

Periodontal care in general practice: 20 important FAQs – Part one

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Key points

Periodontitis has a negative impact on quality of life and potentially general health.

Risk factors such as diabetes, smoking and pregnancy need to be identified and taken into account during the management of patients with periodontitis.

The ultimate goal of periodontal therapy is to preserve or maintain the dentition in a state of health and comfort throughout life. Non-surgical periodontal therapy is beneficial and effective in the treatment of periodontitis.

Abstract

This is the first in a two-part series that aims to summarise answers to common periodontal care questions facing dentists in general practice.

1: Does periodontitis affect quality of life?

Periodontitis is a common, chronic, multifactorial, inflammatory condition affecting the supporting tissues of the teeth. It leads to the progressive destruction of the tooth supporting apparatus and eventual tooth loss. There is now overwhelming evidence that periodontitis has a negative impact on oral health-related quality of life.^{1,2,3,4,5} Significant impacts have been shown in the functional, physical, social and psychological domains. Severe periodontitis appears to have a greater impact than mild to moderate periodontitis.^{6,7,8}

It is important to be aware of this impact when assessing patients in practice. Discussions might include psychological concerns, halitosis, pain, and poor aesthetics. The periodontal treatment plan should be based on both the needs diagnosed by the clinician but also those perceived by the patient.

The latest 'Global burden of diseases, injuries and risk factors' study demonstrated that,

from 354 diseases/injuries measured across 195 countries, the greatest age-standardised prevalence of 'years lived with disease' in both 1990 and 2017 were oral disorders, headache disorders, and tuberculosis including latent tuberculosis.⁹ The periodontal data were true for both males and females and, unlike caries where age-standardised percentage rates had decreased, in periodontal diseases rates had increased between 2007 and 2017.⁹

2: What's the latest on the role of diabetes in periodontitis?

Diabetes mellitus is a long-term condition characterised by an inability to control blood glucose levels due to an absolute or relative lack of the hormone insulin or a lack of cell responsiveness to insulin (insulin resistance).¹⁰ The majority of people with diabetes can be classified as having type 1 or type 2, with type 2 diabetes being eight to nine times more common than type 1. In the UK, there are at least 3.2 million people who have been diagnosed with diabetes. By 2025, it is estimated that five million people will have diabetes in the UK.¹¹ Perhaps more importantly, there are approximately one million undiagnosed cases of diabetes in the UK and 17 million across Europe. These people regularly attend dental practices, providing an opportunity for the oral healthcare team to engage in prevention strategies and early detection.¹²

Diabetes is a significant risk factor for periodontitis, if sub-optimally controlled.¹³ Patients with hyperglycaemia (diabetes) are three times more likely to develop periodontitis. Indeed, even glycaemia in people with no diabetes is associated with severe periodontitis.¹⁴ Diabetes also increases the severity of periodontitis; that is, patients have greater clinical attachment loss and probing pocket depths.^{15,16} Diabetes is considered as a modifiable risk factor for periodontitis because, although it cannot be cured, it can be controlled.

Dentists are encouraged to compile a careful history from their patients who have diabetes, including their level of control. The most objective way of ascertaining this is by requesting a copy of their most recent HbA1C results. Diabetes patients without periodontitis should be placed on a preventive care regime and monitored regularly, while those with periodontitis should be treated accordingly, ensuring that the importance of good glycaemic control is also emphasised. Dental patients without diabetes but with risk factors for type 2 diabetes should be informed of their risk and, if appropriate, referred to their general practitioner for screening.¹⁷

Recently, the European Federation of Periodontology and the International Diabetes Federation joined forces to publish a report and consensus guidelines for physicians, oral healthcare professionals and patients to improve

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early diagnosis, prevention and management of people with diabetes and periodontitis. This includes encouraging physicians to refer people with diabetes for a periodontal examination.¹⁸ Conversely, a recent study has demonstrated that the public, patients and the profession are strongly supportive of formally risk assessing for diabetes in the dental practice and potentially testing HbA1C levels as part of the risk assessment (rather than formal diagnosis).¹⁹

3: What do I need to bear in mind when treating smokers and vapers?

The literature unanimously demonstrates that smoking increases susceptibility, severity and rate of progression of periodontitis.²⁰ In the NHANES III study, which was designed to assess the health and nutritional status of adults and children in the United States, approximately half of periodontitis cases were attributable to either current or former smoking. After adjusting for age, race, ethnicity, income and educational level, smokers were four times as likely to have periodontitis when compared to non-smokers.²¹ The effect of smoking has been shown to be dose-dependent and particularly marked in younger individuals.²² The evidence further demonstrates that smokers lose more teeth and have a less favourable response to periodontal therapy than non-smokers. Smokers are also more likely to suffer disease recurrence following treatment of their periodontitis. Although it is well established that smoking significantly impacts on the onset, progression and outcome of periodontitis, the mechanisms involved remain unclear.

When treating smokers:^{23,24}

- Clinicians should strongly advise smokers to enrol in cessation programmes to improve overall periodontal outcome. Engagement with NHS stop-smoking services triples the odds of successfully quitting when compared to going alone or using over-the-counter products
- Simple and brief advice on smoking cessation in general dental practice increases quit rates and personalised biofeedback adds further benefit
- If the patient continues to smoke, they should be warned of the risk of less predictable and poorer outcomes as well as an increased rate of recurrence
- The above should be discussed in detail with the patient and also recorded in their notes
- If a patient is unwilling to stop, it is sensible to accept the level of disease following an

appropriate level of active treatment, place them onto a regular supportive periodontal therapy regime, and accept that this is a palliative periodontal care programme, until they engage with cessation advice.

In recent years, electronic e-cigarettes have been gaining popularity, with over two million Britons now regularly vaping.²⁵ E-cigarettes provide nicotine for inhalation in a vapour generated by heating a solution containing water, nicotine, propylene glycol and vegetable glycerine. Since e-cigarettes became available in the UK in 2007, their safety and use as a substitute for tobacco smoking have been surrounded by medical and public controversy. A report by the Royal College of Physicians concluded that e-cigarettes are likely to be much safer for general health than smoking. They have also been shown to help smokers quit.²⁶ However, their effects on periodontal health have yet to be determined. In practice, it would be important to ask all patients about the use of e-cigarettes. It would be worth recording their vaping habits, including the nicotine concentrations of the solution that is being used, which usually ranges from 0–36 mg/ml. It would also seem sensible to include vaping cessation as part of the periodontal treatment plan.

4: What do I need to be aware of when treating pregnant patients?

In pregnancy, elevated hormone levels (oestrogen and progesterone) significantly increase vascular permeability in the gingival tissues and, in the presence of dental plaque, promote gingival inflammation. In those who already have gingivitis or periodontitis, the clinical situation normally worsens and can do so rapidly. Specific localised lesions (pregnancy/vascular epulides) and a more generalised pregnancy gingivitis are associated with pregnancy. Moreover, existing periodontal bone loss can deteriorate rapidly in certain patients when pregnant and a more intensive supportive care programme is recommended in such cases. The evidence base remains inconclusive when exploring whether periodontitis is related to adverse pregnancy outcomes, however it is safe to treat periodontitis during pregnancy.²⁷

When treating pregnant patients in practice:²⁸

- Identify the stage of pregnancy and perform a comprehensive periodontal examination.

- Pregnant women with a healthy periodontium should be provided with oral health education including detailed oral hygiene instructions
- Emphasis to patients with gingivitis or periodontitis that non-surgical periodontal therapy during pregnancy is safe, effective and beneficial
- Following treatment, reassess the periodontal status according to normal practice
- Once treated, frequent monitoring of the periodontal condition should be maintained throughout pregnancy and, if there is a recurrence, a similar intervention should be provided
- For a pregnancy epulis, surgical excision can be performed for large lesions that are impacting upon function or aesthetics. However, if lesions are small, excision can be delayed until postpartum and supportive measures (plaque removal demonstration and professional debridement) should be carried out during pregnancy. If possible, other forms of elective periodontal surgery should also be avoided during pregnancy.

5: What is the link between periodontitis and general health?

Periodontitis has potentially negative consequences on general health. Consistent and robust evidence is available which demonstrates that severe periodontitis is associated with premature mortality due to 'all causes' and due to cardiovascular disease.^{29,30} Furthermore, in patients with diabetes, there is a direct and dose-dependent relationship between periodontitis severity and diabetes complications. Emerging evidence indicates an increased risk for diabetes onset in patients with severe periodontitis. Randomised clinical trials consistently demonstrate that mechanical periodontal therapy is associated with an approximately 0.4% reduction in HbA1C at three months; this is a clinical impact equivalent to adding a second drug to a pharmacological regime for diabetes. Recently, a 0.5% HbA1C reduction at 12 months following intensive periodontal therapy has been reported.³¹ Periodontitis is also independently associated with cardiovascular diseases, and additional emerging evidence also appears to link periodontitis with a range of other conditions.³² In practice, it is important to increase awareness among patients about the importance of periodontal health for general health and wellbeing.

6: What were the key changes made to the BPE guidelines in 2016?

The British Society of Periodontology (BSP) updated the BPE guidelines in 2016.³³ The following six changes or key points were made:

1. If a code 4 is identified in a sextant, continue to examine all sites in the sextant. This will help to gain a fuller understanding of the periodontal condition and will make sure that furcation involvements are not missed
2. If a code 3 is detected, then perform initial therapy including self-care advice (oral hygiene instructions and risk factor control) first. Then after initial therapy, record a six-point pocket chart in that sextant only
3. The BPE should not be used around dental implants (four- or six-point pocket charting is recommended)
4. Radiographs should be taken for all code 3 and code 4 sextants. The type of radiograph used is a matter of clinical judgement but crestal bone levels should be visible. The periapical view is regarded as the gold standard
5. When a six-point pocket chart is indicated, it is only necessary to record sites of 4 mm and above (although six sites per tooth should be measured)
6. Bleeding on probing should always be recorded in conjunction with a six-point pocket chart.

7: Where can I find out more about the new classification?

The 2017 World Workshop Classification system for periodontal and peri-implant diseases and conditions was developed in order to accommodate advances in knowledge derived from both biological and clinical research, that have emerged since the 1999 International Classification of Periodontal Diseases. The new classification defines clinical health for the first time and distinguishes an intact and a reduced periodontium throughout. The term 'aggressive periodontitis' has been removed, creating a staging and grading system for periodontitis. The BSP convened an implementation group to develop guidance on how the new classification system should be implemented in clinical practice. The clinical implementation of the new classification system in the UK was recently published in the *British Dental Journal*,³⁴ and has been followed by a case series to help illustrate

Table 1 Steps to ensure oral hygiene instructions are effective in the limited time available

Point	Step	Details
1	Orientate	Many patients are unfamiliar with their oral anatomy and have an inadequate spatial sense, so begin by introducing the basic anatomy of the oral tissues. The teeth and gingivae can be visualised using a hand mirror or intraoral camera.
2	Disclose	Disclosing can provide a visual illustration of the areas the patient is missing and help calculate an objective plaque score. Plaque scores can help with motivation but can also be important medico-legally. Taking a photo for the patient on their camera phone is a great idea as it allows the patient to refer to the photo a reference between visits.
3	Demonstrate	Always demonstrate toothbrushing and interdental cleaning in the mouth.
4	Lingual/palatal	For those patients constantly missing these areas, ask them to start here first, as the start of the brushing cycle is when the patient has the most energy and is likely to do a better job.
5	Overzealous brushers	Watch out for overzealous brushers. Although they may not have pocketing, they might have recession. Ask them to use a pen-grip to hold the toothbrush and to brush using their wrist rather than their elbow or shoulder.
6	Promote power brushes	Power brushes provide statistically significantly greater reductions in plaque and gingivitis than manual brushes. Promote rechargeable brushes, as these are superior to battery-operated. ³⁵
7	Emphasise the importance of interdental cleaning	Interproximal cleaning is essential for gingival health and the use of interdental brushes is the most effective method for interproximal plaque removal. Flossing should only be recommended for sites of gingival and periodontal health, where interdental brushes will not pass through the interproximal area without trauma. ³⁵
8	GPS	This is an evidenced-based approach to change oral hygiene behaviour that is based on: goal setting (including instruction in an appropriate technique to achieve that goal), planning (a target plaque score by a certain time) and self-monitoring (for example, through using disclosing tablets at home). ³⁶
9	Risk assessment tools	The use of certain risk assessment tools can predict disease progression and tooth loss, ³⁶ and can also improve patient motivation and self-efficacy and the patient-practitioner relationship. ^{37,38}
10	Keep it simple and reinforce advice	Be careful to avoid dental jargon and reinforce the advice at every visit.
11	Patient responsibility	Emphasise the patient's responsibility in looking after their own oral health.

its implementation. There are also webinars available on the BSP website related to the new classification.

8: What language can I use with my patients to convince them of the importance of treating periodontitis?

When explaining the benefits of periodontal treatment, it is important to translate clinical information, such as improvements in probing pocket depths, into a language that the patient can understand and closely relate to. For example, you might prefer to explain that if the condition is treated and the patient adopts the requisite lifelong home care regime, then the patient may:

- Not lose any teeth or will keep their teeth for longer, potentially for life
- Not have bad breath
- Have greater self-confidence, less oral discomfort as well as a better oral function and quality of life

- Not have to wear dentures
- Not have a bad taste in their mouth or suffer from bad breath
- Not wake up with blood on their pillow.

The associations between periodontitis and general health should also be discussed to improve motivation. Phrases that can be used include:

- The mouth is a gateway to the rest of the body and should not be seen in isolation
- A healthy mouth is an important step to a healthy body.

9: How do I provide effective oral hygiene instructions in the limited time given?

Optimal plaque control is imperative for the prevention of periodontitis, its treatment and long-term stability. In practice, it is therefore important to identify steps to ensure your oral hygiene instructions are effective in the limited time available (Table 1).

10: When carrying out non-surgical periodontal therapy, is there one approach that is superior to another, specifically when considering number of visits and instruments/equipment used?

The ultimate goal of periodontal therapy is to preserve or maintain the dentition in a state of health and comfort throughout life. Non-surgical periodontal therapy is beneficial and effective in the treatment of periodontitis.³⁹ It should be considered:

- In highly motivated patients
- For those with a high standard of supragingival and subgingival plaque control
- For pockets with probing depths of >5 mm or 4 mm with bleeding on probing
- Where there are subgingival deposits in a high risk patient despite an absence of overt clinical signs of inflammation.

We no longer vigorously remove cementum/root structure as endotoxins have been shown to be superficially attached.^{40,41,42} There is also no evidence that one technique or regime is superior to another.⁴³ Generally, when it comes to deciding between quadrant, half-mouth or full-mouth debridement, this is dependent on:

- Severity of disease
- Need for anaesthesia
- Patient anxiety
- Level of plaque control
- Logistics.

However, the systemic insult caused by full-mouth debridement may be significant and the quality of the debridement is more important than the technique.^{44,45} There is an incorrect perception that one-stage full-mouth therapy is beneficial,⁴⁶ and its use should now be carefully considered given the above evidence. The expected reduction in probing depth through non-surgical periodontal therapy for moderate (4–6 mm) pockets is 1 mm and for deep pockets (7 mm +) it is 2 mm.⁴⁷

In general, no significant difference has been shown between hand and powered

instrumentation in deposit removal and improved clinical parameters,^{48,49} but in furcation grade II or III lesions, powered instruments are more effective due to the difference in tip size.⁵⁰ There are specific benefits of both ultrasonic and hand scaling, and so the use of a blended approach is ideal for non-surgical periodontal therapy.⁴⁷ The evidence from a recent review on the use of lasers in the treatment of periodontitis remains conflicted and insufficient to suggest that the integration of a laser in a periodontal treatment protocol will provide antimicrobial and healing outcomes superior to those achieved by traditional therapy.⁵¹

Further reading

For further resources and reading material concerning periodontal care in general practice, see Box 1.

References

1. Ferreira M C, Dias-Pereira A C, Branco-de-Almeida L S, Martins C C, Paiva S M. Impact of periodontal disease on quality of life: a systematic review. *J Periodontol Res* 2017; **52**: 651–665.
2. Araujo A C, Gusmão E S, Batista J E, Cimões R. Impact of periodontal disease on quality of life. *Quintessence Int* 2010; **41**: e111–e118.
3. Bernabe E, Marcenes W. Periodontal disease and quality of life in British adults. *J Clin Periodontol* 2010; **37**: 968–972.
4. Needleman I, McGrath C, Floyd P, Biddle A. Impact of oral health on the life quality of periodontal patients. *J Clin Periodontol* 2004; **31**: 454–457.
5. McGrath C M, Bedi R, Gilthorpe M S. Oral health related quality of life - views of the public in the United Kingdom. *Community Dent Health* 2000; **17**: 3–7.
6. Meusel D R, Ramacciato J C, Motta R H, Brito Júnior R B, Flório F M. Impact of the severity of chronic periodontal disease on quality of life. *J Oral Sci* 2015; **57**: 87–94.
7. Lawrence H P, Thomson W M, Broadbent J M, Poulton R. Oral health-related quality of life in a birth cohort of 32-year olds. *Community Dent Oral Epidemiol* 2008; **36**: 305–316.
8. White D A, Tsakos G, Pitts N B *et al*. Adult Dental Health Survey 2009: common oral health conditions and their impact on the population. *Br Dent J* 2012; **213**: 567–572.
9. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392**: 1789–1858.
10. World Health Organisation. International Classification of Diseases ICD-11. Geneva: WHO, 2017. Available at <http://www.who.int/classifications/icd/en/> (accessed May 2019).
11. Diabetes UK. Facts & Figures. Available at <https://www.diabetes.org.uk/professionals/position-statements-reports/statistics> (accessed May 2019).
12. Chapple I L C. Bleeding gums: Sentinels of non-communicable diseases of ageing. 2018. Available at <https://www.openaccessgovernment.org/bleeding-gums-non-communicable-diseases/55853/> (accessed May 2019).
13. Chapple I L C, Genco R, Working group 2 of joint EFP/AAP workshop. Diabetes and periodontal diseases: Consensus report of the Joint EFP/AAP Workshop on Periodontitis and Systemic Diseases. *J Clin Periodontol* 2013; **40 (Spec Iss)**: 106–112.
14. Graziani P, Gennai S, Solini A, Petrini M. A systematic review and meta-analysis of epidemiologic observational evidence on the effect of periodontal disease on

- diabetes: An update of the review of the EFP-AAP workshop. *J Clin Periodontol* 2018; **45**: 167–187.
15. Khader Y S, Dauod A S, El-Qaderi S S, Alkafajei A, Batayha W Q. Periodontal status of diabetics compared with nondiabetics: a meta-analysis. *J Diabetes Complications* 2006; **20**: 59–68.
 16. D'Aiuto F, Gable D, Syed Z *et al*. Evidence summary: The relationship between oral diseases and diabetes. *Br Dent J* 2017; **222**: 944–948.
 17. European Federation of Periodontology. Recommendations for the oral-healthcare team. Available at https://www.efp.org/publications/projects/perioanddiabetes/recommendations/recommendations_01-oralteam.pdf (accessed May 2019).
 18. Sanz M, Ceriello A, Buyschaert M *et al*. Scientific evidence on the links between periodontal diseases and diabetes: Consensus report and guidelines of the joint workshop on periodontal diseases and diabetes by the International Diabetes Federation and the European Federation of Periodontology. *J Clin Periodontol* 2018; **45**: 138–149.
 19. Yonel Z, Sharma P, Yahyouche A, Jalal Z, Dietrich T, Chapple I L. Patients' attendance patterns to different healthcare settings and perceptions of stakeholders regarding screening for chronic, non-communicable diseases in high street dental practices and community pharmacy: a cross-sectional study. *BMJ Open* 2018; **8**: e024503.
 20. Nociti F H Jr, Casati M Z, Duarte P M. Current perspective of the impact of smoking on the progression and treatment of periodontitis. *Periodontol* 2000 2015; **67**: 187–210.
 21. Tomar S L, Asma S. Smoking-attributable periodontitis in the United States: findings from NHANES III. National Health and Nutrition Examination Survey. *J Periodontol* 2000; **71**: 743–751.
 22. Tonetti M S. Cigarette smoking and periodontal diseases: aetiology and management of disease. *Ann Periodontol* 1998; **3**: 88–101.
 23. Stead L F, Lancaster T. Combined pharmacotherapy and behavioural interventions for smoking cessation. *Cochrane Database Syst Rev* 2012; CD008286.
 24. Barnfather K D P, Cope G F, Chapple I L C. Effect of incorporating a 10 minute point of care test for salivary nicotine metabolites into a general practice based smoking cessation programme: randomised controlled trial. *BMJ* 2005; **331**: 999–1001.
 25. Action on Smoking and Health. Over 2 million Britons now regularly use electronic cigarettes. 2014. Available at <http://ash.org.uk/media-and-news/press-releases-media-and-news/over-2-million-britons-now-regularly-use-electronic-cigarettes/> (accessed May 2019).
 26. Royal College of Physicians. *Nicotine without smoke: Tobacco harm reduction*. London: RCP, 2016. Available at <https://www.rcplondon.ac.uk/projects/outputs/nicotine-without-smoke-tobacco-harm-reduction-0> (accessed May 2019).
 27. Sanz M, Kornman K, working group 3 of the joint EFP/AAP workshop. Periodontitis and adverse pregnancy outcomes: consensus report of the Joint EFP/AAP Workshop on Periodontitis and Systemic Diseases. *J Periodontol* 2013; **84 (Spec Iss)**: S164–S169.
 28. European Federation of Periodontology. The relationship between oral health and pregnancy: guidelines for oral health professionals. Available at https://www.bsperio.org.uk/professional/oralhealthandpregnancy/EFP_OralB_GUIDELINE_01.pdf (accessed May 2019).
 29. Garcia R I, Krall E A, Vokonas P S. Periodontal disease and mortality from all causes in the VA Dental Longitudinal Study. *Ann Periodontol* 1998; **3**: 339–349.
 30. Sharma P, Dietrich T, Ferro C J, Cockwell P, Chapple I L. Association between Periodontitis and mortality in stages 3-5 chronic kidney disease: NHANES III and linked mortality study. *J Clin Periodontol* 2016; **43**: 104–113.
 31. D'Aiuto F, Gkranias N, Bhowruth D. Systemic effects of periodontitis treatment in patients with type 2 diabetes: a 12 month, single-centre, investigator-masked, randomised trial. *Lancet Diabetes Endocrinol* 2018; **6**: 954–965.
 32. European Federation of Periodontology. EFP Manifesto. Available at <https://www.efp.org/efp-manifesto/manifesto.html> (accessed May 2019).

Box 1 Further resources and reading material

British Society of Periodontology website: <http://www.bsperio.org.uk>

European Federation of Periodontology website: <https://www.efp.org>

33. British Society of Periodontology. Basic Periodontal Examination guidelines. 2016. Available at https://www.bsperio.org.uk/publications/downloads/114_085945_bpe-guidelines-2016.pdf (accessed May 2019).
34. Dietrich T, Ower P, Tank M *et al.* Periodontal diagnosis in the context of the 2017 classification system of periodontal diseases and conditions - implementation in clinical practice. *Br Dent J* 2019; **226**: 16–26.
35. Chapple I, Van der Weijden F, Doerfer C *et al.* Primary prevention of periodontitis: managing gingivitis. *J Clin Periodontol* 2015; **42 (Spec Iss)**: S71–S76.
36. Tonetti M S, Eickholz P, Loos B G *et al.* Principles in prevention of periodontal diseases: Consensus report of group 1 of the 11th European workshop on periodontology on effective prevention of periodontal and peri-implant diseases. *J Clin Periodontol* 2015; **42 (Spec Iss)**: S5–S11.
37. Asimakopoulou K, Newton J T, Daly B, Kutzer Y, Ide M. The effects of providing periodontal disease risk information on psychological outcomes - a randomised controlled trial. *J Clin Periodontol* 2015; **42**: 350–355.
38. Newton J T, Asimakopoulou K. The perceived acceptability of the DEPPA patient assessment tool: A questionnaire survey of Denplan Excel patients. *Br Dent J* 2017; **222**: 767–770.
39. Suvan J E. Effectiveness of mechanical nonsurgical pocket therapy. *Periodontol 2000* 2005; **37**: 48–71.
40. Hughes F J, Smales F C. Immunohistochemical investigation of the presence of and distribution of cementum associated lipopolysaccharides in periodontal disease. *J Periodontol Res* 1986; **21**: 660–667.
41. Hughes F J, Auger D W, Smales F C. Investigation of the distribution of cementum-associated lipopolysaccharides in periodontal disease by scanning electron microscope immunohistochemistry. *J Periodontol Res* 1988; **23**: 100–106.
42. Nyman S, Westfelt E, Sarhead G, Karring T. Role of “diseased” cementum in healing following treatment of periodontal disease. A clinical study. *J Clin Periodontol* 1988; **15**: 464–468.
43. Sagar A. Full mouth versus quadrant treatment in chronic periodontitis. *Prim Dent J* 2014; **3**: 66–69.
44. Graziani F, Cei S, Orlandi M *et al.* Acute phase response following full-mouth versus quadrant non-surgical periodontal treatment. A randomised clinical trial. *J Clin Periodontol* 2015; **42**: 843–852.
45. Morozumi T, Yashima A, Gomi K *et al.* Increased systemic levels of inflammatory mediators following one-stage full-mouth scaling and root planing. *J Periodont Res* 2018; **53**: 536–544.
46. Lang N P, Tan W C, Krähenmann M A, Zwahlen M. A systematic review of the effects of full-mouth debridement with and without antiseptics in patients with chronic periodontitis. *J Clin Periodontol* 2008; **35 (Spec Iss)**: 8–21.
47. Cobb C M. Non-surgical pocket therapy: mechanical. *Ann Periodontol* 1996; **1**: 443–490.
48. Badersten A, Nilvéus R, Egelberg J. Effect of nonsurgical periodontal therapy. I. Moderately advanced periodontitis. *J Clin Periodontol* 1981; **8**: 57–72.
49. Loos B, Kiger R, Egelberg J. An evaluation of basic periodontal therapy using sonic and ultrasonic scaler. *J Clin Periodontol* 1987; **14**: 29–33.
50. Drisko C H. Root instrumentation. Power-driven versus manual scalers, which one? *Dent Clin North Am* 1998; **42**: 229–244.
51. Cobb C M. Lasers and the treatment of periodontitis: the essence and the noise. *Periodontol 2000* 2017; **75**: 205–295.