

Proactive prevention and effective periodontal care: Major challenges, scientific updates, and key issues for success

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Executive summary

Periodontal diseases represent a major global health burden that have daunting socio-economic impacts and impose huge healthcare costs. Severe periodontitis is the leading cause of multiple tooth loss and edentulism in adults: it not only negatively affects oral health but is also closely linked to major noncommunicable diseases (NCDs) such as diabetes and heart disease. However, awareness of oral/periodontal health remains low. Adopting a global strategy of oral/periodontal health in all health policies and promoting the Common Risk Factor Approach (CRFA) are two extremely important actions for tackling periodontal problems worldwide.

Over the years, one hurdle on the path to developing a global strategy remains the lack of a common definition/classification of periodontal diseases. In 2017, a global workshop was organized jointly by the American Academy of Periodontology and the European Federation of Periodontology, to develop a new, contemporary and consensus-based classification scheme. As a result, a new classification of periodontal and peri-implant diseases and conditions was released in 2018. It captures the new concepts and knowledge on periodontal health and diseases, aiming to support clinicians in making a more accurate diagnosis and giving patients the benefit of being managed as a person and not as a condition. New concepts in the aetiology and pathogenesis of periodontal diseases, e.g. symbiosis and dysbiosis, may have profound implications in the management of periodontal diseases in the future, including classification, case definition, prevention or treatment. This symposium highlighted the main changes introduced in the new classification.

This symposium also emphasized dentists' role in tackling periodontal diseases and highlighted the different state-of-the-art treatment modalities available. Dentists play a fundamental role in determining how to effectively manage and control the diseases, through proactive promotion of oral/periodontal health, formulating an individualized treatment plan and undertaking various evidence-based approaches, e.g. oral health education, non-surgical periodontal treatments, re-evaluation, various forms of surgical therapies and long-term regular supportive care.

In summary, this symposium addressed the critical issues and strategic frameworks of global periodontal health, with an update and perspective on the Global Periodontal Health Project.



Introduction

Dr Kathryn Kell, FDI president (2017-2019), welcomed all participants to the Global Periodontal Health Project (GPHP) Symposium at the 2018 FDI World Dental Congress. She congratulated the GPHP Task Team members for their commitments to this global project. At a time when almost everyone is affected by oral diseases, including gingivitis and periodontitis, the work performed by the team demonstrates FDI's commitment to optimal oral health for all people.

FDI has been able to advance its goal to achieve global periodontal health by reducing the global burden of periodontal diseases, thanks to GPHP's three partners, namely EMS Electro Medical Systems, GlaxoSmithKline and Procter & Gamble.

The GPHP Task Team should be proud of what they have already accomplished. Periodontal diseases headlined the World Oral Health Forum at the 2017 FDI World Dental Congress; the *White Paper on Prevention and Management of Periodontal Diseases for Oral Health and General Health* as well as an advocacy toolkit to reduce the global burden of periodontal diseases have been published with open access; and most recently, a chairside guide designed for general dentists to manage periodontal diseases has been released. Taken together, these published works constitute a comprehensive set of useful resources for dental practitioners, other healthcare professionals, the public, educators and policymakers.

Lastly, the speakers' wealth of expertise was recognized and appreciated. This symposium contributed to formulating forward-thinking strategies and solutions to further promote oral/periodontal health, prevent periodontal diseases, enhance clinical assessments and improve therapeutic approaches.



Presentation 1

Global periodontal health: Challenges, tackling strategies & an update on FDI's action

Prof. Lijian Jin is the modern dental laboratory professor in clinical dental science and professor of periodontology at the Faculty of Dentistry at the University of Hong Kong; he is also an FDI councilor, chair of the GPHP Task Team, member of the FDI Advocacy Task Team, and past chair of the FDI Science Committee; a member of the International Association for Dental Research (IADR) Board of Directors; a board member of the International Academy of Periodontology, and the past-president of the Asian Pacific Society of Periodontology.

Global burden of periodontitis

Periodontal diseases (gingivitis and periodontitis) are some of the most common diseases worldwide. The report on the Global Burden of Disease (GBD) study of 291 diseases and injuries (1990-2010) shows that oral diseases affect 3.9 billion people¹. Notably, severe periodontitis is the 6th most prevalent disease, and 11.2% of the global population is affected by this severe inflammatory disease². The overall burden of periodontal disease, oral cancer, and caries has increased by 45.6% from 1990 to 2010, and, surprisingly, the global burden of periodontal diseases has increased by 57.3% during this 20-year period, alongside diabetes (69.0%) and heart disease (22.6%)³. In addition, the extended GBD study shows that there has been little change in the 10 leading causes of the disease burden measured by the years lived with disability between 1990 and 2015, except for oral diseases, which are marked as a major 'global public health issue'^{4,5}.

Periodontitis and general health

Periodontitis is a serious, destructive inflammation. It is a major cause of multiple tooth loss and edentulism, leading to masticatory dysfunction and poor nutrient intake, affecting quality of life and self-esteem⁶⁻⁸. Indeed, periodontitis, as a leading cause of severe tooth loss and edentulism, prompts patients to seek dental implant treatment. In other words, most patients who ask for dental implants are those with severe periodontitis. Moreover, periodontitis significantly affects general health and general well-being, and it has been well-documented scientifically for its close links to common systemic diseases/disorders, such as diabetes mellitus, cardiovascular disease, stroke, pulmonary disease, chronic kidney disease, rheumatoid arthritis, some forms of cancer, e.g. orodigestive and pancreatic cancers, cognitive impairment, obesity, various metabolic syndromes like dyslipidemia, and depression^{3,8-12}. According to long-established studies and emerging scientific evidence, the underlying connections and interactions between periodontal disease and systemic conditions have been brought to light, including complex molecular mechanisms and pathological pathways of infection, inflammation, dysbiosis and common risk factors¹³.

Socio-economic impacts of periodontal diseases

Periodontal diseases are truly a 'silent' global epidemic with a huge disease burden and socio-economic effect. Periodontal diseases not only have direct healthcare costs, but also serious, indirect financial consequences. It is estimated that the global cost of lost productivity amounts to about USD 54 billion per year due to severe periodontitis and USD 63 billion due to severe tooth loss, collectively accounting for close to one-third of the direct and indirect costs of lost productivity from oral diseases in 2010^{14,15}.

The outlook for future global healthcare highlights the critical challenges of providing funding for the rising demands and spending on healthcare, particularly due to global ageing populations, increasing chronic



diseases/systemic comorbidities, and high expenses of new medical facilities and clinical approaches. Therefore, the outlook makes essential strategic recommendations on investing in disease prevention and healthcare¹⁶. As such, it would be of great importance to invest in oral and periodontal health.

Awareness of periodontal health and consequences of periodontal diseases

One alarming issue is that periodontal diseases are deemed to be relatively 'silent' conditions, starting from the minor and often overlooked signs and symptoms, e.g. gingival redness, swelling, noticeable bleeding during brushing and halitosis, gingival recession, and tooth sensitivity, followed by tooth drifting, interdental spacing, and sensible tooth mobility. Then come chewing and speech problems, aesthetic concerns, and psychological disorders that make patients seek 'symptom-driven' dental visits and treatments in the late stage of the pathological process¹⁷. Due to limited awareness of oral/periodontal health and few demands for preventive care, patients often suffer from advanced stages of periodontal diseases. It affects their quality of life, increases their risk of developing other noncommunicable diseases, and poses a financial burden because of high treatment costs. Patients often seek to manage the consequences of severe periodontitis, e.g. severe tooth loss and edentulism, by electing to have *prosthodontic* and dental implant treatments, rather than proactively controlling the 'roots' of their problems. Therefore, it is essential for dentists to further enhance their awareness of periodontal health and actively engage in effective periodontal care through teamwork in clinical practice for optimal oral healthcare and the general well-being of their patients.

Key issues and strategies for proactive promotion of periodontal health

Periodontitis, particularly in its severe form, represents a major oral health challenge with enormous socio-economic impacts and huge healthcare costs worldwide. However, public awareness of the disease remains low. Oral healthcare should not only focus on treatment and health promotion. Disease prevention strategies need to be seriously considered and acted on. How do we tackle these long-lasting critical challenges? As highlighted in a *Lancet* editorial (2009), prevention is the key to maintaining good oral health for all¹⁸. Oral/periodontal health should be integrated with the general health agenda. Currently, the CRFA^{19,20} is a well-recognized and highly effective method and relies on inter-professional health promotion for optimal health of all people. It is therefore of profound importance to develop and adopt a global strategy of oral/periodontal health in all health policies.

In 2017, a green paper calling for global action to tackle periodontal diseases was adopted by five major international organizations in periodontology, including the European Federation of Periodontology, American Academy of Periodontology, International Academy of Periodontology, Asian Pacific Society of Periodontology, and the Ibero-Panamerican Society of Periodontics as well as 46 national societies of Periodontology¹⁵. This is the first-ever global consensus of professionals on the identification and implementation of actionable strategies for prevention (10 recommendations), diagnosis (2 approaches) and treatments (14 recommendations), in order to promote periodontal health and general health for all people. This strategy is in line with the current policies developed by the World Health Organization on the prevention and control of non-communicable diseases via the CRFA.

About the Global Periodontal Health Project

GPHP aims to achieve periodontal health by reducing the disease burden worldwide through proactively raising awareness of the impact of periodontal diseases on public health and socio-economic development and by actively engaging with oral health professionals globally. The three specific objectives are i) to increase global awareness of periodontal health to target audiences; ii) to raise the priority of periodontal health at a national level, via health promotion and disease prevention, and to provide stakeholders with the appropriate



tools to promote and advocate health; and iii) to integrate oral/periodontal health into policies addressing general health and NCDs through the CRFA.

An update and perspective on the Global Periodontal Health Project

According to the three-year (2016-2019) action plan, a number of steps have been taken through teamwork with notable deliverables, including i) the global awareness campaign among all FDI member National Dental Associations; ii) the global survey on assessing how periodontal health and care are addressed within national policy frameworks; iii) development and dissemination of specialized advocacy toolkits for periodontal health; iv) addressing periodontal health at the 2017 World Oral Health Forum; v) issuing the first-ever *White Paper on the Prevention and Management of Periodontal Diseases for Oral Health and General Health*; vi) sharing periodontal science and evidence-based approaches to effectively manage periodontal diseases at a symposium at the FDI World Dental Congress; vi) launching the practical chairside guide for dentists; and vii) initiating and drafting the first FDI Policy Statements on global periodontal health, which was adopted by the FDI General Assembly during the 2018 FDI World Dental Congress.



Presentation 2

The new classification of periodontal and peri-implant diseases

Prof. David Herrera is a full-time professor of periodontology at the Complutense University of Madrid (UCM), associated dean for clinics (UCM), co-director of the European Federation of Periodontology Graduate Program in Periodontology (UCM), and president of the Spanish Society of Periodontology (SEPA, 2013-2016).

Periodontal diseases can be divided into several sub-conditions:

Gingivitis is a superficial infection of the gum. The main warning sign is bleeding. If it is not correctly treated, it can lead to periodontitis.

Periodontitis is a profound inflammation of the gum and the other tissues supporting the tooth. It can lead to tooth loss. It may affect general health and lead to an increase in the risk of cardiovascular disease, diabetes, or adverse pregnancy outcomes.

Severe periodontitis is the 6th most frequent disease worldwide, affecting 750 million people (11.2% of the global population)².

History of classification

In 1989, the American Association of Periodontology published a relevant classification of periodontal diseases:

1. Adult (35+) periodontitis
2. Early-onset periodontitis
3. Periodontitis associated with systemic diseases
4. Necrotizing ulcerative periodontitis
5. Refractory periodontitis

In 1993, just 4 years later, the European Federation of Periodontology proposed a different classification, with only 3 categories:

- Adult (30+) periodontitis
- Early-onset periodontitis
- Necrotizing periodontitis

Remarkably, while “adulthood” starts at 35 in the US classification, it starts at 30 in the European classification.

A few years later (1999), a much more detailed classification that included gingivitis and detailed periodontitis in many more categories, was published ²¹. The main problem with this classification, which is quite complex, was the inability to differentiate between chronic and aggressive periodontitis. The age criterion was dropped.

A new classification was published earlier in 2018 as the result of a workshop organized jointly by the American Association of Periodontology and the European Federation of Periodontology, which gathered around 120 experts: 50 from each association and 20 from the rest of the world. This was the first time that peri-implant conditions were also included within the classification ²².



The new 2018 classification

CLASSIFICATION OF PERIODONTAL AND PERI-IMPLANT DISEASES AND CONDITIONS 2017										
Periodontal Diseases and Conditions										
Periodontal Health, Gingival Diseases and Conditions Chapple, Mealey, et al. 2018 Consensus Rept link Trombelli et al. 2018 Case Definitions link			Periodontitis Papapanou, Sanz et al. 2018 Consensus Rept link Jepsen, Caton et al. 2018 Consensus Rept link Tonetti, Greenwell, Kornman. 2018 Case Definitions link			Other Conditions Affecting the Periodontium Jepsen, Caton et al. 2018 Consensus Rept link Papapanou, Sanz et al. 2018 Consensus Rept link				
Periodontal Health and Gingival Health	Gingivitis: Dental Biofilm-induced	Gingival Diseases: Non-Dental Biofilm-Induced	Necrotizing Periodontal Diseases	Periodontitis	Periodontitis as a Manifestation of Systemic Disease	Systemic diseases or conditions affecting the periodontal supporting tissues	Periodontal Abscesses and Endodontic-Periodontal Lesions	Mucogingival Deformities and Conditions	Traumatic Occlusal Forces	Tooth and Prosthesis Related Factors
Peri-Implant Diseases and Conditions Berglundh, Armitage et al. 2018 Consensus Rept link										
Peri-Implant Health			Peri-Implant Mucositis			Peri-Implantitis		Peri-Implant Soft and Hard Tissue Deficiencies		

Figure 1: The new 2018 classification source: 2017 World Workshop on the Classification of Periodontal and peri-implant Diseases and Conditions²²

This new classification includes four main groups:

1. Periodontal health and gingival disease/conditions
2. Periodontitis
3. Developmental and acquired conditions and periodontal manifestations of systemic diseases
4. Peri-implant diseases and conditions.

Periodontal health and gingival diseases/conditions

For the first time, it was decided to define gingival and periodontal health, not just disease. Periodontal health was defined as follows: "Clinical gingival health is characterized by the absence of bleeding on probing, erythema and oedema, patient symptoms, and attachment and bone loss. Bone levels can range from 1.0 to 3.0 mm from the cement-enamel junction. For epidemiological purposes, gingival health is defined as <10% of bleeding sites with probing depths ≤ 3 mm".

A definition of gingivitis was also provided. It states that gingivitis can occur in healthy patients, patients who have been treated and are stable, or in patients with reduced periodontium.

A list of criteria to define gingivitis in an intact periodontium, a reduced periodontium in a healthy patient and a reduced periodontium in successfully treated stable periodontitis were developed. They slightly differ according to periodontium status.



Periodontitis

The question of chronic versus aggressive was not discussed anymore, as differentiation was problematic. Instead, stages have now been defined (Stages I to IV). Stages are defined by combining different factors. Staging captures 3 aspects: severity, complexity and extent and distribution. It is based on an approach similar to the one used for cancer. In Stage I, severity is very mild – probably unobservable and challenging to measure. Stage II is slightly more advanced. Stage III can already cause some tooth loss. Stage IV means that a lot of damage has already been caused, and the case is complex and necessitates additional measures after treatment, such as rehabilitation. Stage I refers to initial periodontitis, Stages II-III to moderate to severe periodontitis, and Stage IV to severe periodontitis with additional resources needed.

The criteria are presented as follows:

Periodontitis stage		Stage I	Stage II	Stage III	Stage IV
Severity	Interdental CAL at site of greatest loss	1 to 2 mm	3 to 4 mm	≥5 mm	≥5 mm
	Radiographic bone loss	Coronal third (<15%)	Coronal third (15% to 33%)	Extending to middle or apical third of the root	Extending to middle or apical third of the root
	Tooth loss	No tooth loss due to periodontitis		Tooth loss due to periodontitis of ≤4 teeth	Tooth loss due to periodontitis of ≥5 teeth
Complexity	Local	Maximum probing depth ≤4 mm Mostly horizontal bone loss	Maximum probing depth ≤5 mm Mostly horizontal bone loss	In addition to stage II complexity: Probing depth ≥6 mm Vertical bone loss ≥3 mm Furcation involvement Class II or III Moderate ridge defect	In addition to stage III complexity: Need for complex rehabilitation due to: Masticatory dysfunction Secondary occlusal trauma (tooth mobility degree ≥2) Severe ridge defect Bite collapse, drifting, flaring Less than 20 remaining teeth (10 opposing pairs)
		Extent and distribution			
Add to stage as descriptor		For each stage, describe extent as localized (<30% of teeth involved), generalized, or molar/incisor pattern			

Figure 2: Periodontitis Stage source: 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions²³

As a second step, grading criteria have been defined to indicate the risk of progression: Grade A indicates a low risk of progression and Grade C a high risk of progression. This gives the risk of progression in the next 5 years. Grade C resembles aggressive periodontitis. Its phenotype is defined as follows:

- Destruction exceeds expectation given biofilm deposits
- Specific clinical patterns suggestive of periods of rapid progression and/or early onset disease, for example molar incisor pattern.
- Lack of expected response to standard periodontal therapies.



The criteria are presented as follows:

Periodontitis grade			Grade A: Slow rate of progression	Grade B: Moderate rate of progression	Grade C: Rapid rate of progression
Primary criteria	Direct evidence of progression	Longitudinal data (radiographic bone loss or CAL)	Evidence of no loss over 5 years	<2 mm over 5 years	≥2 mm over 5 years
	Indirect evidence of progression	% bone loss/age	<0.25	0.25 to 1.0	>1.0
		Case phenotype	Heavy biofilm deposits with low levels of destruction	Destruction commensurate with biofilm deposits	Destruction exceeds expectation given biofilm deposits; specific clinical patterns suggestive of periods of rapid progression and/or early onset disease (e.g., molar/incisor pattern; lack of expected response to standard bacterial control therapies)
Grade modifiers	Risk factors	Smoking	Non-smoker	Smoker <10 cigarettes/day	Smoker ≥10 cigarettes/day
		Diabetes	Normoglycemic / no diagnosis of diabetes	HbA1c <7.0% in patients with diabetes	HbA1c ≥7.0% in patients with diabetes

Figure 3: Periodontitis Grade source: 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions²³

Another group focused on periodontal abscesses, as it is important to differentiate between previously existing periodontal pockets and non-periodontitis patients.

Regarding necrotizing periodontal diseases, there is a need to differentiate between chronically, severely compromised patients and temporarily and/or moderately compromised patients.

A new classification of endodontic-periodontal lesions (EPL) was also developed, differentiating between EPL with root damage and EPL without root damage.

Overall, this new classification introduces major changes to previous classification systems. Therefore, there may be a need to digest and then provide more concrete guidance. Currently, this new classification needs to be tested, and perhaps refined, as it can be complex.

Finally, work was also done on developmental/acquired condition and manifestations.

Systemic diseases and conditions affecting periodontal tissues are also categorized as follows:

i) those with predominant effects on the destruction of periodontium:

- rare diseases
 - Genetic disorders
 - Acquired immunodeficiency diseases
 - Inflammatory diseases
- common diseases/disorders
 - Noncommunicable diseases, such as diabetes mellitus



- conditions/major risk factors, e.g. smoking and obesity

ii) heterogeneous group of disorders/conditions that lead to periodontal destruction, independent of oral biofilm-induced immuno-inflammatory responses, i.e. neoplasms and other rare disorders like Langerhans cell histiocytosis

Developmental and acquired conditions and periodontal manifestations of systemic diseases

A new terminology was also adopted:

The classic term *gingival biotype* was replaced with **periodontal phenotype** (3D profile of gingival phenotype and thickness of underlying buccal alveolar bone).

Gingival recession should be appropriately categorized through careful assessment of interproximal loss of clinical attachment.

A novel classification of gingival phenotype and recession was adopted, including normal status **and different types of gingival recessions** (RT1-RT3).

With regard to occlusal trauma and excessive occlusal forces, the terminology was also adapted:

Excessive occlusal forces were renamed as **traumatic occlusal force**.

Orthodontic force was added as an item in the previous classification of occlusal trauma, which consists of primary occlusal trauma and secondary occlusal trauma.

With regard to dental prosthesis and tooth-related factors, terminology adaptations included: the commonly used term 'biological width' was replaced with **supracrestal tissue attachment** to reflect its histological nature for effective oral/periodontal care.

The previous classification (localized tooth-related factors that modify or predispose to plaque-induced gingival diseases/periodontitis) was changed to *localized tooth-related factors and localized dental prosthesis-related factors*.

Take-home message

The new classification has many positive items, but also some things that might be trickier in daily usage.

The new classification has some notable changes:

- Together with the classification of diseases and conditions, case definitions are presented, as well as recommendations for diagnosis, both in clinical and research contexts, are presented.
- Peri-implant diseases and conditions are for the first time classified, together with periodontal diseases and conditions.
- The challenging problem of differential diagnosis between chronic and aggressive periodontitis has been solved in a Solomonic way, by pooling both conditions into one: periodontitis.
- Periodontitis should be now characterized in two dimensions: stage and grade. Although the benefits of this approach can be foreseen, the complexity of dealing with staging and grading of periodontitis is going to be challenging for clinicians when first dealing with the new system. It may be suggested that scientific societies try to "digest" the new approach, to help general practitioners use the staging and grading system appropriately.

Taken together, the new classification could provide oral health professionals a useful and practical way to undertake further research and enhance patient management worldwide.



Presentation 3

Effective management of periodontal diseases: An evidence-based state-of-the-art approach – non-surgical therapy

Prof. Jörg Meyle is the head of the Department of Periodontology at the University of Giessen, Germany. He was appointed for a lifetime position in 1994. Dr Meyle is a specialist in periodontology as well as in implantology, and he received his degree in oral surgery in 1984 from the University of Tuebingen. He is the past-president of the German Society of Periodontology and the European Federation of Periodontology, current board member of the European Federation of Periodontology and International Academy of Periodontology. He received honorary memberships from the German Society of Periodontology in 2003 and the American Academy of Periodontology in 2015.

There are different effects of periodontitis. Assessing the extent and severity of the disease necessitates “brains, hands, and a periodontal probe.” Determining the extent and severity of the disease necessitates a thorough examination.

The examination often starts with screening, but often a specific diagnosis and charting system are needed to assess severity. The main role of the dentist is to determine how to stop the disease. To do so, different options co-exist: non-surgical treatment, re-evaluation, and surgical therapy are all options. Once the final examination is performed, the dentist can move to supportive periodontal care on a long-term and regular basis. Treatment of periodontitis is characterized by a constant interaction between diagnosis and treatment, a back and forth to assess the outcomes of the treatment and to decide upon next steps. Very often, the final examination is skipped. As a result, it is very difficult to precisely set up the maintenance phase and assess the risk of the patient for the future.

Anti-infective therapy – nonsurgical treatment

Non-surgical therapy was addressed during the 11th European Workshop on Periodontology: “Effective prevention of periodontal and peri-implant diseases”, which recommended that such treatment includes the following components:

- Motivation and instruction
 - Mechanical treatment
 - Supragingival cleaning and polishing (PTC)
 - Subgingival debridement
 - Manual instruments
 - Machine-driven instruments
 - + Antiseptic treatment (FMD)
 - Pocket irrigation
 - Full mouth disinfection
 - Photodynamic therapy
 - + Antibiotic treatment (FMDC)
- Full mouth decontamination
- + Probiotics

In addition, controlled studies showed that power toothbrushes produce statistically significant greater short-term (3 months) and long-term (≥ 3 months) reductions in plaque indices compared to manual toothbrushes. The same findings apply for reductions in gingival inflammation.



This information is very important when considering how to instruct and motivate a patient in order to achieve effective control of oral biofilms.

In addition, mechanical treatment also includes subgingival debridement with manual instruments or machine-driven instruments. Depending on pocket-depth, professional tooth-cleaning might not suffice.

In sites with deep pockets, several appointments with oral hygiene instructions and repeated recording of plaque indices might not result in good outcomes, leading to a feeling of frustration by the patient, dentist, and hygienist^{24,25}.

If focusing solely on supragingival cleaning, without subgingival treatment, it will be difficult for a patient to achieve a real improvement in oral hygiene measures. Individuals with a strong inflammatory response develop a lot of plaque. To achieve good results, it is therefore important to not only address supragingival sites, but also subgingival sites/niches²⁶.

Various case studies demonstrate that mechanical treatment can lead to very good long-term results. For example, a study by Badersten et al²⁷ found that non-surgical therapy was equally effective independently from initial probing depth, and that one single subgingival debridement in conjunction with further supragingival cleaning and polishing was sufficient to achieve these results.

Depending on pocket depth, however, it is not always possible to remove all plaque and calculus. Treatment may not be successful in one single session for all the sites. However, other tools can be used. For instance, the full mouth disinfection therapy has been introduced.

Full mouth disinfection (FMD)

Reducing inflammation in patients with advanced periodontitis is of great importance. However, FMD leads to a massive release of bacterial load into the body. It has been demonstrated that fever may occur in the first 24 hours after treatment. Another study showed a significant increase in C-reactive protein concentrations among patients within the first 24 hours after treatment^{28,29}. What can be done? In such cases, not only in *Actinobacillus actinomycetemcomitans*-associated infections, but also in increasing C-reactive proteins, a combination of metronidazole plus amoxicillin is a valuable adjunct to mechanical therapy. Combined treatment for seven days has shown to be effective in patients with severe periodontitis in combination with mechanical treatment³⁰.

Preliminary results from a study currently being conducted in Germany have also shown that treatment has a significant effect for people aged 55 years or less (Ehmke et al submitted 2019).

Finally, a recent paper by Graziani et al³¹ (2017) has concluded that:

- anti-infective treatment may be delivered by conventional staged or full-mouth approaches;
- systemic antibiotics are not capable of treating periodontitis as a monotherapy;
- several different combinations of systemic antibiotics may improve clinical outcomes of non-surgical periodontal therapy especially in subjects affected by aggressive, severe or “recurrent” periodontitis.

Take-home message

In addition to non-surgical treatment, it is important to supervise the patients to achieve effective daily plaque control during the healing phase. Improving a diseased site takes time, and patients should be looked after and inspected at regular intervals so that undisturbed healing can take place in order to maximize the outcomes of non-surgical treatment.



Presentation 4

Effective management of periodontal diseases: An evidence-based state-of-the-art approach – surgical therapy

Prof. Stefan Renvert is the research director at the Department of Oral Health Sciences at Kristianstad University in Sweden. He is also an honorary professor at the University of Hong Kong, at the Dublin Dental University Hospital, and at the Blekinge Institute of Technology in Karlskrona, Sweden. He is the past president of the Swedish Society of Periodontology. He has served as the president and secretary general of the European Federation of Periodontology, the scientific chairman for Europerio 5 and chairman of the Europerio 6.

Non-surgical therapy of periodontitis can be successful, as mentioned before. However, sometimes it is not enough. In this case, a surgical procedure must be envisaged. Reasons for this can be:

- conventional non-surgical therapy has not solved the problem;
- regeneration of periodontal tissues;
- access for further diagnosis in non-healing areas;
- reduction of probing pocket depth;
- root coverage.

In these cases, a choice must be made about the best-adapted surgical procedure:

- access for proper diagnosis - conventional flap surgery;
- pocket reduction - apical positioned flap or gingivectomy;
- regeneration of lost tissues – minimal invasive flap surgery;
- root coverage – connective tissue graft procedure.

Everything may work, provided that the patient complies. A prerequisite for successful periodontal therapy is that the patient performs good oral hygiene at home. If not, whatever is done will be useless. This has been documented for a very long time.

A study by Rosling et al³² (1976) assessed two groups of individuals, and they were randomized: one was given plaque-control every 14 days, and the other once a year. After 24 months, the test group had a low plaque index score, and the control group had a significantly higher plaque index score. In addition, a gain in bone fill was observed in the test group, while bone loss occurred in the control group.

Another study by Graziani et al³³ (2012) assessed the use of surgical procedures in treating intrabony defects and found that twelve months after conservative surgery:

- tooth survival was 98% (IQ: 96.77–100);
- CAL gain 1.65 mm (95% CI: 1.37–1.94; $p < 0.0001$);
- PD reduction 2.80 mm (CI: 2.43–3.18; $p < 0.0001$);
- REC increase 1.26 mm (CI: 0.94–1.49; $p < 0.0001$);
- longer follow-up showed similar findings.

Conservative surgery alone is associated with high tooth retention and improvement of periodontal clinical parameters. Hence, it can be concluded that periodontal surgery works. The question is: Can this be further improved and will graft materials and/or biological agents lead to further clinical improvements?



In a systematic review, Trombelli et al³⁴ (2002) found that CAL gain in intraosseous lesions significantly improved after the additional use of:

- coralline calcium carbonate, weighted mean difference of 0.90 mm;
- bioactive glass, weighted mean difference of 1.04 mm;
- hydroxyapatite, weighted mean difference of 1.40 mm;
- enamel matrix proteins, weighted mean difference of 1.33 mm.

A systematic review focusing on the use of enamel matrix derivative (EMD)³⁵ concluded that treatment of intra bony defects with EMD demonstrated a significant additional gain in CAL of 1.30 mm compared with open-flap debridement (OFD), EDTA, or placebo. Similarly, Graziani et al (2014) analyzed if, in subjects with periodontitis-associated suprabony defects, the adjunctive application of EMD did provide additional benefits compared to OFD alone, in terms of tooth survival, CAL gain, probing pocket depth (PPD) reduction, and gingival recession (REC) six months after surgery. They found that the benefit of EMD was³⁶:

- 1.2 mm for CAL gain [confidence interval (CI): (0.9, 1.4), $p < 0.00001$, $I^2 = 66\%$];
- 1.2 mm for the PPD reduction (CI: [0.8, 1.5], $p < 0.0001$, $I^2 = 0\%$);
- 0.5 mm for the REC increase (CI: [0.8, 0.2], $p = 0.003$, $I^2 = 0\%$).

Infections at dental implants

Implant therapy is, in general, a good treatment option, but in approximately 20% of cases, peri-implantitis occurs. Peri-implant mucositis is characterized by:

- presence of bleeding and/or suppuration on gentle probing with or without increased probing depth compared to previous examinations;
- absence of bone loss beyond crestal bone level changes resulting from initial bone remodeling.

Peri-implantitis is defined as: a plaque-associated pathological condition occurring in tissues around dental implants characterized by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone. It is characterized by:

- presence of bleeding and/or suppuration on gentle probing;
- increased probing depth compared to previous examinations;
- presence of bone loss beyond crestal bone level changes resulting from initial bone remodeling.

Take-home message

Surgical treatment of periodontitis is successful and treatment results can be maintained over decades. Nevertheless, many teeth are extracted and replaced by dental implants in the belief that this is a more predictive treatment option.

General comments

Prof. Niklaus Lang

The classification that was released in early 2018 addresses several issues that had not been discussed 17 years ago when the previous classification was developed.

- a. Health was defined. There has been a realization that within health, there are always a few bystanders of inflammatory cells. Health as the complete absence of inflammation may not exist. Therefore, it was decided to focus on the surveillance of the tissues.
- b. The classification of peri-implant diseases represents another big step forward. Before, there were many competing definitions, and now there is one that everybody can potentially agree to.



- c. The shift towards an oncology-like system (stages and grade – progression rate) is a very useful way of looking at the problem. It will help end the endless debate and uncertainty over chronic versus aggressive, which is flawed anyway (aggressive periodontitis is also a chronic inflammatory disease).

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