Pragmatic treatment planning for the older dentate patient

Précis
Population ageing will have a profound impact on the practice of dentistry. This article offers treatment strategies for this growing patient group.

Abstract
Introduction: Population ageing is a progressive trend in most developed nations, including Ireland. Alongside this trend, there has been a concomitant decrease in tooth loss among Irish adults (Whelton, 2007). As a result, there will be more dentate older patients presenting for care. Future treatment strategies will be based on patient demand, clinician skill set, pragmatism, future planning and cost-effectiveness.

Case reports: This article presents the use of minimally invasive concepts in the management of older patients. As well as describing these principles, two cases treated by the staff and students of Cork University Dental School and Hospital are presented as examples.

Discussion: Older patients can be provided with good aesthetic, functional outcomes using the principles of minimally invasive dentistry. Furthermore, these treatment options are less likely to fail catastrophically in future years, resulting in tooth loss and edentulousness in advanced years when adaptation may be challenging.

Conclusion: Treatment choices for older adults should be as evidence based and pragmatic as possible, with a view to impact of future failure.

Table 1: The challenges encountered in providing oral care for the elderly

<table>
<thead>
<tr>
<th>Society</th>
<th>Systemic</th>
<th>Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited finances</td>
<td>Physical disability</td>
<td>Heavily restored</td>
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<tr>
<td>Difficulties accessing</td>
<td>Cognitive impairment</td>
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<td>transport</td>
<td>Polypharmacy</td>
<td>Xerostomia</td>
</tr>
<tr>
<td>Taking care of others (e.g., spouse)</td>
<td>Root caries</td>
<td>Tooth wear</td>
</tr>
<tr>
<td>Multiple medical appointments</td>
<td></td>
<td>Periodontal disease</td>
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<tr>
<td></td>
<td></td>
<td>Missing teeth</td>
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Oral health changes

Over the past 40 years there has been a profound change in oral health in Ireland. This has been characterised by a decline in caries and extractions. Three national adult oral health surveys have shown a marked increase in the percentage of those over 65 years who have some remaining teeth (Figure 1). As part of the National Adult Oral Health Survey (2002), older patients were asked if they expected to retain their teeth and whether they had attended the dentist in the previous year. Of the dentate elderly, 80% expected to retain some teeth for their lifetime and 29.5% had attended the dentist in the previous 12 months, compared to only 1.7% of the edentate group (Whelton, 2007).

In summary:
- the number and proportion of the elderly will increase in Ireland;
- an increasing number of the elderly will be dentate; and,
- the dentate elderly visit their dentist more often than their edentulous counterparts.

Clinical challenges in delivering oral healthcare to the ageing population

Providing oral care for the older population will present clinicians with a series of individual and societal challenges (Table 1).

With increasing age, there is an increasing risk of life experience of disease and treatment. Older patients are more likely to have experienced disease and may be taking medications. As part of the normal ageing process there is likely to be reduced mobility, dexterity, hearing and vision. All of these issues are likely to complicate or delay the delivery of care.

However, a degree of perspective is needed. The majority of older people are in the American Society of Anaesthesiologists (ASA) 1 and 2 groups, with values of 93.9% in adult oral health. Furthermore, in Ireland the majority of older patients live independently, with only 22% of those aged over 85 years residing in nursing homes (CSO, 2011).

While the proportion of older patients who are edentulous has declined and will continue to decline, the challenge they present to the clinician will be significant. Over the next 10-15 years those patients who present for full dentures are most likely to be either those who are edentulous now or those who have lost all of their teeth due to periodontal disease. These groups are likely to present with pronounced alveolar bone loss. Coupled with the reduced clinical experience in the provision of complete dentures among dentists, managing edentulous patients with severe bone loss is going to be especially challenging. Indeed, provision of complete dentures could become a specialist activity.

Treatment strategies for older patients

Pragmatic treatment planning

A pragmatic rather than an idealistic approach towards managing older patients can take several manifestations:

1. Repair rather than replace: replacement of existing restorations accounts for 50-71% of all restorations placed worldwide (Tyas et al., 2000). When treating secondary caries, it is more conservative to repair rather than replace a restoration unless the defect is very large (Fernandez et al., 2011). The replacement of restorations results in loss of tooth structure and ultimately a reduction in the longevity of the tooth as cavity sizes increase when restorations are removed (Millar et al., 1992). Given the benefits of repair rather than replacement, several dental material manufacturers have developed products for performing chairside aesthetic and functional composite resin repairs of ceramic restorations (Kupiec et al., 1996). Numerous studies have demonstrated that the application of silane significantly increases the bond strength of the composite resin repair to the fractured ceramic, enhancing the clinical success of the repair procedure. Given that repair of a crown or a bridge is substantially more conservative than replacement, repair of ceramics should be attempted in the first instance of failure.

2. MID/non-invasive treatment: the concept of minimal intervention dentistry (MID) has evolved as a consequence of an increased understanding of the caries process and the development of adhesive restorative materials. To implement this “medical model” of dentistry, every patient should undergo risk assessment for dental disease. This allows early detection and control of active disease processes, which should minimise the need for operative treatment. Elderly patients may be unwell, unable to transport themselves, or fearful of the dental visit. In addition, financial circumstances mean that some older people may be restricted in the dental treatment they can afford. MID, if employed correctly, can avoid the need for frequent dental treatment and can be more affordable than operative intervention when disease is established. The less invasive the treatment, the less that can fail. The single biggest barrier to the implementation of preventive regimes in dental practice is the lack of remuneration for such treatments (Ericson, 2006).

3. Aesthetics: aesthetic demands from older patients are not a new issue. From time immemorial complete denture patients have demanded the brightest shade of A1 for their denture teeth. With an increasing dentate cohort, patient expectations are changing. Older people may wish to enhance their dental and oral appearance, preferably at minimal biologic and financial costs. Bleaching and bonding represents an appropriate treatment option and a sensible strategy for this group. Bleaching addresses the discolouration, while composite bonding can improve the shape of worn, or otherwise anaesthetic, teeth without damaging the structure or health of the residual tooth tissue. This pragmatic treatment is well tolerated by older patients (Kelleher et al., 2011). The visual and functional improvements are greatly appreciated by this group, partly because of the non-destructive and affordable nature of the treatment. It is also possible that due to a combination of cultural and commercial influences there will be an increased expectation that dentists will provide collagen fillers to...
alter the skin tone of older patients. The use of collagen fillers is not considered to be within the normal scope of dental practice (Dental Council, 2013).

Cost
Given the altered demographics and oral health pattern, the financial cost of care provision is likely to be considerable (McKenna et al., 2015). Planning for oral care will have to factor in the cost of such care provision, whether it is borne by the patient or society.

In many cases there is also a biological cost in the delivery of dental treatment. An obvious example is a full crown preparation where up to 72% of tooth tissue can be removed in the tooth preparation (Edelhoff and Sorensen, 2002). Coupled with the tooth destruction in crown preparation is the potential for pulp damage with temporisation and the potential for leakage at the crown margin. A loss of vitality of up to 20% under crowns has been reported (Saunders and Saunders, 1998). An alternative with less sacrifice of tooth tissue would be the utilisation of vital bleaching to alter tooth colour in conjunction with the use of adhesive restorations to replace lost tooth tissue and/or alter tooth shape.

CASE 1
A 68-year-old man presented to Cork University Dental School and Hospital concerned about the missing lower right lateral incisor (Figure 2). He was encouraged to attend by his wife who wanted him to improve the appearance of his teeth. He was also missing seven posterior teeth but did not have any issues with chewing function. Oral hygiene was poor but there was no bone loss evident. As this gentleman’s concerns were purely aesthetic, treatment focussed on the aesthetic zone. Non-surgical periodontal treatment and polishing of the teeth resulted in an immediate improvement (Figure 3). The patient bleached at home for two weeks nightly with 10% carbamide peroxide, at which point he was satisfied with the shade (Figure 4). After allowing a further two weeks for the shade to stabilise, the upper incisors were lengthened and reshaped with composite resin (Figure 5). Finally, the missing lower lateral incisor was replaced using a resin-bonded cantilever bridge using the canine as the abutment. No tooth tissue was removed from the canine. The bridge was cemented using rubber dam isolation and Panavia 21 (Kuraray Dental) cement. Care was taken after fit to check that there was no contact on the pontic during protrusive movements or lateral excursion. Finally, to reduce the risk of fracture of the composite restorations, a night guard was provided (Figure 6).

The patient and his wife were pleased with the final aesthetic result. The treatment was non-invasive, requiring no loss of tooth tissue. Although he was missing seven posterior teeth he did have ten occluding contacts so he was able to function satisfactorily. Placement of upper and lower partial dentures to replace the missing posterior teeth would have been superfluous (Kayser, 1981).

FIGURE 2: Case 1 at presentation. Note the poor oral hygiene, stained dentition and missing lower incisor.

FIGURE 3: Anterior view after non-surgical periodontal treatment, including stain removal.

FIGURE 4: Anterior view after two weeks’ vital bleaching with 10% carbamide peroxide.

FIGURE 5: Anterior view after provision of resin-bonded bridge to replace the lower left lateral incisor. The upper incisors have been restored with composite.

FIGURE 6: Splint in situ to protect composite restorations on upper incisors (photos courtesy of Dr F. Awan).
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CASE 2

A 72-year-old male presented to Cork University Dental School and Hospital seeking treatment. He was encouraged to attend by his wife and daughter regarding his short teeth. He hadn’t worn a denture for ten years. Other than taking daily medication for hypercholesterolaemia, he was fit and well. The gentleman’s complaint was poor aesthetics, which had deteriorated. He had severe non-carious tooth tissue loss, exacerbated by a lack of occluding contacts. He was posturing his jaw forwards into a pseudo-class III incisal relationship (Figure 7) and he was missing five posterior teeth in the mandible and 12 in the maxilla. The patient expected that he would require extractions and complete dentures due to the severity of his wear and had been reluctant to see a dentist for this reason.

A treatment plan was formulated to replace the missing tooth tissue from the lower incisors using composite resin and to fabricate a cobalt chromium partial denture for the upper arch, which would serve as an onlay appliance for his severely worn upper incisor teeth. The patient was happy to try any treatment that might allow him to keep his own teeth. A wax-up was made to determine the most appropriate aesthetic and functional vertical dimension (Figure 8). This information was transferred to the mouth using a putty matrix during composite build-ups (Figure 9). It was noteworthy that the wax-ups were greater than 2mm in height. Composites of less than 2mm in height will tend to fracture so a greater thickness of composite is needed. The cobalt chromium upper denture was designed and occlusion was adjusted at the try-in stage. No preparation of the severely worn upper anterior teeth was required. At first the margin between denture and tooth tissue is clearly visible (Figures 10 and 11). However, the forgiving low lip line of this patient resulted in a satisfactory final aesthetic result (Figure 12).

The patient was an engaged, vital, independent-living gentleman. He was receptive to the maintenance needs for the upper chrome and the probable need for polish and repair of the lower composite restorations in the future. As with the previous case there was no need to provide him with a partial denture to replace the missing mandibular posterior teeth. Provision of the upper partial denture afforded him 11 occlusal contacts. He adapted well to the new vertical dimension. It was emphasised to the patient that the denture abutment teeth are at high risk of caries and so meticulous oral and denture hygiene are needed, as well as regular maintenance visits.

Conclusions

The projected increase in the older population, especially the older dentate population, presents challenges for the dental profession, and for society as a whole. There is a compelling need for a national oral health survey to inform...
policy making. Treatment choices for older adults should be as evidence based and pragmatic as possible, with a view to impact of future failure. In a climate of limited financial resources, the funding and effectiveness of treatment, coupled with an evaluation of the best skills mix of those who deliver oral care, needs to be evaluated. A challenging and interesting future lies ahead for the profession.

Bibliography