or group function) are needed to facilitate occlusal analysis on mounted cast. If patient is wearing removable prosthesis, examination of retention, stability and occlusion is a must in providing a diagnosis¹.

After detailed history taking and examinations, hopeless teeth which is deemed unrestorable will be extracted^{12,18}. This may not always be evident immediately as some teeth may need more investigation such as sensibility test, good quality long cone radiograph prior to confirm a diagnosis¹². Furthermore, decisions regarding periodontally compromised teeth may be influenced by the patient's efforts in plaque control^{1,12}.

Good quality study cast mounted on semi adjustable articulator in maximum intercuspation and centric relation assist in assessing occlusion without the interference of soft tissue. Presence of occlusal interference during excursive and protrusive movements are more easily identified. The vertical and horizontal components of the slide from CR to CO can also be determined at this stage¹⁹. Diagnostic wax mock up may be designed in according to the finalized occlusal scheme. This procedure helps in providing a good communication and visualizing tool to assist in the evaluation of overall aesthetics, tooth shape, length/height and inclination¹⁷. Furthermore, it can be transferred into vacuum formed PVC matrix that can be utilized as a tooth reduction

guide, assist the fabrication of provisional restorations and definitive prosthesis. The wax up occlusion should aim in achieving occlusal stability, based on principles of a mutually protective scheme as explained below²⁰.

- a) Simultaneous stable bilateral tooth contacts.
- b) Centric relation (CR) coincident with centric occlusion (CO).
- c) Disclusion of the posterior teeth, upon lateral and protrusive mandibular movements.
- d) Anterior teeth disclusion, when posterior teeth contact in maximum intercuspation.
- e) Shared/ even anterior guidance.
- f) Canine guided occlusion, with planned group function upon loss of canine guidance (or where the canine tooth may be unsuitable as a guiding unit), with the absence of working or non working side interference.

(Table 3) discussed the sequence of treatment in oral rehabilitation for bulimic patient, in most of tooth wear cases, initial treatment should focus on preventive and conservative measurements. For example dietary advice on reducing the frequency, duration and amount of carbonated, sports, alcoholic drinks which will reduce salivary secretion and hence less protection⁷. A coating with dentine agent or sealant application may reduce hypersensitivity by protecting tooth substance from acid attack. Patient is advised to avoid toothbrushing shortly after vomiting, a neutral sodium fluoride mouth rinse is recommended to combat acid damage. Splint may be prescribed to protect teeth during episodes of vomiting for bulimic patients, but precise instructions must be given to avoid the splint to become a reservoir for acid produced. Regular follow up with medical practitioner for

Table 3. Sequence of treatment in oral rehabilitation for bulimic patient.

Stages	Procedures
1. Emergency care Aim: resolution of acute problems	<ul style="list-style-type: none"> • Arrest bleeding, relieve pain, reduce swelling. • Urgent extractions. • Dressing and temporary fillings. • Cancer referral.
2. Stabilisation Aim: stabilisation of active disease	<ul style="list-style-type: none"> • OHI, scaling and remove other plaque retentive factors. • Dietary analysis and advice. • Professional and self-applied fluoride regimen. • Smoking cessation advice. • Eliminating active carious lesion. • Extraction of non-restorable teeth. • Referral to manage gastric reflux, alcohol abuse, eating disorder, anxiety and depression. • Root surface debridement. • Permanent restoration. • Endodontics treatment. • Occlusal splint therapy. • Interim removable denture(s).
3. Reassessment 1	To review whether the patient's condition has been stabilised. Is the patient interested in treatment? In this case, if bulimic activities still on going, the patient should be referred to the medical practitioner for further management, preventive measurements should be emphasized.
4. Preliminary Restorative Phase	<ul style="list-style-type: none"> • Providing cores and new adhesive restorations as necessary. • Any definitive endodontic therapy. • Full analysis of occlusion. • Pre-restorative and pre-prosthetic surgery.
5. Reassessment 2	Further review of progress made and any concern that the dentist or patient has over the final phase of treatment can be discussed. No definitive treatment should be provided until bulimic activity is under control.
6. Definitive Restorative Phase	<ul style="list-style-type: none"> • Orthodontics. • Occlusal planning – conformative or reorganized. • Aesthetic treatments (include whitening). • Direct adhesive restorations for toothwear purpose including the direct Dahl appliance. • Indirect restorations and prosthesis. • Implant placement and superstructure construction.
7. Maintenance Phase	<ul style="list-style-type: none"> • Regular assessment of periodontal, caries and other disease risks. • Tooth wear monitoring. • Preventive advice reinforcement. • Monitor restorations and repair or replace when necessary.

bulimic activities or other psychological issues is important in treating the underlying cause of tooth wear.

These preventive measurements aim to prevent further pathological tooth wear with the hope that the wear rate may ultimately return to that a physiological rate. It is worth spending some time to assess the efficacy of preventive regime before active restorative intervention to reassess and re-establish treatment plan to restore the dentition with possible minimal loss of hard and soft tissue. Monitoring progression of tooth wear can be done by high quality clinical intraoral photographs or periodic study cast every 6-12 months¹².

Conclusion

General dental practitioners should be equipped with knowledge regarding oral manifestation of bulimic patients to be able to detect warning signs of eating disorder. Prompt referral and organized dental management help in limiting the damaging effects and promote better patients' outcome.

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