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Consequences of Tooth Loss: 1. The Patient Perspective – Aesthetic and Functional Implications

Abstract: Tooth loss in adults is becoming less common, and the attitudes of patients and professionals towards it have changed dramatically over the last quarter of a century. This paper explores these changes, from the patient's perspective, in terms of psychological perspectives, aesthetics, function and the need or desire for tooth replacement. A second paper will examine the evidence available on the positional and functional changes following tooth loss.

Clinical Relevance: Clinicians need to have an awareness of changes in disease patterns, trends in patient expectations and the demand for restorative interventions.

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Owing to alteration in the patterns of dental disease, most practitioners will have seen a change in the amount and distribution of tooth loss in their patients during their practising careers. These improvements in oral health are particularly apparent over the last quarter of a century, resulting in a reduction in the extent of tooth loss and the age at which it occurs. It is now not uncommon to see functioning fully or partially dentate octogenarians in our everyday practice.

The Adult Dental Health Survey 1998[1] has shown not only a large decrease in the number of edentulous adults over the last 30 years, but also shows that most patients will remain partially dentate for life. Patients' attitudes to losing even small numbers of teeth are also changing and the same survey shows that patients are willing to undergo extensive treatment in order to save their teeth. A Finnish study[2] carried out in 1977–78, and repeated in 1989, showed that there were improvements in the number of remaining teeth in the 30–39 age group, but that the middle-aged and elderly patients still had a reduced dentition. It is hoped that this trend will continue and that, at some time in the future, most patients will have a functioning dentition for their entire lives, with only minimal numbers of missing teeth (Figure 1). A number of studies[3,4] demonstrate that posterior teeth are usually lost before anterior teeth and that the most commonly missing posterior tooth was the first permanent molar, followed by the second molar, second premolar and, finally, the first premolar. Mandibular posterior teeth are more commonly missing.[5]

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Patient perceptions

In the past, many patients felt that tooth loss was inevitable and were, to a certain extent, prepared for that eventuality. Today, patients' expectations have changed and many see tooth loss as a very negative event. Patients may suffer real or perceived detrimental effects following the loss of one or more teeth.

Figure 1. Partially dentate patient aged 80 years.

Elias and Sheiham[6] conducted a review of the current literature and found that, in general, patients were more likely to seek replacement of a missing anterior tooth than a posterior tooth, and rated aesthetics above function in their priority for tooth replacement. It is easy to appreciate the very negative effects of loss of an anterior tooth in terms of self confidence and aesthetics. The Adult Dental Health Survey 1998[1] also noted that patients with a reduced dentition were more likely to seek replacement of an anterior tooth, but that a significant proportion felt that they would also prefer to have a missing posterior tooth replaced.

Few have investigated the psychological effects of partial tooth loss. However, in a study of the emotional effects of total tooth loss,[7] 45% of patients had difficulty in accepting total tooth loss, citing loss of confidence and an inability to accept change in facial shape as particular problems. Ultimately, 30% of the group questioned were unable to come to terms with the loss of their teeth at all. Nedefors[8] found that all patients, regardless of sex and age, placed great importance in retaining their natural teeth, and it was postulated that loss of teeth would have a negative impact on a patient's psychological well being. Partially dentate patients[7] have also been found to have difficulties in accepting tooth loss and have cited the following factors:

- Loss of confidence;
- Limitation of food choice;
- Reduction in enjoyment of food;
- Avoidance of laughing in public; and
- Reluctance to form close relationships.

Steele *et al*[1] reported that 27% of patients stated that the thought of wearing a partial denture was upsetting.

A recent Australian study[9] of the quality of life impact of tooth loss on a middle aged/older adult population confirmed the findings of earlier researchers that both functional and psychological compromise may follow tooth loss, even when removable prostheses are provided to replace missing teeth.

Tooth replacement

For over half a century clinicians have postulated a need for tooth replacement in the maintenance of oral health. Hirschfeld[10] implied that failure to replace a missing tooth could lead to caries and periodontal disease, and suggested that tooth replacement, preventing undesirable changes in tooth position, were likely to reduce the risk of disease. McCollum[11] also felt that maintenance of an intact arch was important in the maintenance of oral health, but also recognized that prevention of tooth loss was of primary importance. He also intimated that good oral function was an important factor in quality of life. Although we now have far more evidence relating to the aetiology of dental diseases and the consequences of tooth loss, it is encouraging that the value of maintaining a healthy dentition was seen as important by these authors.

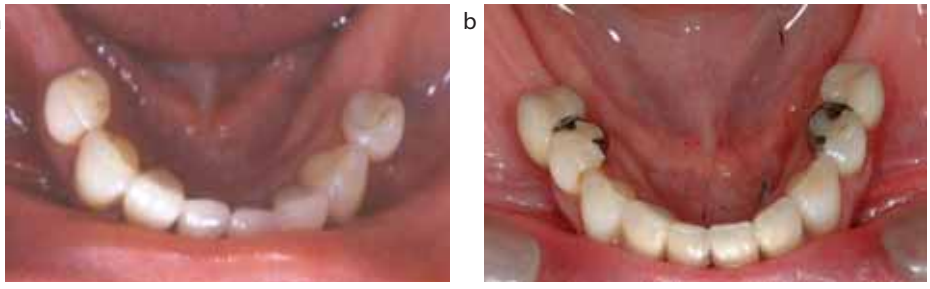

Figure 2. (a, b) Increasing the length of a lower shortened dental arch with resin-bonded bridges.

Most of the recent surveys are reporting an increase in patient demand for replacement of missing teeth. The reasons for these may be either functional or aesthetic. Torabinejad *et al*[12] discussed a range of aesthetic, functional and psychosocial issues related to tooth loss and replacement and concluded that those retaining teeth or having fixed replacement of missing teeth had better psychosocial outcomes. The authors did, however, note that further large prospective multi-centre clinical trials would be needed to improve the evidence for other outcomes addressed in their review.

Functional considerations

The degree of chewing ability, which is largely subjective, will be dependent upon the patient's expectations and diet to be consumed. Witter *et al*[13] advocated the shortened dental arch concept for several reasons including:

- Problems associated with prostheses;
- Biological effects on teeth prepared for prosthodontic replacement;
- Cost of healthcare provision; and
- Adequacy of function provided by the shortened dental arch.

They did, however, recognize the need for further study into the precise relationship between arch length and oral function.

Obviously, each study of function tends to be specific for a given population group, which may have similarities in diet and functional expectations. Kayser's original studies[14,15] involved a fairly typical group of Northern European subjects. When a large study (725 subjects) of chewing ability in patients with shortened dental arches was carried out in a Tanzanian population,[16] the majority of patients with 3–4 occluding pairs of premolars and at least one pair of occluding molars reported adequate chewing ability. Subjects with only 3–4 pairs of occluding premolars, or with asymmetric arches, reported chewing difficulties, particularly with hard foods. The most severely shortened arches, predictably, had the greatest dietary limitations. The conclusions drawn by the authors were that, as the foods which produced the most chewing difficulty were not staples of the Tanzanian diet, and softer foods presented little difficulty, the use of the shortened dental arch was justified in this population. Obviously, in terms of individual choice and quality of life, this may be open to some debate.

The association between the number of teeth remaining and diet has been reported by Sheiham *et al.*[17] The conclusion drawn from this nationwide British survey is that selection of foods is substantially affected by the number of occluding pairs of posterior teeth. This is a large study, with the numbers of teeth verified by clinical examination, and food choices reported by patients.

Adhesive dentistry has provided clinicians with opportunities to extend shortened dental arches and thereby improve both function and aesthetics at minimal cost to remaining tooth tissue. Jepson and Allen[18] suggested the use of adhesive distal cantilever bridges to increase the length of shortened dental arches and improve function and aesthetics (Figure 2).

Figure 3. (a) Aesthetic compromise with missing UR4. **(b)** First upper right premolar after prosthetic replacement.

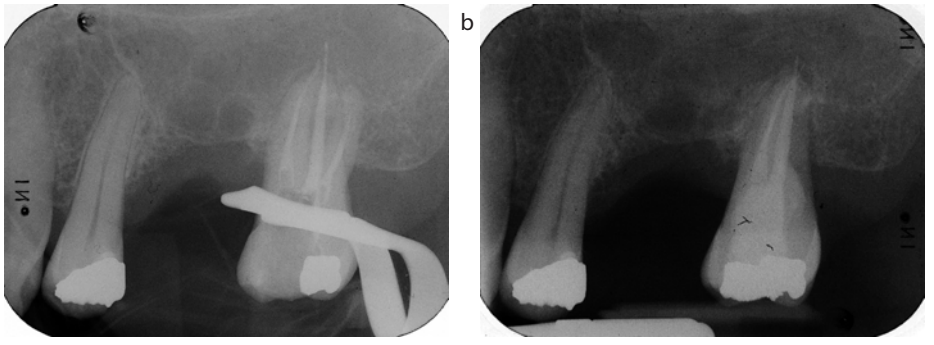

Figure 4. **(a)** Endodontically treated tooth before amputation of the disto-buccal root. **(b)** Tooth in **(a)** following amputation of the disto-buccal root.

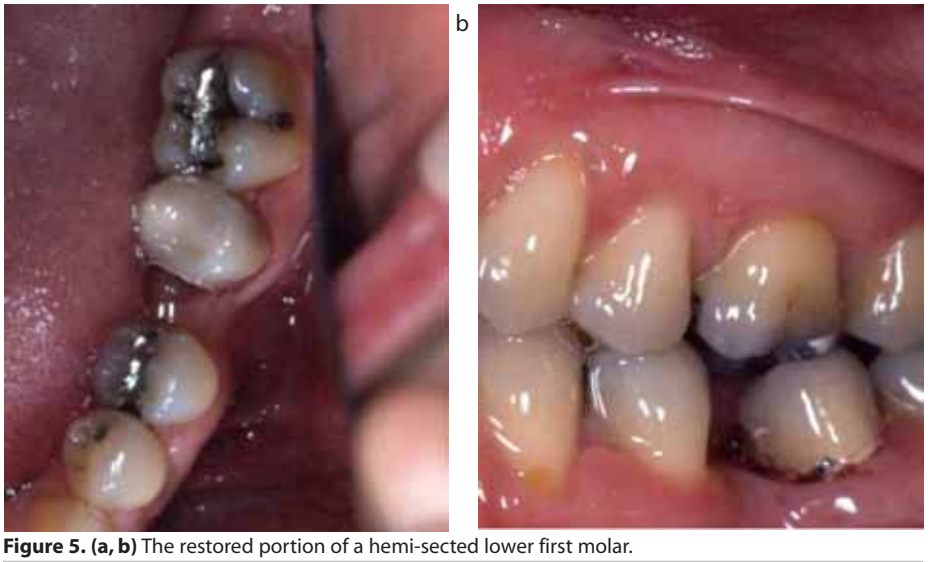

Figure 5. (a, b) The restored portion of a hemi-sected lower first molar.

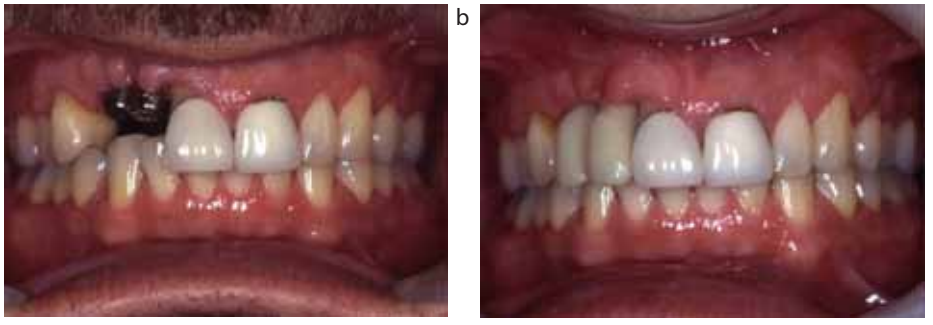

Figure 6. (a, b) Aesthetic management of implants may require careful planning of soft and hard supporting tissues to achieve an optimum result in terms of gingival level and emergence profile.

Aesthetic considerations

In the 1998 Adult Dental Health survey,[1] 18% of the population were dissatisfied with the appearance of their teeth owing to gaps and spaces. This represents an increase of 5% since the previous survey in 1988. This is against a background of diminishing rates of tooth loss and reflects patients' reluctance to accept missing teeth. This is demonstrated in Figure 3. Premolar spaces are now less well tolerated than a decade or two ago. Obviously, the width of the patient's smile and the lip level will determine how much the aesthetics are compromised.

The same survey also reported that 79% of adults would prefer to save a posterior tooth whenever possible. This may indicate that patients place a higher value on the maintenance of posterior teeth and are dissatisfied with the aesthetic compromise resulting from gaps and spaces within the arch. As restorative techniques develop, and as the demand by patients to retain posterior teeth whenever possible increases, strategies for retaining all or part of what would once have been unrestorable teeth have been developed. These include root amputation and hemi-section to retain the non-diseased parts of multi-rooted teeth. Figure 4 shows radiographs of an endodontically treated molar, from which the disto-buccal root was amputated owing to extensive periodontal bone loss around that root.

The clinical photographs in Figure 5 demonstrate the hemi-section of a lower left first molar following the failure of endodontic therapy on the mesial root owing to external root resorption. The distal root was retained and the coronal restoration recontoured to the coronal morphology of a lower premolar. Had the patient been keen to restore the space remaining where the mesial root had been lost, an adhesive bridge cantilevered from the lower left second premolar would have been an acceptable option. In this case, keeping the remaining tooth

tissue to support a prosthesis would have been more cost–effective[12] than implant replacement and would also have removed the risk of damage to the inferior alveolar bundle when placing an implant in this region. Proprioception from a natural periodontal ligament would also be maintained.

Demand for aesthetic treatment is thought to be increasing and patient awareness is fuelled by the media as never before.[19] The internet also makes enquiry into aesthetic and dental treatment far more accessible for patients.

Predictable options for fixed replacement of missing teeth is now the goal of many of our well informed patients and we may need to invest in a multi-disciplinary strategy to achieve the best aesthetic and functional result.[20,21] Implants in particular may pose aesthetic challenges. Placement may be carried out by an oral surgeon, with final restoration being carried out by a restorative dentist. Often, there is some loss of alveolar height and width prior to implant placement, which may cause problems with emergence profile and length of clinical crown. Ideally, such a case would be best planned in a multi-disciplinary way, enlisting input from oral surgeons and restorative dentists to provide an appropriate supporting base for correct implant placement and soft tissue contour. Figure 6 demonstrates how a better aesthetic result could have been achieved in terms of gingival level and emergence profile if ridge augmentation had been used to increase the ridge width and height prior to implant placement. Input from a periodontology colleague would have been useful when planning the correct gingival level.

Summary

The desire of patients to have an intact arch of functional and aesthetically pleasing teeth may pose dentists with challenges. One of these challenges may result from changes following extraction, particularly if the patient presents some time after a tooth has been lost. The evidence available on the positional and functional changes following tooth loss will be outlined in the second part of this two part series of papers on the consequences of tooth loss.

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