

FULL DENTURE PROBLEMS AND SOLUTIONS – A GPs' GUIDE

Robert Burke, Dental Practitioner
Yorkshire Street, Morecambe

INTRODUCTION

Millions of patients in this country have to wear partial or complete dentures and a high percentage of these cases have problems of some sort with them. In this article we shall look at some of the problems associated with tooth loss and the wearing of full dentures and the increasing use of dental implants as a means of overcoming some of these problems.

TOOTH LOSS

With removal of the teeth there is an immediate shrinkage of the alveolar bone and loss of the periodontal ligament that was holding them in place. Between forty and sixty percent of the bone loss occurs in the first few months after extraction of the teeth and thereafter continues indefinitely. The causes are multifactorial but include disuse atrophy, hormonal changes and other local and systemic factors. The effects of bone loss are cosmetic, anatomical and functional:-

- 1 Cosmetic deterioration – this is not as noticeable in the younger patient whose facial musculature retains its tone and, therefore, contour without the support of dentures. In the older patient where the tissues are less elastic there is a narrowing of the lips, a deepening of the nasolabial groove and a loss of the labiomental angle leading to an ageing in appearance.
- 2 Anatomical problems – these can include sharpness of the residual ridge, exposed neurovascular structures such as the mental nerve, and prominent muscle attachments interfering with denture function. A sharp or knife-edged ridge can often be felt by tactile examination under the attached mucosa of the denture-bearing area. This can lead to pain under the fitting surface of the denture and can be dealt with either by removing the sharp edge surgically or by placing a soft lining on the denture's fitting surface.

Where bone resorption of the mandible is marked the mental nerve can come to lie on top of the denture-bearing area. The patient will often complain of a shooting pain to the lower lip when the dentures are closed together. Usually the problem can be resolved by easing the fitting surface of the lower denture in the region of the prominent nerve.

Pronounced muscle attachments can lead to displacement of the denture in function and if this cannot be cured by easing the denture then surgical intervention may be necessary to reposition the offending attachment.

- 3 Functional problems – the periodontium which holds the tooth in the bone is a specialised supporting tissue. With tooth removal the periodontium disappears leaving behind

a bony ridge which may or may not favour load-bearing, covered by a mucosa which is not specialised supporting tissue. There is also significantly less surface area of mucosa overlying the ridge (particularly in the mandible) than there was periodontal ligament and there is therefore both a qualitative and quantitative loss of load-bearing potential. In fact the average biting load with tissue-borne dentures is 7.4kg as opposed to 21.7kg with natural teeth, causing a huge decrease in chewing efficiency.

COMPLETE DENTURES

The patient's first set of full dentures is often placed immediately after the extraction of any remaining anterior teeth so he does not suffer the ignominy of being seen by family, friends and colleagues in an edentulous state. As discussed previously, this causes a problem because of the rapid loss of bone following the extractions which causes the denture to become a poor fit very quickly. This has to be dealt with by the use of denture fixatives and periodic relining of the dentures until the rate of bone loss slows down: at this point new dentures can be constructed.

Further problems can be caused by poor quality saliva or lack of saliva (often caused by medication) leading to poor mucosal health and reduced retention of the denture.

Lower dentures are notoriously difficult due to the presence of a mobile tongue causing difficulty in obtaining a good peripheral seal and subsequent suction over an inherently reduced denture-bearing area. The lower denture is, therefore, to some extent patient-dependent and patients with unfavourable patterns of neuromuscular control, especially the elderly and the disabled, can be difficult and in some cases impossible to treat successfully with a basic tissue-borne denture.

Edentulous patients can also suffer from psychological problems brought on by a loss of confidence and self-esteem following tooth loss, social problems if they cannot eat in public or if they experience speech difficulties, and nutritional problems if they cannot masticate efficiently.

LESIONS OF THE ORAL MUCOSA

Lesions of the oral mucosa have many causes but the ones most commonly associated with denture wearing are:

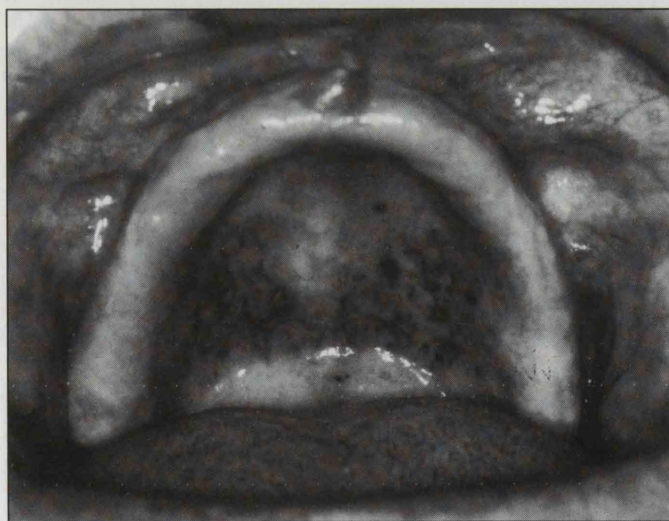
- 1 Traumatic ulcer
- 2 Denture stomatitis (often in association with angular cheilitis)
- 3 Fibrous hyperplasia
- 4 Papillary hyperplasia

- 1 Traumatic ulcer – can be caused by over-extension of the denture base or imbalance of the occlusion causing the dentures to tip in function. It responds quickly to easing the denture or adjusting the occlusion. Early stages of squamous cell carcinoma can resemble a traumatic ulcer but would not respond to denture adjustments and need to be referred quickly to an oral surgeon for diagnosis and treatment.



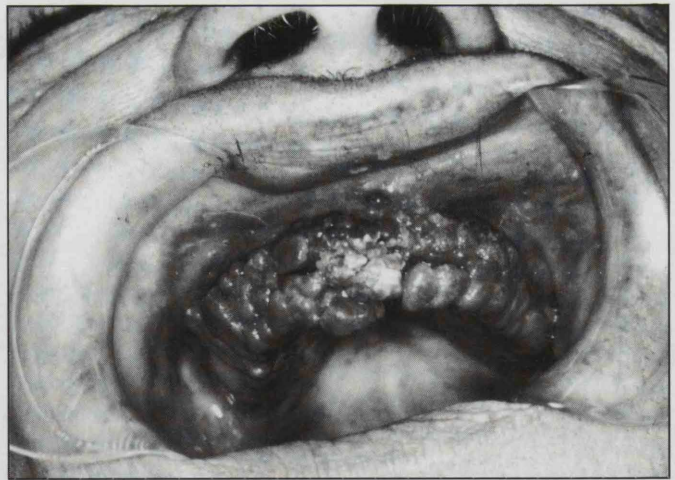
Traumatic ulcer

- 2 Denture stomatitis – usually symptomless. The characteristic feature is an area of bright uniform erythema exactly corresponding to the upper denture-bearing area. It is often associated with angular cheilitis, both being caused by poor oral hygiene and the presence of candida albicans. Treatment involves use of fungicidal cream on the fit surface of the denture, cleaning the dentures in hypochlorite (Milton) and easing the denture in any areas causing trauma. It should be noted, however, that there are precancerous candidal infections and candidosis can also be a manifestation of systemic disease.



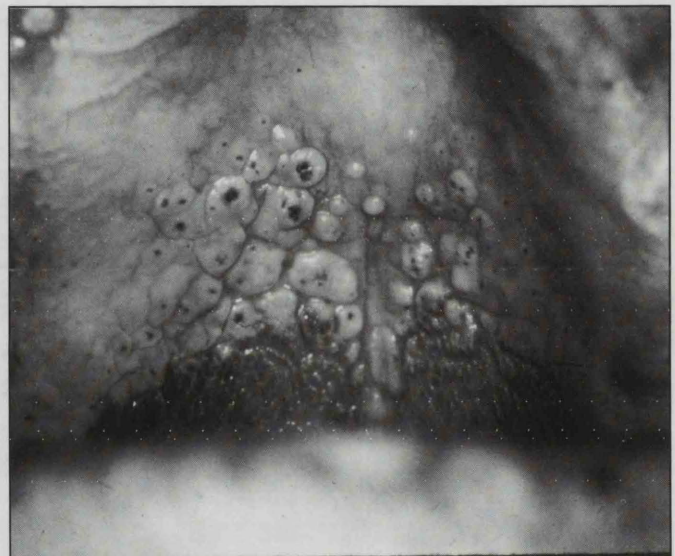
Denture stomatitis

- 3 Fibrous hyperplasia – basically consists of scar tissue at the periphery of an ill-fitting denture following prolonged wear. Treatment consists of easing the denture, using tissue conditioners and possibly surgical excision of the hyperplastic tissue.



Fibrous hyperplasia

- 4 Papillary hyperplasia – enlarged papillae in the centre of the palate caused by the sucking effect under the full upper denture. Treatment consists of having the patient leave the plate out at night, brushing the palate with a soft brush and the use of a tissue conditioner on the denture. Surgery may be necessary to excise the enlarged papillae if the initial treatment does not work. The denture can then be remade.



Papillary hyperplasia

Hypersensitivity to denture base materials is rare. It is worth noting that the symptoms of allergic stomatitis tend to be more marked than the clinical signs.

IMPLANTS

Definition – implants are solid structures of varying design and materials which are either attached to the jaw bone and transposed between the bone and the oral mucosa and used as a means of support for replacing lost teeth on an individual basis or for giving anchorage to an entire prosthesis of the upper or lower jaw.

Classification

- 1 Endosteal
 - a) cylinder (root form) implants
 - b) blade implant
 - c) others, eg ramus implant
- 2 Subperiosteal
- 3 Intramucosal inserts
- 4 Transosteal (staple implant) for severely atrophic mandible

HISTORY

These days most implants fall into the cylinder root form category. These osseointegrated implants are cylinders of commercially pure titanium placed into the jaw bones, generally in the area previously occupied by tooth roots: they integrate with the bone to give a firm anchor to which types of prosthesis are attached.

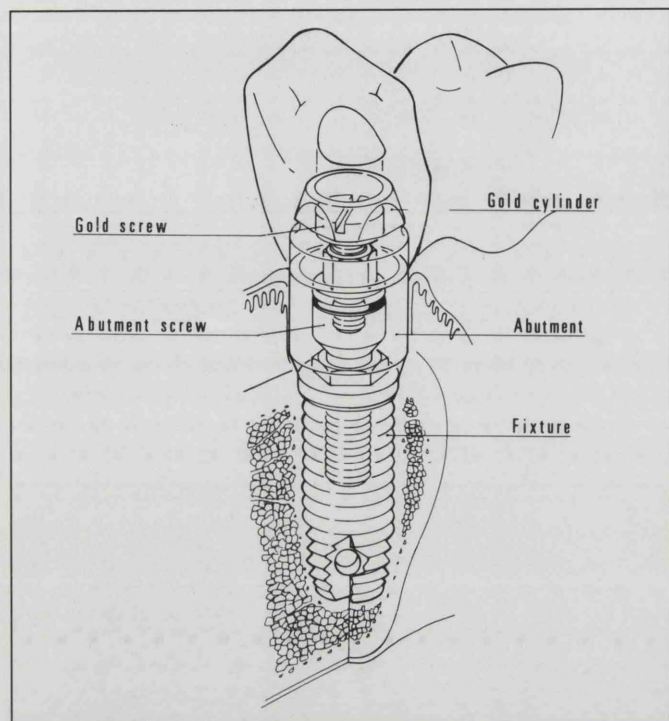


Fig. 1- diagram of Nobelpharma implant system

The system was pioneered more than 30 years ago by Professor Per Ingvar Branemark who discovered the osseointegration of titanium to bone when using a titanium chamber for longterm vital microscopy of bone and marrow tissues in rabbits. This concept was developed and modified for dental use and now longterm multicentre studies show a high and predictable success rate for this type of implant work (85%-95% over 25+ years).

BENEFITS

By placing a denture on to osseointegrated implants several important benefits are achieved – the denture becomes more stable, the force of the bite is transmitted directly to the bone and does not have to be borne entirely by the mucosa, and ridge height is maintained as bone loss due to disuse atrophy is dramatically arrested.

Implants can be used to replace a single missing tooth in an otherwise complete arch, to support a small bridge if two or three teeth are missing, to support a full arch fixed bridge if the patient is edentulous, or two to four implants can be placed in a jaw to support a full over-denture (which is removable).

Several factors influence the decision whether a complete fixed bridge or a complete overdenture is supplied for the edentulous patient. Cost is obviously a significant consideration and will be dealt with later in the article. Clinical considerations are:

- does the patient wish to have a fixed structure ?
- can effective lip contour be obtained only by a

combination of arch and flange support from a removable prosthesis where there is a loss of soft tissue tone and advanced jaw resorption?

- will the junction of the fixed prosthesis and abutments be revealed when the patient speaks or smiles?
- will the patient find palatal coverage or lingual extension objectionable?
- will the bulk of a fixed bridge spaced from the ridge prove intolerable?
- is there sufficient bone in the anterior jaw to place a minimum of the five implants with a 3.75mm space between each in order to provide a cantilever fixed bridge? (this is the separation necessary to maintain good oral hygiene and a healthy gingival crevice).

OUTLINE OF PROCEDURE

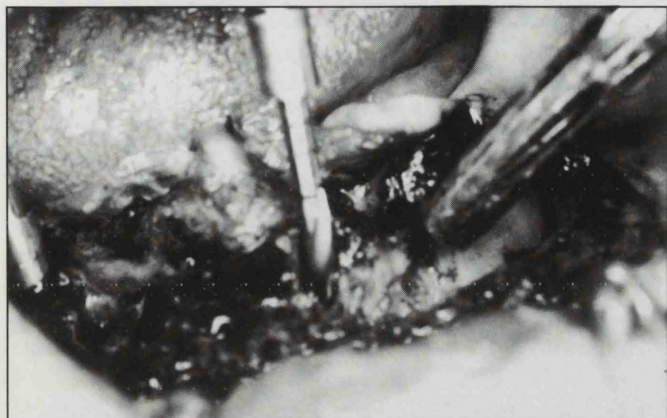
Patient assessment – a detailed medical evaluation should be carried out: is the patient capable psychologically and physically of undergoing a two-hour stage one surgical operation with the use of local anaesthesia and sedation? Absolute medical contraindications to implant surgery include recent myocardial infarction, pregnancy, agranulocytopenia, uncontrolled diabetes and chronic alcoholism. Relative contraindications are prolonged corticosteroid use, brittle diabetes mellitus, blood dyscrasias, collagen diseases, malignancies, osteomyelitis in the operation area, personality disorders, drug dependency, psychoses, chronic renal failure or disease, chemotherapy, vesiculo/bullous mucosal diseases, metabolic diseases (eg osteoporosis, osteopetrosis), endocrine disorders and tobacco usage.

Intraorally, the edentulous ridge should be palpated to assess the mucosal thickness and identify sites of excess fibrous tissue. The relationship of horizontal and vertical jaw components must be assessed to see whether there will be problems in fixture positioning leading to compromised function and/or aesthetics. The patient's manual dexterity and eyesight must also be taken into account; the implants must be kept meticulously clean. Finally, the quality and amount of bone available for placement of implants must be assessed and for this radiographs are essential.

Radiographs – the principle radiographs necessary are intraoral and panoramic in all cases and the lateral skull view in cases involving the mandible. CT scans are used in severely resorbed cases prior to bone grafting. The area to be used for implants must be free of pathological change – in particular retained roots or radiolucencies which impair integration.

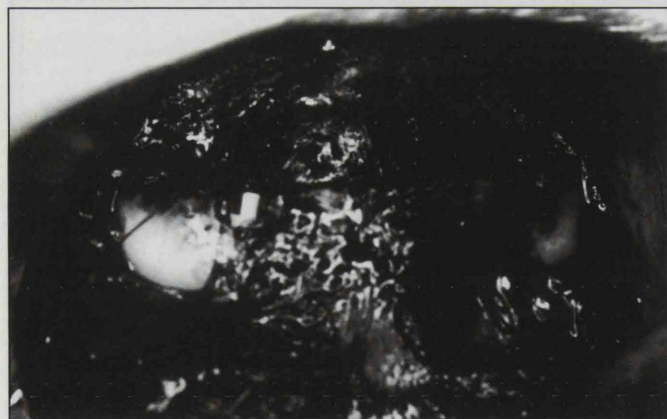
The minimum height for a grossly resorbed jaw which can be used for implants without bonegrafting is 7mm – the height of the shortest fixture. It must also be remembered that tall jaws are not necessarily wide and they too may require bone grafts in order to take a fixture. Position of vital structures must also be ascertained – how much bone is there available above the inferior dental canal, or below the maxillary sinus; what is the extent of the incisive fossa? The panoramic radiograph can be misinterpreted due to the fact that it produces a magnified image and a radiopaque object of known scale must be placed within the field to gauge the degree of magnification in each case.

Placement of implants – impressions of the patient's jaw are made prior to surgery and an acrylic stent is fabricated. The stent is in effect a jig that accurately fits the patient's mouth, with holes set into it in the position where the implants are required. The holes then guide the surgeon's drill into the optimal position for the fixtures from a prosthetic viewpoint. The final decision as to the exact positioning must, however, be made during placement by the surgeon when he has exposed the placement site. -



Preparation of the implant bed with slow speed drill at first stage surgery.

A mucoperiosteal flap is raised and the bone delicately prepared with drills designed to cut and tap the bone under constant irrigation. The bone must not be heated to more than 47°C for longer than a minute or osseointegration will fail. Once the bone is prepared an implant of the same diameter as the tapped hole and of appropriate length is inserted and then in most cases the wound is closed by primary closure. Great care must be taken in handling the sterile titanium implants and the first contamination of its oxide coating must be by the patient's own blood. It must exert some pressure on the surrounding bone but must not itself be subject to loading and so if the patient has dentures these must be heavily relieved and relined with a soft lining material. The implant is then left for three months in the lower jaw and six months in the upper.



Implant in canine region: mandible

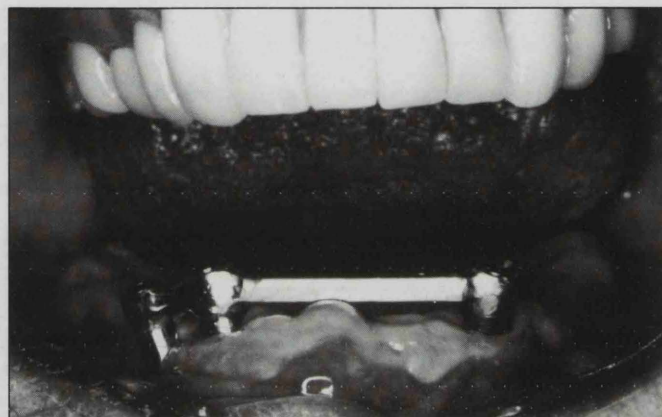
For overdentures supported by implants two fixtures are usually required in the lower jaw and four in the upper jaw where the bone quality is poorer.

After the appropriate time the second surgical phase takes place, the osseointegrated fixture is exposed and an abutment is attached. The type of abutment depends on what type of prosthesis is to be fitted (eg single crown, bar for an overdenture etc), but basically its function is to provide a permanent connection between the mouth and the underlying integrated fixture anchored to the bone. The surrounding

mucosa then forms a weak epithelial attachment and seal around the abutment.



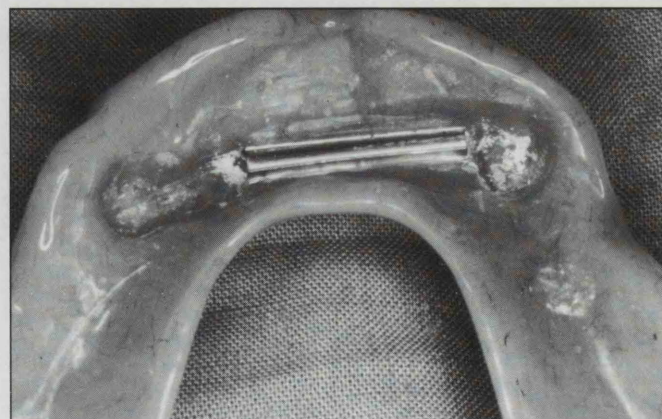
IMZ implants after second stage surgery exposure for the treatment of severely resorbed maxilla with bar over denture.



Maxillary bar overdenture with bar in situ.

The procedures outlined above can be carried out by the dentist who makes the subsequent prosthesis, but usually they are carried out by a dentist specialising in surgery and the prosthetic aspect is carried out by a dentist specialising in restorative work. In other words, this is a team effort in which the GP can play an important part in patient referral and assessment.

Once the sutures are removed after the second surgical phase then construction of the prosthesis can begin.



Maxillary overdenture with female attachment.

COSTS

At present, costs of full upper and lower dentures range from around £110 on the NHS, with private dentures starting at around £350. The difference is the types of materials and techniques used to record impressions, quality of materials

used, and the time spent in construction both in the surgery and at the laboratory. Health Service teeth are usually made on a simple hinge articulator which is merely a device for holding the dentures together during construction – it does not mimic jaw movements at all. The private teeth are generally made on average value or semiadjustable articulators which give a balance to the occlusion when the teeth move both vertically and laterally, thus improving efficiency and comfort.

It is difficult to give precise costings for implant work because prices vary and depend on whether bone augmentation and grafting is required, if a CT scan is necessary and whether theatre and hospital charges are also involved. Nonetheless, a bar retained overdenture using two implants would cost in the region of £2500 and one requiring four implants around £4000. A fixed full arch reconstruction would be in the region of £8000-£14000 per jaw depending on its complexity. In the long term, implants can be a highly cost-effective line of treatment.

SUMMARY

In this article I have attempted to outline some of the age-old problems both dentists and patients encounter with full dentures. For some people at least, with the advent of

implants I hope I have shown that many of these previously intractable problems can be resolved.

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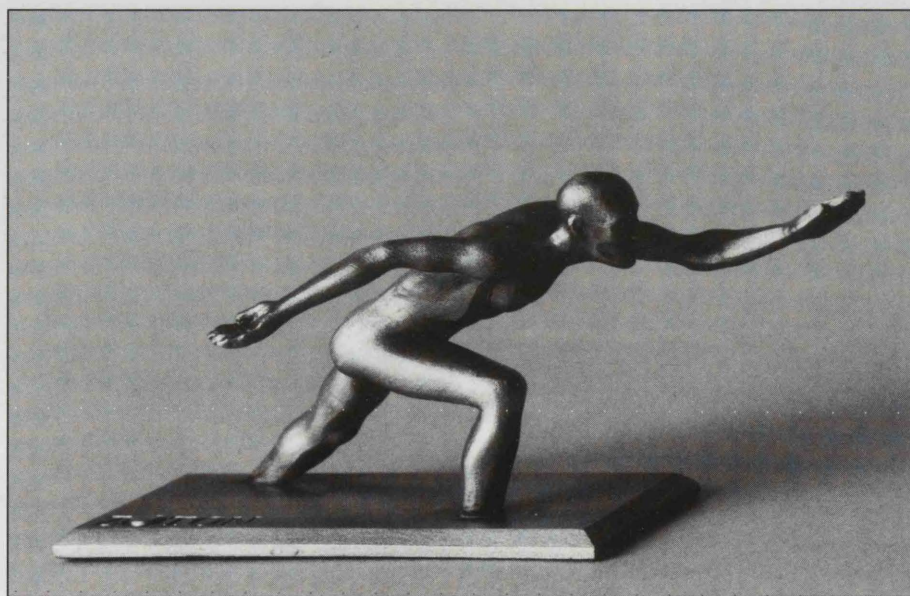
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Further information:

Association of Dental Implantology, 37 Halford Road,
Richmond, SURREY TW10 6AW.
Tel: 0181 332 0321.

PRIZE QUIZ



What is this NHS humanoid doing – or what is his occupation?

Best caption or job description in not more than 20 words wins a bottle of fine wine.