

Management of Periodontal Disease in Elderly Patients

Angela D. Gilbert

It is known that the proportion of older adults in the UK population is increasing, life expectancy is increasing and that edentulism is declining. This means that there will be increasing demand for periodontal treatment from elderly patients and it is incumbent on the dental profession to ensure that their particular and growing needs are addressed. The role of age *per se* in the development and progression of periodontal disease is considered. The main part of the present paper presents a framework for providing such care, emphasising the need for producing individually tailored and adaptive management strategies that cope with particular and changing patient circumstances. The fundamental objective is the preservation of a functional and comfortable dentition and the key to success is setting realistic goals of periodontal therapy. A five-stage approach to treatment is advocated, although the specific therapy undertaken must be individually judged and implemented depending upon the particular circumstances. The potential clinical findings at the re-examination stage after completion of cause-related therapy are considered and there is specific emphasis on management strategies to cope with different treatment outcomes.

Key words: elderly patients, management of periodontal disease, periodontitis

INTRODUCTION

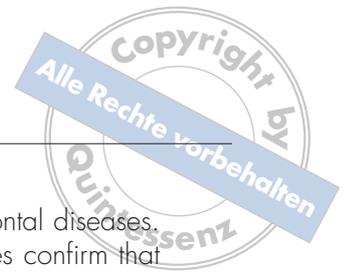
Information published on the website of the UK Office for National Statistics (see reference list), based on data from mid-year population estimates from 2004, states that 'The UK has an aging population. This is the result of declines both in fertility rates and in the mortality rate. This has led to a declining proportion of the population aged under 16 and an increasing proportion aged 65 and over ... In mid-2004 ... one in six people were aged 65 or over'. In conjunction with this, data published from serial UK Adult Dental Health Surveys, the most recent being from 1998 (Kelly et al, 2000), show both a continuous reduction in edentulism and an increase in the number of people with a functional natural den-

tion. This trend is projected to continue in future decades although it is unlikely that there will ever be a time when there will be no edentulous people. Combination of these facts means that there will be an increasing need for periodontal treatment of elderly patients and the dentists providing this therapy need to have appropriate management strategies. The present paper presents one approach to achieving this.

AGE OR DISEASE?

Age-related changes

Age related changes do occur in the periodontium but the clinical significance of these, if any, remains



to be elucidated. The changes affect the gingival tissues, the cementum, the periodontal ligament and the alveolar bone and include the following:

Gingival tissues

The changes in the gingival tissues, comprising both connective tissue and epithelium, include:

- A reduced rate of turnover of gingival fibroblasts, a reduction in the quality and quantity of proteoglycans (Bartold et al, 1986) and reduced protein and collagen production (Johnson et al, 1986).
- Thinning of the oral epithelium (Shklar, 1966) with reduced keratinisation (Papic and Glickman, 1950).
- The rate of turnover of gingival epithelium with advancing age is controversial (van der Velden, 1994), with some workers even finding increased rates in older patients.

Cementum

The thickness of the cementum increases around the entire root but particularly around the apical third (Berglundh et al, 1991).

Periodontal ligament

There is reduced cellularity and increased fibrosis of the periodontal ligament (Grant and Bernick, 1972)

Alveolar bone

The periodontal surfaces of the alveolar bone become more jagged and collagen fibres insert less regularly into the bone (Ive et al, 1980).

Epidemiology

In addition to these findings, epidemiological research published during the 1950s and 1960s (Marshall-Day et al, 1955; Scherp, 1964) was interpreted to suggest that:

- gingivitis inevitably progresses to periodontitis;
- periodontal disease is the main cause of tooth loss in adults older than 35 years;
- the severity of periodontitis increases with age.

The methodology and conclusions from these epidemiological studies were flawed, but the combination of these and the above recognised age-changes meant that age was thought for many

years to be a risk factor for periodontal diseases. More recent epidemiological studies confirm that both clinical attachment loss and alveolar bone loss show increases in prevalence, extent and severity with age (Albandar et al, 1999) but the modern consensus is that age *per se* is not likely to lead to an increased susceptibility to periodontal diseases. Kinane and Lindhe (2003) succinctly state that, 'It is more likely that the cumulative effects of disease over a lifetime, i.e. deposits of plaque and calculus, and the increased number of sites capable of harbouring such deposits, as well as attachment and bone loss experience, explain the increased prevalence of disease in older people.' In short, severe periodontal disease is not a natural consequence of aging.

PARTICULAR CONSIDERATIONS IN THE TREATMENT OF ELDERLY PATIENTS

Chronological age and biological age do not necessarily coincide. Periodontal treatment must thus be tailored to the needs of individual patients. Several factors must be specifically considered, as detailed below.

The general health of the patient

It has been found that 75% of people aged over 65 years suffer from a chronic disease (Lamy, 1985) and many of these will be taking medication(s) to treat them (Baker et al, 1991). Many diseases have direct and/or indirect effects that may affect the periodontium and the same is true for the drugs that are used to combat them. It is not within the scope of this paper to detail all of these but several are worth particular consideration.

Xerostomia

The commonest cause of xerostomia in elderly people is the side effects of drugs (particularly those with anticholinergic, sympathomimetic or diuretic activity), although the number of salivary acini and the salivary secretory reserve both decline with age (Scully and Felix, 2005). Reduction in salivary flow can have a devastating effect on both the teeth and their supporting structures as there is reduced salivary buffering and flushing. The presence of xerostomia may reduce periodontal prognosis and may require specialist referral and/or treatment if the symptoms are distressing to the patient.



Fig 1 This elderly patient has arthritis affecting both hands and finds it difficult to maintain oral hygiene.



Fig 2 Adaptation of an existing oral hygiene aid.

Prolonged bleeding

Patients taking low-dose (75 mg/day) aspirin to reduce their risk of adverse thromboembolic events may display prolonged bleeding. This may result in over-diagnosis of disease activity and hands-on periodontal treatment may provoke more bleeding than would otherwise be anticipated.

Altered drug metabolism

Renal and hepatic functions reduce with age and this means that the metabolism of ingested drugs may be altered. The dosage of drug(s) prescribed and administered by the dentist should be carefully considered as the breakdown of these compounds within the body may be slowed, resulting in higher than expected serum concentrations and possibly increased duration of action.

Deficits in mobility and dexterity

Functional impairments are common (Fig 1) and despite their best efforts it may become very difficult or impossible for affected patients to have adequate plaque control. Alteration to existing hygiene aids (Fig 2) and/or the provision of new ones may help but if the problem is intractable it will be necessary to initiate palliative care.

Mental impairment

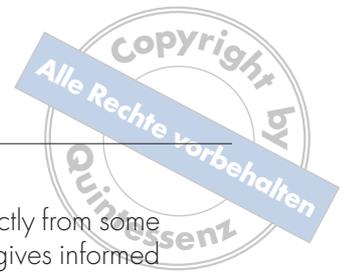
Poor memory and confusion may alter the patient's ability to absorb and/or retain information and make informed choices.

Plaque-control issues

The presence of the above general factors, either alone or in combination, may reduce the ability of elderly patients to maintain plaque levels below their individual disease threshold. The logical conclusion is thus that achieving classic clinically determined periodontal health may not be always possible.

WHAT IS THE DESIRED TREATMENT OUTCOME IN ELDERLY PATIENTS?

Dentists are trained to strive to produce a clinical outcome of periodontal health characterised by a lack of bleeding on probing and the presence of shallow pockets (≤ 3 mm) that can be maintained by the patient. Although this is undoubtedly desirable, and should be pursued whenever there is a chance of success, it may not be an achievable outcome in many elderly patients because of the presence of some or all of the above factors. In such cases, a realistic treatment outcome must be both to produce and to be able to maintain a functional and comfortable dentition with adequate aesthetics for the lifetime of the patient. This compromise should not be regarded as being sub-standard in any way. It may be entirely appropriate to the individual circumstances of the patient. The dentist should have a realistic treatment outcome in mind before hands-on periodontal therapy commences. This may vary,



depending upon the individual findings and including the wishes of the patient, from an attempt to achieving classic periodontal health through to palliative care, designed to keep the patient's dentition functional and comfortable while not eliminating signs of disease, through to recommending extraction and replacement of teeth.

This does not mean that the treatment goal cannot be changed. It is only after therapy has begun that it is possible to assess both the tissue response and the patient compliance and consideration of these factors may alter the realistic goal of treatment. A patient who proves unable to adequately maintain plaque control, despite initial hopes to the contrary, may have a change in proposed treatment outcome from the pursuit of clinical periodontal health to palliative care. The opposite is also possible, although it is less likely.

THE APPROACH TO TREATMENT

Periodontal treatment planning for all patients may usefully follow essentially the same stages:

1. Examination and relief of pain, culminating in production of a provisional diagnosis.
2. Cause-related therapy, designed to reduce plaque levels to the minimum possible. This would include:
 - individually tailored oral hygiene instruction
 - smoking and alcohol cessation/reduction advice as required
 - dietary advice
 - removal of plaque retentive factors
 - scaling and polishing
 - root surface instrumentation of appropriate sites
 - extraction of teeth of hopeless prognosis
3. Re-examination to determine the success or otherwise of the treatment received thus far.
4. Definitive treatment, which could include periodontal surgery.
5. Supportive periodontal therapy (maintenance).

Phase 1: Examination and relief of pain

Collection of the all the appropriate information is essential if correct management decisions are to be taken. This applies to details of the clinical examination as well as histories, including the medical history (including medications taken), dental, family and social histories. It is can be challenging

to gain the required information directly from some elderly individuals, but if the patient gives informed consent facts may be sought from relatives, guardians or other healthcare professionals.

The examination should include the usual clinical evaluations of probing depth, loss of attachment, presence of bleeding on probing (or more correctly lack of bleeding on probing), tooth mobility and presence of furcation involvement. It should also include specific evaluation of chewing function/efficiency, oral comfort (particularly in relation to possible dentine hypersensitivity that may have resulted from or been exacerbated by periodontal therapy) and changes in or concerns about aesthetics.

A periodontal diagnosis should then be ascertained and recorded in the patient's records. This is useful both on the day but also comparatively over time when comparisons between diagnoses should reveal changes in both extent and severity of disease.

Phase 2: Cause-related therapy

It is clear that achieving the lowest possible plaque presence is desirable and there are particular issues concerning this with elderly patients. Instruction in non-damaging cleaning techniques is essential and these may necessitate the formation of new habits and/or the abandonment of previous habits. Significant instruction in and positive reinforcement of modified practices may be needed. Individual assessment should identify patients with reduced dexterity and/or sensory impairment and these individuals may require extra support, additional oral hygiene aids that they can manage and/or modification of currently used aids. It is worth noting that although it may seem sensible to recommend the use of powered toothbrushes for some elderly patients, it is absolutely necessary to make sure that the chosen model(s) are neither too heavy nor too bulky as this would limit or preclude their effective use. Chemical plaque control in the form of chlorhexidine gluconate mouthwash may be recommended if physical plaque control measures are ineffective, although the undesirable side effects of its use (particularly increased calculus formation) (Flotra et al, 1971) may outweigh the advantages. The decision of whether to use chemical plaque control, and if so in what form, must be made on an individual patient basis.



Phase 3: Re-examination

This is essential to determine both the efficacy of treatment received and the need for additional therapy. The examinations carried out in Phase 1 above should be repeated and the results carefully noted. The sum of this information alone is inadequate at this stage however.

Two other issues must be individually addressed:

- What are the patient's wishes? Ultimately, the patient must decide whether they wish to undergo further treatment and if so, what kind. The dentist may make informed recommendations but cannot make the choice of whether or not to proceed. Clearly, accurate notes of any such discussions and subsequent decisions taken should be made in the patient records.
- Evidence (Lindhe and Nyman 1984; Yi et al, 1995) suggests that on average one third of a tooth root must be embedded in bone for adequate function. This means that the dentist must evaluate the loss of support at the age of the patient at the time of examination and make a 'best guess' future projection about whether it is likely that sufficient tooth support will remain to permit adequate function for the remaining likely life span.

Three main outcomes may be seen at this stage:

1. Periodontal stability achieved.
The clinical findings are that the pockets are shallow enough to be maintained by the patient (≤ 3 mm) and there is no bleeding upon probing. This is the ideal outcome and the patient progresses to supportive periodontal therapy (SPT).
2. Periodontal pockets are ≥ 4 mm (too deep to be maintained by the patient) but there is no bleeding upon probing.
Such sites may be resolving slowly and injudicious premature root surface instrumentation is to be avoided, as the consequence of this may be disruption of the healing process. Promotion of the maintenance of adequate oral hygiene and careful scaling and polishing of the area are the only required therapeutic interventions at this stage. The patient should be put on a short-term recall (perhaps one to two months) and re-examined at this time. The clinical outcome at this recall is not certain. It is possible that healing will have continued and affected sites will be shallow enough for patient maintenance while remaining inactive. If so, the patient would

progress to SPT. It is possible that there would be no change, with pockets remaining too deep to be maintained by the patient in the longer term but with no bleeding on probing. If so, the only therapy required would be promotion of oral hygiene as above and any required scaling and polishing. The short recall would be repeated and the clinical findings re-evaluated again at this time. It is, however, also possible that at the recall the deeper sites will have become active again and re-evaluation of treatment options based on all the relevant clinical findings will be required. If this were the result, the reason(s) for treatment failure would have to be elucidated, as provision of continued care would also be likely to be unsuccessful. The most common reason for such failure is inadequate plaque control. If it were deemed that the determined causes for treatment failure could be controlled and it was ascertained that the patient wished to pursue this course, the treatment goal would be achievement of periodontal stability and an appropriate treatment plan could be devised. This would often involve repetition of non-surgical therapy but could involve any other appropriate therapeutic modality. If, however, it was deemed unlikely that stability could be achieved, palliative care could be instituted (Fig 3).

3. Periodontal stability not achieved, i.e. signs of active disease remain.
 - If it is judged that:
 - (a) there is insufficient tooth support to make it likely that the teeth involved will remain functional in the medium to long term AND
 - (b) periodontal stability is an unlikely outcome of further treatment (most commonly due to inadequate oral hygiene);
the logical therapeutic options are either extraction and replacement of the affected teeth or palliative care. Although palliative care is often a reasonable choice, it is not universally the correct decision. It should be noted that patients' powers of adaptation reduce with advancing years and so making the transition to dentures etc. may be more easily accomplished sooner rather than later in life. In these circumstances, extraction and replacement is the more likely option.
 - If it is judged that:
 - (a) there is sufficient support to make it likely that the teeth involved will remain functional in the medium to long term AND

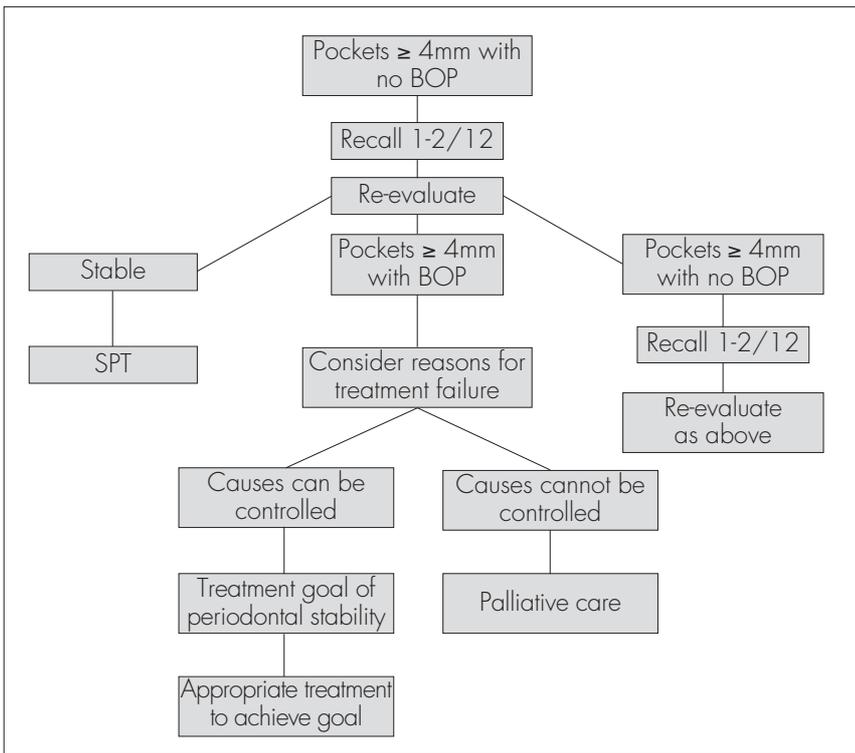


Fig 3 Management strategy for sites with pockets ≥ 4 mm with no bleeding on probing at re-examination phase.

(b) periodontal stability may be achieved after further treatment;

the logical conclusion is that any form of periodontal therapy designed to achieve that outcome, which is safe for the patient to undergo and which the patient wishes to have, should be considered.

- If it is judged that:
 - (a) there is sufficient support to make it likely that the teeth involved will remain functional in the medium to long term AND
 - (b) periodontal stability is unlikely to be achieved (often due to inadequate oral hygiene); the logical management options are either palliative care or extraction and replacement. The latter choice would be made only if there was reason to suspect that the future disease trajectory would be less favourable than in the past and/or the adaptive capacity of the patient would be likely to become much diminished over time. In these circumstances palliative care is the more likely option (Fig 4).

Phase 4: Definitive treatment

The periodontal treatment that may be provided here could include additional non-surgical periodontal treatment or periodontal surgery. The evi-

dence suggests that age *per se* is not a surgical contra-indication (Lindhe et al, 1985), although this form of therapy should be undertaken only if there are no medical contra-indications and the patient can maintain adequately low plaque scores during the healing phase and beyond (Lindhe and Nyman, 1975; Westfelt et al, 1983).

Pocket elimination surgery would not usually be chosen as this inevitably leads to increased root exposure and the literature supports the view that there is an increased risk of root caries with increasing age (Ettinger and Hand, 1994). A flap procedure would usually be a more sensible choice because this would preserve as much soft tissue root coverage as possible. It would also be prudent to give both dietary advice and fluoride applications to protect the affected root surfaces in all cases.

Phase 5: Supportive periodontal therapy

Microbial plaque is constantly forming on the teeth and thus recurrence of periodontal disease may occur in susceptible patients. This means that it is not possible to permanently 'cure' periodontal diseases and this recognition forms the basis for SPT. It has been stated that SPT has three therapeutic objectives (Kerry, 1995):

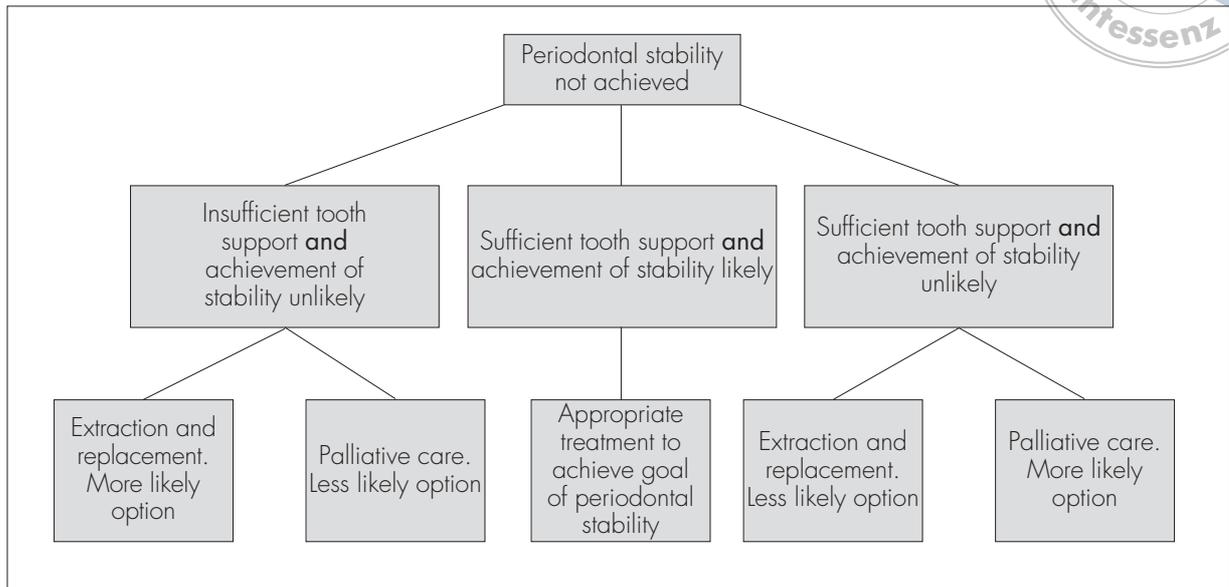


Fig 4 Management strategy if periodontal stability has not been achieved at re-examination phase.

- to prevent the progression and recurrence of periodontal disease in patients who have been previously treated for gingivitis and periodontitis;
- to reduce the incidence of tooth loss by monitoring the patient's dentition;
- to increase the probability of recognising and treating other diseases or conditions found within the oral cavity.

The evidence clearly shows that adult patients of all ages suffer less tooth loss and less periodontal disease recurrence if they receive SPT (Axelsson et al, 1991; Wennstrom et al, 1993) and this has been specifically demonstrated in elderly patients (Papapanou et al, 1989). SPT is therefore an essential and worthwhile part of periodontal treatment in older individuals.

The recall time must be established on an individual patient basis and will be determined by consideration of several factors, including patient susceptibility to periodontal disease, the general health, the type of periodontal disease present, the presence of environmental factors like smoking, stress and medications, as well as the presence of local factors, which present difficulty with plaque control such as crown and bridgework, partial dentures and furcation involvements.

The examination performed at each SPT visit will mirror that detailed previously in the 'initial examination' section above. If signs of disease activity are detected it must be established if the plaque control is adequate. If not this must be rectified, if possible, and it must be recognised that there is no therapeutic advantage in root surface instrumentation etc., unless and until this is achieved. Adequate plaque control gives the treatment of any residual disease by cause-related therapy a good chance of success. If plaque control remains inadequate, palliative care in the form of professional scaling and polishing every three months may be prescribed.

SPT is a life-long commitment and this should be clearly explained to patients. However, a particular group of patients has emerged that presents particular management issues. These are periodontal-disease susceptible elderly patients who have been successfully treated and maintained for many years and who, as they have grown older, can no longer maintain their mouths as successfully as they could previously. This situation is further complicated if more complex restorations such as bridgework, implants and precision attachment prostheses are present. In such circumstances there may be a growing discrepancy between the self-care that is



Fig 5 Pre-treatment photograph of 80-year-old male patient. There are probing depths of 6 mm with bleeding on probing on the mesial surfaces of both lower central incisors.



Fig 6 Post-treatment photograph of the same 80-year-old male patient. The treatment needed was simple and effective and comprised oral hygiene instruction, scaling and polishing of all teeth and root surface instrumentation of the mesial surfaces of both lower central incisors.

required and that which the patient can apply. These complex problems must be managed on an individual patient basis.

HOW EFFECTIVE IS PERIODONTAL THERAPY IN OLDER ADULTS?

The literature suggests that age *per se* is not an important factor in determining the results of periodontal therapy (Lindhe and Nyman 1984; Pollack 1986; Axelsson et al, 1991; Wennstrom et al, 1993). This means that it is certainly worthwhile treating periodontal disease in older adults and that high-quality treatment coupled with adequate plaque control is likely to result in a good therapeutic outcome. It is also worth noting that if patients have retained teeth into old age they are very unlikely to be highly susceptible to periodontal disease. This is helpful from the prognostic point of view. For many elderly patients simple treatment and provision of support is all that is required to achieve a good therapeutic result (Figs 5 and 6).

CONCLUSIONS

Management of periodontal disease in elderly patients is of increasing importance and relevance. Therapeutic choices need to be made on an individual patient basis and must be both pragmatic and sufficiently flexible to cope with changes in circumstances. The framework given presents a logical means of approaching this challenge.

REFERENCES

- Albandar JM, Brunelle JA, Kingman A. Destructive periodontal disease in adults 30 years of age and older in the United States 1988–1994. *J Periodontol* 1999;70:13–29.
- Axelsson P, Lindhe J, Nystrom B. On prevention of caries and periodontal disease. Results of a 15-year longitudinal study in adults. *J Clin Periodontol* 1991;18:182–189.
- Baker KA, Levy SM, Chrischille EA, Kohout FJ. Medications with dental significance: use in nursing home population. *Spec Care Dentist* 1991;11:19–25.
- Bartold PM, Boyd RR, Page RC. Proteoglycans synthesized by gingival fibroblasts derived from donors of different ages. *J Cell Physiol* 1986;126:37–46.
- Berglundh T, Lindhe J, Sterett JD. Clinical and structural characteristics of periodontal tissues in young and old dogs. *J Clin Periodontol* 1991;18:616–623.
- Ettinger RL, Hand JS. Factors influencing the future need for treatment of root surfaces. *Am J Dent* 1994;7:256–260.
- Flotra L, Gjermo P, Rolla G, Waerhaug J. Side effects of chlorhexidine mouthwashes. *Scand J Dent Res* 1971;79:119–125.



- Grant D, Bernick S. The periodontium of aging humans. *J Periodontol* 1972;43:660-667.
- Ive JC, Shapiro PA, Ivey JL. Age related changes in the periodontium of pigtail monkeys. *J Periodont Res* 1980; 15:420-428.
- Johnson BD, Page RC, Narayanan AS, Pieters HP. Effect of donor's age on protein and collagen synthesis in vitro by human diploid fibroblasts. *Lab Invest* 1986;55:490-496.
- Kelly M, Steele JG, Nuttall N, Bradnock G, Morris J, Nunn J et al. *Adult Dental Health Survey. Oral Health in the United Kingdom*. London: The Stationery Office, 2000.
- Kerry GJ. Supportive periodontal treatment. *Periodontol* 2000 1995;9:176-185.
- Kinane DF, Lindhe J. Chronic Periodontitis. In: Lindhe J, Karring T, Lang NP (eds). *Clinical Periodontology and Implant Dentistry*. Oxford: Blackwell Munksgaard 2003;211.
- Lamy PP. Drug nutrient interactions in the aged. In: Watson RR (ed). *Handbook of Nutrition in the Aged*. Boca Raton: CRC Press 1985;249-278.
- Lindhe J, Nyman S. The effect of plaque control and surgical pocket elimination on the establishment and maintenance of periodontal health. *J Clin Periodontol* 1975;2:67-79.
- Lindhe J, Nyman S. Long-term maintenance of patients treated for advanced periodontal disease. *J Clin Periodontol* 1984;11:504-514.
- Lindhe J, Socransky SS, Myman S, Westfelt E, Haffajee AD. Effect of age on healing following periodontal therapy. *J Clin Periodontol* 1985;12:774-787.
- Marshall-Day CD, Stephens RG, Quigley LF Jr. Periodontal disease: prevalence and incidence. *J Periodontol* 1955;26: 185-203.
- Office of National Statistics. Population Estimates, www.statistics.gov.uk/CCI/nugget.asp?ID=6
- Papapanou PN, Wennstrom JL, Grondahl K. A 10-year retrospective study of periodontal disease progression. *J Clin Periodontol* 1989;17:403-411.
- Papic M, Glickman I. Keratinization of the human gingiva in the menstrual cycle and menopause. *Oral Surg Oral Med Oral Pathol* 1950;3:504-516.
- Pollack RP. An analysis of periodontal therapy for the 65-year-old and older patient. *Gerodontology* 1986;2:135-137.
- Scherp HW. Current concepts in periodontal disease research: epidemiological contributions. *J Am Dent Assoc* 1964; 68:667-675.
- Scully C, Felix DH. Oral Medicine. Update for the dental practitioner: dry mouth and disorders of salivation. *Br Dent J* 2005;199:423-427.
- Shklar G. The effects of aging upon oral mucosa. *J Invest Dermatol* 1966;47:115-120.
- van der Velden U. Effect of age on the periodontium. *J Clin Periodontol* 1994;11:281-294
- Wennstrom JL, Serino G, Lindhe J, Eneroth L, Tollskog G. Periodontal conditions of adult regular dental care attendants. A 12-year longitudinal study. *J Clin Periodontol* 1993;20:714-722.
- Westfelt E, Nyman S, Socransky SS, Lindhe J. Significance of frequency of professional tooth cleaning for healing following periodontal surgery. *J Clin Periodontol* 1983;10: 148-156.
- Yi S-W, Ericsson I, Carlsson GE, Wennstrom JL. Long-term follow-up of cross-arch fixed partial dentures in patients with advanced periodontal destruction. Evaluation of the supporting tissues. *Acta Odontol Scand* 1995;53: 242-248.

Reprint requests:

Dr Angela D. Gilbert,
Clinical Senior Lecturer in Periodontology,
Dundee Dental Hospital & School,
Park Place,
Dundee DD1 4HR, UK
Tel +44 (0)1382 635995
Fax +44 (0)1382 635998
Email a.d.gilbert@dundee.ac.uk