Complications in complete denture wearers

To reduce the risk of mucosal damage and bone resorption in complete denture wearers, a check should be made every year. It is important that the patient is not under the mistaken belief that once the artificial substitute for the natural teeth has been provided there will be no further problems, and no need for further maintenance.

Treatment required at long-term recall appointments will be one, or a combination, of the following:

- Adjustment of the impression surface
- Correction of denture base extension
- Occlusal adjustment with or without a check record
- Reline or rebase of the dentures
- Construction of replacement dentures.

Long term recall appointments done because the following changes occurred

- Mucosal changes
- Bone resorption
- Occlusal changes
- Adaptation of patient

Following prosthetic complications have been recorded as a result of research done by Hakan B. et al 2012 for complete denture wearers

1. Loss of retention (62.5%)
2. Existence of any denture irritation or ulceration (51.6%)
3. Existence of any debonded/fractured artificial teeth (26.6%)
4. Existence of any fracture in the denture base (31.3%)
5. Existence of denture stomatitis (9.4%)
6. Existence of epulis fissuratum
7. Existence of inflammatory papillary hyperplasia

Cycle of tissue damage resulting from lack of denture maintenance

Some Clinical Problems and Solutions associated with complete denture

- Pain and instability
- Lack of saliva
- Hard and soft materials for modifying the impression surface of dentures
- The flabby ridge
- Midline fracture
- Debonding of teeth
- Gagging reflex
- The burning mouth syndrome
- Disturbance of speech.
Discomfort can arise from overloading of the mucosa as a result of clenching or grinding the teeth. These occlusal habits are caused by increased activity of the masticatory muscles produced during stressful situations.

In treating parafunction, the patient must be made aware of the problem and should be told that teeth should be out of contact for most of the time. It is
important to reassure the patient, describe the link between stress, parafunction and pain under dentures and point out that there is no change in the oral mucosa. The importance of conscious relaxation should be emphasised and the patient should be strongly encouraged to leave both dentures, or at least the lower denture, out at night.

**Another complication is Lack of saliva**

**Functions of saliva**

Saliva possesses the following functions in the edentulous patient:

- It is responsible for the physical retention of complete dentures
- It prepares food for swallowing and facilitates the sense of taste
- It lubricates and protects the oral mucosa
- It helps to preserve a normal balance of the oral flora
- It promotes clear speech.

**Problems of reduced salivary flow**

A reduction, or absence of saliva (xerostomia), is likely to cause problems with all the functions listed above so that a general, and significant, reduction in the quality of life results. Reduced retention of dentures is a particular problem for edentulous patients.

There may also be an increased susceptibility to denture trauma resulting in complaints of pain and in some case the burning mouth syndrome

**Aetiology of reduced salivary flow**

MEDICAL HISTORY
A full history is taken including a ‘I’m taking an anti-depressant and question on current medication a diuretic’ ‘For how long have you been ‘One year’ DRY MOUTH is a possible taking these tablets?’ contributory factor to the oral complaint

SOCIAL HISTORY

The history has revealed a number of possible causes of the persistent pain. The diagnosis can be established only after a careful examination of the patient, the mouth and the various sets of dentures in order to confirm or deny the various possibilities. The point should be made that unless a full history is obtained some of the possible causes might never be revealed. The provision of new dentures would do little to eliminate the problem if the persistent pain was due to a dry mouth and to parafunction.

However, the condition is relatively common in middle-aged and older people, the main candidates for complete dentures, with between 12% and 16% complaining of a dry mouth

The commonest causes of dry mouth (Niedermeier et al. 2000; Field et al. 2001) are:

- Drugs, e.g. tricyclic antidepressants, beta-blockers
- Depression and chronic anxiety
- Dehydration
- Mouth breathing
- Sjögren’s syndrome
- Head and neck radiotherapy
- Poorly controlled diabetes
• Smoking.

A complaint of dry mouth can occur in the absence of the clinical signs of dryness (‘symptomatic xerostomia’). Under such circumstances the physical retention of the dentures would not be expected to be diminished. In clinical xerostomia there are intra-oral signs of dryness such as a dry, atrophic mucosa and lack of saliva pooling in the floor of the mouth. The dentist can check the dryness of the buccal mucosa simply and quickly during the examination of the patient by carrying out the ‘mirror test’. For this the dentist lightly presses the face of the mirror against the buccal mucosa and then tries to remove it. If the mirror comes away easily the mucosa is still covered by a substantial film of saliva; if the mucosa adheres to the mirror then it is dry.

**Management of dry mouth**

Close collaboration with the patient’s general medical practitioner or with a specialist in oral medicine is often necessary. It might be possible, for example, to change an existing xerostomic drug to one less liable to reduce salivary flow. As there is a definite relationship between fluid intake and secretory performance it is essential that the patient is kept well hydrated. Chewing and energetic exercise improve salivary flow, possibly because of improved blood circulation to the glands. Where some functional salivary tissue remains the problem may be alleviated by sugar-free chewing gum or a scorbic acid. In cases where flow rate cannot be improved limited relief may sometimes be obtained by the use of artificial saliva.

It is very important for a denture patient with a dry mouth to maintain an excellent level of denture hygiene. The likelihood of proliferation of *Candida albicans* is increased in xerostomia and therefore unless denture hygiene is maintained at a high level the denture is likely to be rapidly colonised by the micro-organism, resulting in denture stomatitis.
Motivation and instruction of the patient, followed by monitoring the quality of denture hygiene are essential.

**Cleaning dentures it should be done for:**

Deposits form on dentures such as:

- Microbial plaque
- Calculus
- Food debris.

These deposits may be responsible for a variety of problems including:

- Denture stomatitis
- Angular stomatitis
- Unpleasant tastes
- Odours
- Unsightly appearance
- Accelerated deterioration of some denture materials such as short-term soft lining materials.

The effective cleaning of dentures is therefore of considerable importance to the patient’s general well-being and oral health.

**IPH-Inflammatory Papillary Hyperplasia**

Candidiasis is contributing factor.

Wearing ill-fitting dentures 24h/7 days.

Resolve before making new dentures because. If left as is, new dentures will be loose after placement, as inflammation resolves.

- Leave dentures out at night.
- Reline with tissue conditioner.
- Nystatin mouth rinse
In cases where an intractable dry mouth gives rise to a persistent problem of loose dentures a denture adhesive will usually provide some improvement in denture function.

**Hard and soft materials for modifying the impression surface of dentures**

Materials which can be used to modify the impression surface to overcome some of these problems; these materials can either be applied by the dentist at the chairside or by the dental technician in the laboratory.

The materials may be classified as follows:

- rigid materials
- short-term soft lining materials
- long-term soft lining materials.

**Rigid materials**

Recent years have seen the development of a group of useful materials, frequently described as chairside reline materials, which can be used to modify the impression surface of an existing denture.

**Composition**

Commonly these materials consist of a powder containing polyethylmethacrylate together with a liquid monomer, butylmethacrylate. The important point to make is that monomeric methylmethacrylate, a tissue irritant, is avoided. Many of the products include a primer to enhance the adhesion of the material to the existing denture polymer. The available materials vary in working time, setting time and viscosity. These materials can be useful for relining dentures. As they can be used at the chairside a ‘one-stop’ reline technique can be employed.
Short-term soft lining materials

Composition
Most materials are supplied in a powder/liquid form. An alternative presentation is in a ready-to-use sheet form which can be found in one product available to the dental profession and in several ‘over the counter’ products available directly to the general public.
It is essential that traumatised tissue is examined by the dentist and that rational, rather than empirical, treatment is prescribed.
The composition of the powder/liquid types is as follows:

(1) Powder. Polyethylmethacrylate, or copolymers of polyethyl/methylmethacrylate.

(2) Liquid. A mixture of:
   (a) an aromatic ester, such as dibutyl phthalate which acts as plasticiser
   (b) ethyl alcohol.

Clinical applications
Short-term soft lining materials are placed in existing dentures for the following reasons.

(1) Tissue conditioning. For tissue conditioning, the material is applied for a period of a few days to the impression surface of a denture when the mucosa is traumatised and inflamed. The tissue conditioner acts as a cushion absorbing the occlusal loads, improving their distribution to the supporting tissues and encouraging healing of the inflamed mucosa.

(2) Temporary soft reline. A short-term soft lining material can be used to improve the fit of a denture, typically an immediate restoration.
(3) **Diagnosis.** A short-term soft lining material can be used as a diagnostic aid where the dentist wishes to check the reaction of the patient and the tissues to an improvement in fit of a denture.

(4) Functional impression. A short-term soft lining material can be used as a functional impression material applied to the impression surface of a denture for the purpose of securing an impression under functional stresses.

(5) Recording the neutral zone. The ability of these materials to be moulded by the oral musculature over an extended period of several minutes allows them to be used to record the neutral zone

**Long-term soft lining materials**

Long-term soft lining materials distribute stress more evenly under dentures than do the hard denture base materials. They also absorb impacts that can arise from masticatory function. They can therefore be said to have a shock-absorbing or cushioning effect. As a consequence it has been shown that the addition of a long-term soft lining to a complete lower denture improves the ability to bite and chew and provides general improvement in comfort when compared with hard relines. The lining has also been shown to improve masticatory performance.

**Indications for use**

(1) *Persistent pain under a denture.*

(2) *Thin atrophic mucosa.*

(3) *Parafunction.*

It is useful to consider the first three indications together, as a complaint of persistent pain may be due to the poor quality of the denture-bearing mucosa or to the patient’s inability to regulate gripping or grinding habits. The whole problem may be exacerbated by gross resorption of the mandible which results in the normal masticatory forces being distributed over a reduced area. It is
important to make two points; first, the problem is almost always found in the lower jaw and, second, it is essential to ensure that all existing denture faults have been eliminated before deciding to proceed with a long-term soft lining.

(4) *Replacing an existing denture which has a soft lining.* Once a patient has successfully worn a lower denture with a soft lining and has got used to its ‘feel’ it is often wise to repeat the prescription. If this is not done and the new denture is made with a hard base the patient may have problems in adapting to it and reject the prosthesis as a result.

(5) *Sharp bony ridges or spicules.* The pattern of resorption of the mandible may result in sharp ridges or spicules of bone on which the denture-bearing mucosa. The problem might be overcome, at least in the short term, by surgically smoothing the bone. However, there are often occasions where poor health or a strong preference by the patient to avoid surgery are contraindications to this approach. There is also the danger that surgical interference with the mandible will speed up resorption of the bone. An alternative, conservative approach is to provide a soft lining, which often provides an acceptable level of comfort under these circumstances.

(6) *Superficially placed mental nerve.* Another consequence of advanced resorption of the mandible is that the mental foramen and mental nerve may become superficially placed within the denture-bearing area so that the nerve is traumatised during function. This typically gives rise to a complaint of a severe, sharp, stabbing pain from the area of the mental foramen which is brought on by biting. A soft lining restricted to the problem area may provide relief. However, it is not uncommon to find that a superficial mental nerve requires greater pressure relief than can be provided by a soft lining. If this is the case it may be necessary to cut the
denture away in the area of the nerve to eliminate pressure on the nerve altogether.

*Types of long-term soft lining*
Soft linings are made either of silicone rubber or soft acrylic. The silicone materials may be cold-curing or heat-curing. The soft acrylics are heat-curing; cold-curing soft acrylics have a very limited life span and are best thought of as temporary soft linings.

*The flabby ridge*
This condition is most frequently seen in the upper anterior region. The bone becomes grossly resorbed, often up to the level of the anterior nasal spine, and is replaced by fibrous tissue. As a result of this mobile fibrous tissue, the stability of a complete denture will be poor and both function and appearance can be heavily compromised.

*Aetiology*
It has long been believed that the condition, sometimes called the ‘combination syndrome’, is caused by the presence of lower natural teeth. This is probably not surprising when the many factors that influence bone metabolism are considered. Nevertheless it is probably wise to keep such patients under regular review to ensure that a dramatic level of damage is not occurring.

*Management*
*Approaches to treatment*
The management of this condition is somewhat controversial, opinion falling into two camps. In one, surgical removal of the fibrous tissue is favoured in every case where the health of the patient allows. This approach produces a firm ridge which is reduced in size. Advocates of the opposing view suggest that surgical removal should rarely, if ever, be carried out because the fibrous tissue may have a cushion effect which reduces trauma to the underlying bone. If the
tissue is removed, it must be replaced by denture base material with consequent increase in the bulk and weight of the prosthesis.

**Denture breakages**

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.

**Midline fracture**

The midline fracture of an acrylic denture may occasionally result from careless handling by the patient; for example, accidental dropping of the denture while cleaning can cause an impact fracture. Characteristically, however, a midline fracture is due to fatigue of the acrylic resin produced by 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.

**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)**

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 or, in extreme cases, when a mouth mirror is placed on the lips or tip of the tongue.

**Aetiology**

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.

(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 gagging because as the edge of the denture terminates on relatively incompressible mucosa a satisfactory post-dam cannot be produced. This result 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 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

Most 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 chairside 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 nasopharynx 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 the 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
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 there is, as yet, no evidence that it can be used by the patient to allow the denture to be worn.
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 practise 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.

Aetiology

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. 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 recognised 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 behaviour 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. As mentioned

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/, /h/, /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.

**The position of the tongue for producing the sounds /th/, /s/ and /sh/.*

---

**Dr. Intisar J. Ismail**  
**Prosthodontic Department**