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Innovations in non-surgical periodontal therapy: Consensus Report of the Sixth European Workshop on Periodontology

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Abstract

Introduction: The remit of this working group was to update the existing knowledge base in non-surgical periodontal therapy. The published systematic reviews from the fourth EAP Workshop formed the starting point for this update and in addition specific innovations not covered in previous workshops were included.

Material and Methods: The literature was systematically searched and critically reviewed. Five manuscripts were produced in five specific topics identified as areas where innovative approaches have been developed in non-surgical periodontal therapy and which were deemed to be strategically important for patient care and clinical practice.

Results: The results and conclusions of the review process are presented in the following papers, together with the group consensus statements, clinical implications and directions for future research:

A systematic review of the effects of full mouth debridement with and without antiseptics in patients with chronic periodontitis.

Advances in Power Driven Instrumentation.

Laser application in non-surgical periodontal therapy – a systematic review.

Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm.

The cost-effectiveness of supportive periodontal-care for patients with chronic periodontitis.

Key words: cost-efficiency; instrumentation; laser; non-surgical; periodontal therapy

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The remit of this working group was to update the existing knowledge base in non-surgical periodontal therapy. The published systematic reviews from the fourth EAP Workshop formed the starting point for this update and in addition specific innovations not covered in previous workshops were included. For this purpose the literature was systematically searched and critically reviewed.

Five manuscripts were produced in five specific topics identified as areas where innovative approaches have been developed in non-surgical periodontal therapy and which were deemed to be strategically important for patient care and clinical practice:

1. A systematic review of the effects of full mouth debridement with and without antiseptics in patients with chronic periodontitis (Lang et al. 2008).
2. Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm (Herrera et al. 2008).
3. The cost-effectiveness of supportive periodontal care (SPC) for patients with chronic periodontitis (Gaunt et al. 2008).
4. Laser application in non-surgical periodontal therapy – a systematic review (Schwarz et al. 2008).
5. Advances in Power Driven Instrumentation (Walmsley et al. 2008).

Although the purpose was to produce systematic reviews with meta-analyses in all five manuscripts, the paucity and heterogeneity of the available clinical research in some specific areas precluded this approach and favoured a narrative survey.

Themes common to the reviewed topics emerged, which were deemed fundamentally important to the accurate interpretation of study outcomes and future research. Amongst these we have identified the following:

> Outcomes need to be developed that reflect meaningful objectives for oral health and patient well-being and which assess patient experience and quality of life. Moreover there is a need to identify clinical outcomes that are meaningful for clinical decision-making. The design of the research and the results obtained must be generalisable, encompassing different practice settings and different environments, and should include an analysis of cost effectiveness. Also, studies should systematically report key design criteria using internationally accepted protocols, which are available for a variety of research designs (equator-network). Irrespective of treatment modality a high level of plaque control and patient adherence to prescribed treatment protocols are fundamental to long-term clinical success.

A systematic review of the effects of Full Mouth Debridement with and without antiseptics in patients with chronic periodontitis

N.P. Lang, T.W. Ching, M. Krähenmann & M. Zwahlen

Focussed Question

In patients with chronic periodontitis, what are the clinical and microbiological outcomes of full mouth disinfection (FMD) *versus* conventional staged debridement (CSD) after a follow-up period of at least 6 months?

Conclusions

Although statistically significant differences favouring FMD or full mouth scaling and root planing (FMSRP) when compared with CSD were found for some PPD reductions and clinical attachment loss (CAL) gains, they were inconsistent and small in the light of the documented changes of 1–2 mm for the cause-related phase of periodontal therapy.

Hence, all three treatment approaches may, without any preference, be recommended for debridement in the cause-related phase of periodontal therapy in patients with chronic periodontitis.

No conclusions could be made about the different microbiological outcomes reported, mainly due to differences in the microbiological techniques utilized.

Consensus Statements

The FMD concept typically included the disinfection of the entire oral cavity within a period of 24 h, depletion of the supragingival plaque deposits and prevention of biofilm formation by means of oral rinses with chlorhexidine twice daily for 1 min for 2 weeks and disinfection of bacterial reservoirs of the tongue and tonsils by tongue scraping and spraying the tonsillar region with chlorhexidine. Furthermore, subgingival irrigation of all pockets three times within 10 min. with a 1% chlorhexidine gel was performed and repeated after 8 days.

Derived from the above, another clinical protocol has emerged, FMSRP without the use of antiseptics.

CSD used as a control treatment in the systematic review consisted of quadrant- or sextant-wise instrumentation at usually 1–2 week intervals. FMD or FMSRP do not provide clinically relevant advantages over CSD.

All three treatment modalities may be recommended for debridement in the cause-related phase of periodontal therapy of patients with chronic periodontitis, provided the adequate preventive measures are rendered.

Clinical Implications

- Initial cause-related therapy in patients with moderate to advanced periodontitis has been demonstrated to be efficacious and resulted in PPD reductions of approximately 1 mm for the sites with initial PPD of 5–6 mm, while in deeper pockets ($\geqslant$7 mm) yielded a reduction in PPD of 2.2 mm. In light to these established treatment outcomes the adjunctive effects of either FMD or FMSRP are modest and do not justify a claim of superiority over CSD.
- Hence, all three modalities may be recommended for debridement. Clinicians should choose the modality of debridement according to the needs and the preferences of the patient, their personal skills and experience, the logistic setting of the practice and the cost-effectiveness of the therapy rendered. It should be noted that the performance of optimal oral hygiene practices is an inseparable principle to be observed with any protocol of mechanical debridement.

Implications for Research

There is a need to:

- Investigate the dynamics of the oral microbiome including an in-depth evaluation of the recolonization processes after mechanical debridement.
- Explore the consequences of an intense antigenic challenge on systemic outcomes and adverse systemic effects.
- Investigate the impact of different mechanical debridement protocols on patient-centred outcomes and

cost effectiveness using appropriate methodology.
- Evaluate alternative modalities of non-surgical periodontal therapy combining mechanical debridement procedures with chemotherapeutic agents in different settings.

Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm

D. Herrera, B. Alonso, R. Leon, S. Roldan, M. Sanz

Relevant Questions

1. Can systemic antimicrobials be efficacious if the biofilm is not disrupted?
2. Can the type of debridement (non-surgical *versus* surgical) of the subgingival biofilm impact upon the clinical outcomes of the adjunctive antimicrobial therapy?
3. Is the efficacy of the adjunctive systemic antimicrobial therapy dependent on the quality of the debridement of the subgingival biofilm and the sequence debridement-antibiotic usage?

Conclusions

If systemic antimicrobials are indicated as part of periodontal therapy, they should be adjunctive to mechanical debridement.

Lack of data prevents us from making any conclusion regarding the preferred type of adjunctive debridement (non-surgical *versus* surgical). Furthermore, there is not enough evidence to support the use of adjunctive systemic antimicrobials with periodontal surgery.

There is no direct evidence to recommend a specific protocol for the use of adjunctive systemic antimicrobials with non-surgical mechanical debridement. However, indirect evidence suggests that antibiotic intake should start on the day of debridement completion; it should be completed within a short time (preferably < 1 week) and with an adequate quality. These factors may help to improve the results.

Consensus Statements

- Systemic antimicrobials should not be used in most patients with periodontitis. They could be considered in specific patient groups (such as in aggressive periodontitis) and defined conditions (such as in severe and progressing forms of periodontitis). Their prescription however, should be considered on a case-by-case basis.
- When indicated as part of periodontal therapy, systemic antimicrobials should be used in conjunction with mechanical debridement of the subgingival biofilm, preferably as part of non-surgical periodontal therapy.
- Indirect evidence suggests that for obtaining optimal outcomes with the use of systemic antimicrobials, the drug therapeutic levels should be achieved at the time of debridement completion and all debridement should be carried out preferably within 7 days.
- There is not enough evidence to support the use of systemic antimicrobials with periodontal surgery.
- Due to important public health implications, the use of systemic antimicrobials should be restricted and they should be used under the most optimal conditions.

Clinical Implications

- Due to the problems related with the indiscriminate use of antimicrobials (especially systemic side effects, microbiological adverse effects and the increase in bacterial resistances), the use of systemic antimicrobials in periodontitis should be restricted to certain patients and certain periodontal conditions:
    - Specific patient groups (such as in aggressive periodontitis).
    - Periodontal conditions (such as in severe and progressing forms of periodontitis).

Their prescription however, should be considered on a case-by-case basis.

- Once the indication for the individual patient has been established, systemic antimicrobials should be used under the most optimal conditions to achieve the best possible results. These optimal conditions include:
    - The use of the systemic antimicrobial should be adjunctive to mechanical debridement; specifically there is more evidence to support its use adjunctive to scaling and root planing.
    - Systemic antimicrobials will be more effective when the biofilm has been disrupted and still is not re-organized. This will imply:
        - To carry out all needed debridement within the shortest time span (< 1 week).
        - To achieve effective levels of the drug on the day of the completion of debridement.
        - To assure a thorough and effective disruption of the biofilm and to implement effective measures of supragingival plaque control by the patient.

Implications for Research

There is a need to:

- Carry out well-designed RCTs to compare the use of systemic antimicrobials either after SRP or after periodontal surgery. This will also include an evaluation of the most appropriate phase of the periodontal treatment in which systemic antimicrobials will be more suitable, either with the non-surgical cause-related phase, at its re-evaluation step, or in conjunction with the surgical phase.
- Carry out well-designed RCTs to compare antibiotic intake immediately after full-mouth debridement within 12–24 h with conventional protocols.
- Investigate which periodontitis patients and clinical conditions will benefit the most from systemic antimicrobial therapy, which are the most efficacious antibiotics and which are the recommended doses and posology.
- Evaluate their adverse effects, including adverse microbiological effects that should be assessed in studies with different designs, such as RCTs. And population-based studies, especially when combined antibiotic therapies such as amoxicillin plus metronidazole are utilized.

The cost-effectiveness of SPC for patients with chronic periodontitis.

F. Gaunt, M. K. Devine, I. N. Steen, E. Gwynnett, C. Vernazza, M. Pennington, P. A. Heasman

Focussed Question

What is the effect of SPC in specialist versus general dental practice in terms of clinical outcomes and financial costs in patients with chronic periodontitis?

Conclusions

SPC delivered in specialist compared with general dental practice will likely result in greater periodontal stability and higher tooth survival rates.

An economic evaluation of cost effectiveness based on model remuneration scales, care provision in the United Kingdom and assumptions made specifically for this model indicate that the clinical benefit from the provision in specialist practice is more expensive; incremental cost effectiveness ratios were approximately €290 for one extra tooth year and around €1500 for 1 mm less CAL over 30 years.

Consensus Statements

The long-term stability of successfully treated chronic periodontitis demands the introduction of, and compliance with an effective programme of SPC.

The ultimate success of SPC has been identified and reported through long-term, retrospective, population studies which have unequivocally demonstrated that whether in university, hospital or specialist practice settings, only 2–5% of teeth in patients originally treated for chronic periodontitis are lost over periods of between 5 and 10 years.

There is considerable need for facilities and manpower of oral health personnel to provide effective SPC for all patients

SPC delivered in specialist compared with general dental practice will likely result in greater periodontal stability and higher tooth survival rates.

An increased cost for better clinical outcomes from receiving supportive care in specialist *versus* general dental practice has been identified; willingness to pay has not been established.

Clinical Implications

- Patients should be informed of the need for SPC and their own responsibilities to future care and this should include an overview of the possible long-term clinical outcomes and the costs of achieving those outcomes and maintaining a functional dentition.

Implications for Research

There is a need to:

- Evaluate this cost effectiveness model in different communities and oral health systems.
- Carry out a prospective, long-term clinical trial that compares patient-related and clinical outcomes in patients who are randomized to receive SPC in either specialist or general dental practice. Details of SPC provision, periods of recall and compliance should be reported. Such a trial should include an evaluation of:

  Costs and cost effectiveness, thus eliminating some of the assumptions that have been made in this review.
  Patients' views with respect to the costs of SPC and future treatment, and their ''willingness to pay''.

Laser application in non-surgical periodontal therapy: a systematic review

F. Schwarz, A. Aoki, J. Becker, A. Sculean

Focussed Question

What is the clinical effect of laser application compared with mechanical debridement in non-surgical periodontal therapy in patients with chronic periodontitis?

Conclusions

A meta-analysis could not be performed due to the heterogeneity of the studies and therefore, a narrative synthesis allows us following limited conclusions:

Er:YAG laser application in non-surgical periodontal therapy compared with mechanical debridement resulted in similar clinical outcomes, both in the short- and long-term (up to 24 months), when compared with non-surgical mechanical debridement in patients with chronic periodontitis. However, issues related to the design and power of a limited number of studies prevents us from making definite conclusions.
There is insufficient evidence to support the clinical application of either CO_2, Nd:YAG, Nd:YAP, or different diode laser wavelengths, because clinical studies available have used this laser applications as adjuncts to mechanical debridement, without demonstrating a significant added clinical value.

Limited available information on the safety of different laser therapies is provided in the assessed literature. With the wavelengths and power settings used, no major adverse effects were reported.

Consensus Statements

- Among all lasers currently used in dentistry, the Er:YAG laser seems to possess characteristics most suitable for the non-surgical treatment of chronic periodontitis. Research conducted so far has indicated its safety and effects that might be expected to be within the range to that reported for conventional mechanical debridement. However, the evidence from the evaluated studies is weak.
- CO_2, Nd:YAG, Nd:YAP, or diode laser with different wavelengths have not demonstrated efficacy when compared with conventional mechanical debridement and when used as adjuncts they have not shown a significant clinical added value.
- In general, a potential thermal injury to the adjacent periodontal tissues must be prevented by choosing proper radiation parameters, conditions and techniques.

Clinical Implications

- Although preliminary data shows the potential of some laser applications (Er:YAG) in the treatment of chronic periodontitis, stronger evidence is needed before a clinical recommendation can be given.

Implications for Research

There is a need of:

- Well designed randomized, parallel-arm controlled clinical trials using a larger number of patients in order to further evaluate Er:YAG laser application when compared with conventional mechanical debridement.
- Well designed randomized, parallel-arm controlled clinical trials of the adjunctive use of Nd:YAG-, 809 diode-, as well as low level InGaAIP and GaAlAs diode laser radiation, since the available preliminary evidence has suggested a potential clinical benefit.
- Safety and efficacy of various protocols of laser application in clinical practice should be determined, including the effect on subgingival biofilms, calculus and periodontal and dental tissues as well as a full description of the energy density.
- Studies where the cost-effectiveness of the use of these laser applications is evaluated.

Advances in Power Driven Instrumentation

A. D. Walmsley, S. C. Lea, G. Landini., A. J. Moses

Relevant Question

Does power driven pocket/root instrumentation offer a clinical advantage over hand instrumentation?

Conclusions

- The use of power driven instrumentation provides similar clinical outcomes compared with hand instrumentation. The difficulty of pooling studies continues to hinder the drawing of definitive conclusions.
- The addition of antiseptic agents to coolants or irrigants does not provide any additional clinical benefits.
- Newer designs of powered instruments have not shown any benefit when compared with other ultrasonic devices in non-surgical periodontal therapy.
- New in vitro research shows that there is variation in the performance of different tip designs and generators, but its clinical relevance remains unknown.

Consensus Statements

- Power driven scalers encompass a broad range of technologies and therefore clinical outcomes from studies employing different instruments cannot be extrapolated to other devices.
- New in vitro studies have highlighted inconsistencies in instrument performance but the impact of such variability upon clinical results is unknown. Furthermore, the working parameters utilized during clinical research are rarely quoted making meaningful cross-study comparisons impossible.
- The introduction of slimmer tip designs is a positive development that facilitates root surface access and has the potential to reduce soft tissue trauma from clinical instrumentation. However, in vitro studies indicate that mechanical inefficiencies result from variations in the load applied to the tip and the flow rate of the surrounding irrigant. These inefficiencies are likely to result from the necessity for a less robust tip design.
- There is currently no evidence from clinical studies to support or refute the contention that slimmer tips improve clinical outcomes relative to traditional inserts.

Clinical Implications

- Power-driven scalers are a valuable part of the therapeutic periodontal armamentarium.
- The introduction of new power-driven scalers into the market place frequently occurs without comprehensive clinical evaluation of their efficacy. Manufacturers are strongly recommended to undertake such studies before marketing such new technologies.
- There has been widespread adoption of slimmer inserts into power driven scaling protocols, yet evidence for equivalent or improved clinical outcomes, relative to conventional inserts is lacking.
- Manufacturers should implement and report upon the outcomes of their quality-control programmes (such as tip displacement amplitudes), to help guide clinicians in their selection of instrumentation.

Implications for Research

- The introduction of new tip designs or instruments should be accompanied by independent laboratory-based evaluation of their performance under various working conditions.
- There is a need for more randomized-controlled clinical trials to translate such laboratory findings into clinically relevant outcomes.
- Clinical studies should report the working conditions of the instruments employed, such as power setting (displacement amplitude of the tip), irrigant flow rate, duration of treatment, in order to enable appropriate interpretation of results relative to other studies.
- There is a need for studies to address patient-centred outcomes such as treatment discomfort, length of treatment times and the periodontal endpoint (e.g. root surface texture, time to treat, or clinical improvements).
- Direct comparisons between different power-driven devices and with the combined use of manual and power driven instrumentation through RCTs are required.
- Whether cavitation occurs in vivo needs to be established. If demonstrated, the working conditions necessary to maximise this biophysical phenomenon within the periodontal pocket need to be determined.
- The role of cavitation and microstreaming in removing the biofilm, as opposed to direct biofilm disturbance by the tip during clinical treatment remains to be established.

References

Herrera, D., Alonso, B., Leon, R., Roldan, S. & Sanz, M. (2008) Antimicrobial therapy in periodontitis: the use of systemic against antimicrobials against the subgingival biofilm. *Journal of Clinical Periodontology* **35** (Suppl. 8), 45–66.

Gaunt, F., Devine, M. K., Steen, I. N., Gwynnett, E., Vernazza, C., Pennington, M. & Heasman, P. A. (2008) The cost-effectiveness of supportive periodontal care for patients with chronic periodontitis. *Journal of Clinical Periodontology* **35** (Suppl. 8), 67–82.

Lang, N. P., Ching, T. W., Krähenmann, M. & Zwahlen, M. (2008) A systematic review of the effects of full mouth debridement with and without antiseptics in patients with chronic periodontitis. *Journal of Clinical Periodontology* **35** (Suppl. 8), 8–21.

Schwarz, F., Aoki, A., Becker, J. & Sculean, A. (2008) Laser application in non-surgical periodontal therapy: a systematic review. *Journal of Clinical Periodontology* **35** (Suppl. 8), 29–44.

Walmsley, A. D., Lea, S. C., Landini, G. & Moses, A. J. (2008) Advances in power driven pocket/root instrumentation. *Journal of Clinical Periodontology* **35** (Suppl. 8), 22–28.

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