

Midline fracture of the complete upper denture accounts for 29% of all repair work in dental laboratories, whilst teeth debonded from complete dentures account for 33%. These two common problems will be considered.

Types of fracture

☐ ***Fatigue of the acrylic resin***

Fatigue fracture results from repeated flexing of the denture by forces too small to fracture it directly. Failure of the denture base is due to the progressive growth of a crack originating from a point on the surface where an abrupt change in the surface profile causes a localised concentration of stress many times that applied to the bulk of the denture. The crack often starts palatally to the upper central incisors, grows slowly at first but undergoes an enormously increased rate of growth just before the denture fractures. A failure of this type most commonly occurs in dentures that are about 3 years old. Midline fracture due to fatigue of the acrylic resin is the commonest type of denture breakage.

☐ ***Impact***

Denture breakage might occur, for example, if the patient accidentally drops the denture while cleaning it. It might also result from an accident in which the patient receives a blow to the mouth. Whenever possible, the cause, or causes, of the fracture must be identified before the denture is repaired or replaced. Unless this is done and the cause attended to, the denture is likely to fracture again within a short period of time.

Causes of fracture:

A. Denture factors

- ❖ Stress concentrators.
- ❖ Absence of a labial flange.

- ❖ Incomplete polymerisation of the acrylic resin.
- ❖ Previous repair.
- ❖ Shape of the teeth on the denture.
- ❖ Poor fit.
- ❖ Lack of adequate relief.

B. Patient factors:

- ❖ Anatomical factors: a prominent labial frenum will require a deep notch in the flange resulting in stress concentration in that area.
- ❖ High occlusal loads: These may occur in patients with powerful muscles of mastication, or whose natural lower teeth are still present, or who are bruxists.

Debonding of teeth

The usual reasons for a weak bond between tooth and denture base are:

- The presence of tin-foil substitute on the ridge-lap surface of the tooth
- The presence of residual wax on the same surface
- The use of cross-linked teeth which are incompatible with the particular denture base polymer.

Of the various recommendations that have been made for minimising the risk of debonding, **the following have received fairly widespread support**

(1) Choose artificial teeth and a denture base polymer which are compatible by checking the information sheets provided with the products or by seeking information from the manufacturers. Conventional denture teeth tend to achieve a higher bond strength than cross-linked teeth.

(2) Ensure all traces of wax and tin-foil substitute are removed. The complete removal of wax is not consistently achieved with boiling water alone and so for optimum bond strength the use of a wax solvent is recommended .

(3) Drill small channels into the palatal surface of the teeth to increase the area available for the polymerising denture base resin. However, it needs to be remembered that such recesses in the ridge-lap surface of the teeth can make complete wax removal more difficult. Therefore particular care needs to be taken when removing the wax, otherwise the adjustments can result in a weaker, rather than a stronger bond.

(4) Apply a solvent such as dichloromethane to the ridge-lap surface of the teeth. The solvent creates microscopic pores and channels which promote diffusion of the polymerisable materials.

(5) Use a heat-curing denture base polymer. This material polymerises more slowly than a cold-curing material and ensures better penetration into the tooth substance.

Gagging reflex (retching):

Retching is a protective reflex which guards the airway and posterior oropharynx. It may occur during prosthetic procedures such as impression taking, or when dentures are worn, in extreme cases, when a mouth mirror is placed on the lips or tip of the tongue.

Etiology

There are a number of causes that may be conveniently grouped together as follows.

(1) Somatic: The term 'somatic' covers those situations where the reflex is triggered by tactile stimulation of the soft palate, posterior third of the tongue and fauces.

(2) Iatrogenic: Iatrogenic causes, which are related to the dentures, are numerous. Some patients begin to retch after new dentures are inserted, but in most cases this reflex soon disappears as they adapt to the dentures. However, the reflex may persist if there are faults with the dentures such as an excessive occlusal vertical dimension, or if

the dentures are stimulating the sensitive areas of the soft palate and tongue directly.

This stimulation may be caused by palatal over-extension, a posterior border which

is too thick or poorly adapted, the teeth encroaching on tongue space or indeed by

any factor producing denture instability.

An upper denture whose posterior border is under-extended posteriorly can provoke

retching because as the edge of the denture terminates on relatively incompressible

mucosa a satisfactory post-dam cannot be produced. This results in poor retention,

which increases denture instability, stimulates the tongue and palate, and causes apprehension in the patient. When this diagnosis is established, it requires a very careful explanation by the dentist to convince the patient that to cure the problem it will be necessary to cover more, rather than less of the palate.

(3) Psychogenic: Psychogenic causes may arise from sight, sound or thought. They include the sight of impression material being mixed or the sound of another patient

retching. The patient may be extremely apprehensive because of an unhappy first hand

experience of dental procedures or as a result of disturbing stories from friends.

In rare instances, retching may be a manifestation of a psychological disturbance which is not primarily related to the patient's dental treatment.

(4) Systemic: Less frequently, the causative factor may be systemic disease, particularly conditions affecting other regions of the gastrointestinal tract; for example, the link between retching and alcoholism may be related to the persistent gastritis found in such patients. Persistent catarrh will prevent nose breathing and may contribute to the problem of retching.

Patient management

A carefully taken history will reveal the severity of the problem and provide clues as to the cause. For example, a situation where a patient has been able to tolerate the clinical stages of denture construction, but then has difficulty in wearing the finished dentures, points to an iatrogenic cause which should be treated relatively simply by correcting the error in denture design.

Impressions

All but the most phlegmatic of individuals find impression taking unpleasant. However, retching during impression taking can usually be prevented by the following:

(1) Reassurance and relaxation:

It is very important that the dentist has a confident and relaxed chair side manner. It

is essential that the anxious patient is reassured and encouraged to relax both physically and mentally. The dental nurse can also play a major role in creating an appropriate state of mind in the patient.

(2) Position of the patient:

The dental chair should be adjusted so that the patient is sitting comfortably in the upright position.

(3) Breathing through the nose:

Instructing the patient to breathe through the nose while the tray is being tried in

the mouth or the impression is being taken is one of the most helpful methods of

preventing retching. During nasal breathing the soft palate remains stationary in its

low position and the tongue in its 'guarding' position, protecting the naso-pharynx

from the threat of the foreign body in the mouth. If the patient breathes through the mouth, this protection is lost and movement of the soft palate results in intermittent contact with the setting impression material, increasing stimulation.

(4) Impression technique:

Impression trays should be well fitting. As close-fitting special trays are less bulky than spaced trays, they are better tolerated and should be used whenever possible. When trying trays in the mouth, firm, positive movements should be used. Most patients tolerate the lower impression better than the upper one, so if the lower impression is taken first, the success of the procedure is likely to reassure the patient. The impression material should be mixed or prepared out of sight of the patient and the amount placed in the tray kept to the minimum necessary to record the relevant structures. A saliva ejector should be used if copious amounts of saliva collect in the floor of the mouth.

(5) Distraction:

It is during the insertion of the impression and while the material is setting that it is particularly important to distract the patient's attention from what is going on. This may be achieved by the dentist talking about something that is known to be of particular interest to the patient, or by reinforcing the requirement that the patient continues to breathe slowly

and steadily through the nose. It has even been suggested that patient be asked to raise one leg and to concentrate on not lowering it until the impression has set!

The severe retching reflex:

The first challenge when trying to treat a patient who has this problem is to obtain an

accurate impression so that a well-fitting denture base can be constructed.

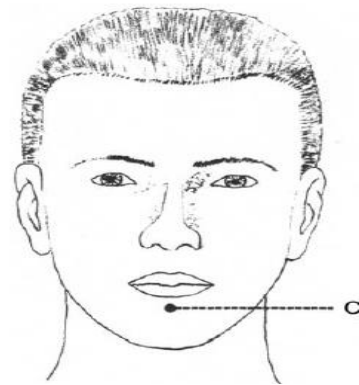
The second

challenge is to provide a prosthesis that can be worn by the patient for a reasonable length of time.

THE FOLLOWING APPROACHES TO THE MANAGEMENT OF THIS DIFFICULT PROBLEM HAVE BEEN FOUND USEFUL:

(1) Conscious sedation. Conscious sedation will allow the dentist to obtain a satisfactory impression without causing the patient embarrassment.

(2) Acupuncture. The gag reflex has been shown to be capable of being controlled by Acupuncture. Although there is evidence to show that the technique is of assistance when undertaking the various clinical stages of denture construction . Apply light finger pressure with the index finger in a point midway between chin and lower lip. Progressively increase the finger pressure until the patient feels discomfort and distension. The acupressure procedure should start at least 5 minutes before insertion, and continue through the insertion procedures can be applied by the assistant.



(3) Hypnosis. Hypnosis has been used in the treatment of severe cases . Its success is dependent upon the patient being well motivated and being able to practice self-hypnosis, thus enabling a denture to be worn outside the dental surgery.

(4) The training denture. The training denture approach may be of value when treating any patient with a long history of difficulties which suggest frank denture intolerance, including retching.

The burning mouth syndrome

The burning mouth syndrome (BMS) can be very troublesome to the patient, presents

problems of diagnosis and often involves prolonged treatment. The symptoms occur in 5–7% of the adult population. Of those who seek treatment, there is a predominance of women, with a mean age of approximately 60 years. The most common sites of the complaint are the tongue and the upper denture-bearing tissues. Rather less common are the lips and lower denture-bearing tissues. The oral mucosa appears normal. Many of the BMS patients have consulted a number of health care professionals before seeking help from the dentist or dental specialist. They know of no other people with the complaint and therefore feel quite isolated. If several professionals have stated that the mouth looks normal the patient may start to feel as if ‘it is all in the mind’. The level of anxiety is consequently raised and cancerophobia may well develop.

Classification

Three types of BMS have been described. The classification is useful as it points the way towards appropriate treatment and a probable prognosis.

Type 1

There are no symptoms on waking. A burning sensation then commences and becomes worse as the day progresses. This pattern occurs every day. Approximately 33% of patients fall into this category and are likely to include those with haematinic deficiencies and defects in denture design.

Type 2

Burning is present on waking and persists throughout the day. This pattern occurs everyday. About 55% of patients are placed in this category, a high proportion of who have chronic anxiety and are the most difficult to treat successfully.

Type 3

Patients have symptom-free days. Burning occurs in less usual sites such as the floor of the mouth, the throat and the buccal mucosa. This category is made up of the remaining 12% of patients. A study of this group has shown that the main causative factors are allergy and emotional instability. The investigation of these patients is likely to include patch testing.

Etiology

BMS has been attributed to a multitude of causes and these broadly fall into three groups:

- Local irritants including denture faults
- Systemic factors
- Psychogenic factors.

Local irritation

Denture faults

Errors in denture design which cause a denture to move excessively over the mucosa, which increase the functional stress on the mucosa or which interfere with the freedom of movement of the surrounding muscles may initiate a complaint of burning rather than frank soreness. Denture design errors have been discovered in 50% of BMS patients.

Residual monomer

High levels of residual monomer in the denture base have been reported and the tissue damage produced is considered to be the result of chemical irritation rather than a true allergy. It is possible that high levels of residual monomer, which have ranged from three to ten times the normal

value, are due to errors inadvertently introduced into the short curing cycles which are popular with manufacturers and dental laboratories. If the requisite curing temperature of 100°C is not achieved in the relevant part of the short curing cycle, there is a marked increase in residual monomer content. Some authorities may not consider this condition to be an example of BMS where, classically, the mucosa looks normal. However, a patient who reacts to a high level of residual monomer complains of a burning sensation and so we feel justified in including it.

Micro-organisms

The role of micro-organisms in burning mouth syndrome is controversial and studies

have not shown a link between the presence of *Candida albicans* and the complaint.

Smoking and mouthwashes

Smoking and the regular use of some mouthwashes are irritants that have been implicated in BMS.

Systemic causes

Nutritional deficiencies

Contributions from nutritional deficiencies such as iron, vitamin B complex and folic

acid should be highlighted. An example of BMS caused by a deficiency is Iron deficiencies have been found in 8% and folic acid deficiencies in 6% of BMS

patients. Low blood levels of vitamin B1 and B6 were found in 40% of patients .

Endocrine disorders

What is apparent is the relative unimportance of the climacteric as a causative factor, a modern viewpoint which is at variance with past clinical opinion. On rare occasions, the symptoms are found to be linked

with an undiagnosed diabetes mellitus. Treatment of the medical condition invariably results in complete resolution of BMS. Xerostomia, frequently associated with BMS, has many causes. One that should be highlighted here is drug-induced xerostomia. Recent investigations have produced evidence of a link between BMS and reduced parotid gland function and of antidepressant medication reducing the salivary flow. It should be recognized that the presence of a dry mouth is capable of accentuating the symptoms initiated by any of the causes of local irritation. This is an example of the multifactorial nature of BMS.

Hypersensitivity

True hypersensitivity to constituents of denture base polymer is rare and usually results in local symptoms such as burning or itching. In one instance where there were systemic symptoms of nausea, dizziness and general malaise the patient was found to have reacted to dyes used to colour the polymer. Dentures made of clear polymer proved successful.

Parkinson's disease:

It has been reported that the prevalence of BMS was 24% in people suffering from Parkinson's disease.

Psychogenic causes:

The more common disorders associated with BMS are anxiety, depression, cancerophobia and hypochondriasis. The associated parafunctional activities such as bruxism and abnormal and excessive tongue movements are capable of inducing mucosal irritation.

Management

Faced with a multitude of causative factors, it will be recognised that the process of diagnosis and treatment is usually a time-consuming affair.

- Initial assessment (history/examination/special tests).
- Provisional diagnosis.

- Initial treatment (e.g. elimination of local irritants and investigating and treating haematinic deficiencies).
- Assessment of initial treatment.
- Definitive diagnosis.
- Definitive treatment (local/systemic correction/psychological therapy).
- Follow-up.

With regard to outcome, analysis of various studies suggests that about two-thirds of

BMS patients are either cured or improved to such an extent that the burning sensation is no longer an overwhelming problem. There remain a group of patients for whom the current state of knowledge can offer relatively little benefit. Some in this small group remain totally resistant to treatment. However, it should be remembered that even in these refractory cases BMS is not necessarily a life sentence as spontaneous remissions can eventually occur for no apparent reason.

Disturbance of speech:

The presence of complete dentures can modify speech by affecting articulation and by altering the degree of oral resonance . A number of sounds are articulated by contact of the tongue to the palate and to the teeth. A change in speech that may be quite marked when the dentures are first inserted will usually disappear completely within a few days. However, if the changes in the contact surfaces require a modification of tongue behavior that is beyond the adaptive capability of an individual patient, a speech defect will persist. It should also be remembered that the tongue of a patient who is wearing complete dentures has a dual function – to take part in speech articulation and to control the dentures. If the dentures are loose, the demands of this latter function may be so great that there is a general deterioration in the quality of speech.

The following relationships are particularly important to the production of clear speech:

(1) Tip of the tongue to the palate:

Contact between the tip of the tongue and the palate is required in the production of

/s/, /z/, /t/, /d/ and /n/. Consequently, a change in the shape or thickness of the denture

contact surface resulting from the fitting of new dentures will require a modification

of tongue behaviour in order to produce sounds which are the same as before. In the

vast majority of cases, the necessary modification occurs without any difficulty in a

relatively short period of time.

The sound most commonly affected in this way is /s/, a sound which is generally

produced with the tongue tip behind the upper anterior teeth. A narrow channel remains in the Centre of the palate through which air hisses . If the palate is too thick at this point, or if the incisors are positioned too far palatally, the /s/ may become a /th/. If the denture is shaped so that it is difficult for the tongue to adapt itself closely to the palate, a channel narrow enough to produce the /s/ sound will not be produced and a whistle or /sh/ sound may result. This is most likely to be the consequence of excessive palatal thickening laterally in the canine region .

(2) Lower lip to incisal edges of upper anterior teeth:

The lower lip makes contact with the incisal edges of the upper anterior teeth when

the sounds /f/ and /v/ are produced. If the position of these teeth on a replacement

denture is dramatically different to that on the old denture there is likely to be a disturbance in speech.

(3) Lateral margin of the tongue to posterior teeth:

Contact between the lateral margins of the tongue and the posterior teeth is necessary

to produce the English consonants /th/, /t/, /d/, /n/, /s/, /z/, /sh/, /zh/ (as in measure),

/ch/, /j/ and /r/ (as in red). Air is directed forwards over the dorsum of the tongue and

may be modified by movement of the tongue against the teeth or anterior slope of the

palate to produce the final sound. If the contact can only be achieved with difficulty,

movement of the tip of the tongue may be restricted with consequent impairment

of speech. This difficulty arises if the posterior contact surfaces are too far from the

resting position of the tongue as a result of the occlusal plane being too high, the

occlusal vertical dimension too great or the posterior teeth placed too far buccally.

In extreme cases, it may not be possible for the tongue to produce a complete lateral

seal and so a lateral sigmatism develops.

(4) The relationship of mandible to maxilla:

The mandible moves closest to the maxilla during speech when the sounds /s/, /z/,

/ch/ and /j/ are made. Normally, at this time, there will be a small space between

the occlusal surfaces of the teeth. However, if the occlusal vertical dimension of the

dentures is too great, the teeth may actually come into contact so that the patient

complains that the teeth clatter.