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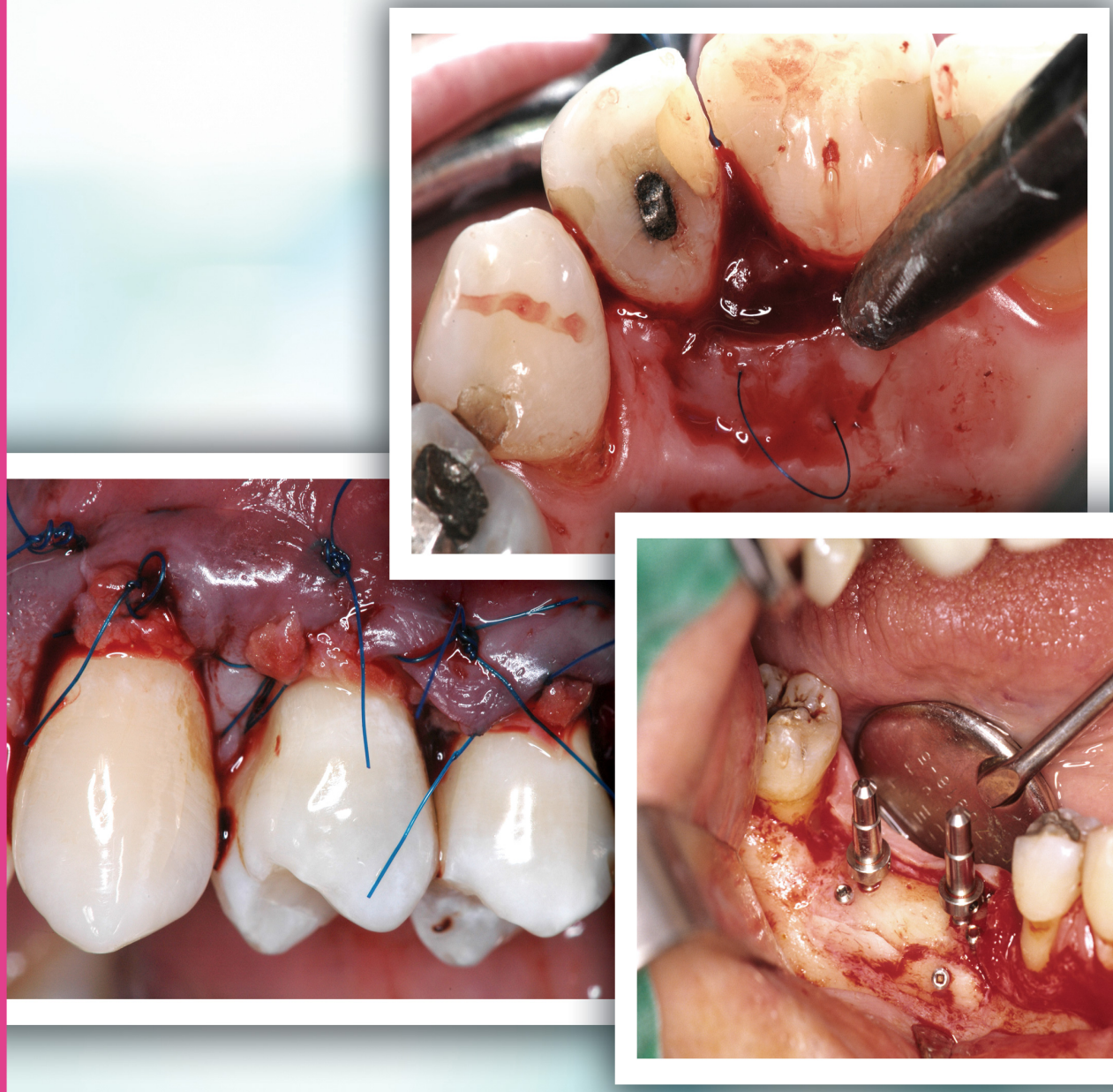
ECONOMIC PERIODONTAL AND IMPLANT DENTISTRY



Rainer Buchmann

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Economic Periodontal and Implant Dentistry

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PREFACE

Continuing education is important to the dental profession. It allows the patient to participate in medical progress, supports the economics of the practice and ensures our well-being. The dentist is an expert on oral health, comfort and esthetics. More than ever, dentistry as it is practiced today is facing innovations from practice, academics and industry. No other discipline in dental, oral and maxillofacial surgery is subject of more exciting developments than periodontal and implant dentistry. Industrial innovations, scientific discoveries and the close relationship between medicine, periodontics and implantology affect the dental approach to diagnosis and treatment planning. Due to the variety of today's treatment concepts, patients advocate a cost-benefit treatment plan with trust, transparency and safeness in realization.

The versatility of modern dentistry can be maintained only by further education and specialization of particularly committed dentists. The altered economic situation has increased the number of dental partnerships with special emphasis on profitable treatment protocols, especially implant therapy.

Current medical and dental treatment plans follow generally accepted health care standards. The health benefits of periodontal therapy encompass the control of organ-induced inflammation, the stabilization of body protection zones and the reduction of premature vascular aging. Future services in dental offices comprise the promotion of periodontal health as part of the improvement of general health, micro-incision surgery, implant therapy, cosmetic gum surgery and esthetics with ceramic restorations. Improved 3D-diagnostic care, micro-incision surgery, microscopic protocols and the use of lasers or sound preparations are supported by industry and will expand further. The initiation of biological processes with biomimetically active factors, the enamel matrix proteins, and tissue regeneration by the combination of cells, matrix and biologically active factors, the tissue engineering are advocated for specific applications. Genetically engineered growth and differentiation factors, the recombinant human BMPs, are approved in Europe and the USA for a range of orthopedic and surgical indications.

Contemporary periodontal and implant treatment require a medical approach to oral diseases. A convenient treatment duration, uncompromised healing and esthetics represent the hallmarks of today's perio-implant care. Micro-incison surgery promotes the predictability of bone and soft tissue augmentation in periodontal and implant therapy. The treatment of recession type defects by soft tissue grafts and regenerative protocols are promising offers. In the reduced dentition, implant therapy following periodontal care is challenging. Management of periodontal risk patients, bad breath and the treatment of peri-implant disease are emerging

areas requiring special management skills.

These developments fostered the idea of writing a manual primarily for dental professionals in private practice. Students needing to work through textbooks and specialists focusing on special literature may also benefit from this textbook. It makes an important contribution towards helping dental professionals to treat their patients systematically and contemporarily without need for time- and cost-intensive periodontal and implant training. There is fast growing evidence from medical health care that periodontal therapy enhances body health, followed by a prolonged survival of implant restorations.

The manual is divided into the three keystones (i) principles, (ii) diagnosis and (iii) treatment of periodontal diseases with focus on implant therapy. The fundamentals are presented as an update of university knowledge. Diagnosis and treatment are focused on clinical relevance and economics to meet the needs of the practicing dentist. Readers are provided with a comprehensive collection of expertise relevant to contemporary periodontal and implant therapy.

Key elements of the present application result from the german textbook “Patientengerechte Parodontologie”, Georg Thieme Publishers KG, Stuttgart 2011. Valuable experiences and suggestions derived from long-standing collaboration with *D.E. Lange*, Munster, Germany. *T.E. Van Dyke* and *C.N. Serhan*, Boston, USA, expanded specialized knowledge in medicine and periodontology included in this book. I am grateful to *F. Khoury*, Oslberg, and *G. Kochhan*, Düsseldorf, Germany, for their recommendations on implant therapy. With *K. Müterthies*, Gütersloh, Germany, a defensive approach to natural esthetics following periodontal care was established. I am grateful to *M. Hashmi* for her comprehensive support in the realization of this project.

CONFLICT OF INTEREST

The author confirms that author has no conflict of interest to declare for this publication.

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Declared none.

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MISSION

Periodontology is medical.

Periodontal and implant dentistry have concept.

Implant dentistry is economical.

www.rainer-buchmann.com

Working to promote periodontal health nationwide.

CHAPTER 1

Economic Periodontal and Implant Dentistry

Abstract: Advances in research, science and industry and their responsible application create the fundament for a trustful and economic relationship between dental health care providers and their patients. The dental practice is growing and ensures referrals if a qualified service follows patient needs for treatment duration, comfort and appropriate esthetic solutions.

Keywords: Benefits, Billing, Charges, Comfort, Cost-benefit, Dental clinic, Dental staff, Economics, Education, Efficacy, Esthetics, Hygiene, Implants, Inflammation, Medicine, Microincision, Predictability, Prevention, Regeneration, Service, Surgery, Training.

1.1. POTENTIAL

The increasing number of graduates from dental schools compete for economic treatment regimens that will maximize both patient's and practice's benefits [1]. However, in the past, comprehensive restorative dental therapy has lead to neglect medical and biological demands. Reasons reach back to university education, social systems and economic requirements in each country. Due to lack of health care insurance, time and unawareness of health benefits, periodontal therapy is insufficiently applied within routine daily care, or often omitted in favour of restorative or implant dentistry. Dentists are routinely familiar with the medical focus of dentistry, the variety of oral and periodontal infections and the growing necessity to implement biologic solutions into dental care. Due to growing access to web, tv and magazines, more and more young people, educated individuals and wealthy patients are willing to invest into their body and oral health either spending part of their monthly income or even taking out loans.

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1.2. VISION

Research that links medicine and dentistry is currently shifting periodontics into the scope of practice, science and industry. Advances in microbiology, immunology and healing renew our understanding about the development of periodontal diseases and their relevance in dentistry. Periodontal therapy becomes highlighted and repositioned into a new medico-dental framework. Medical knowledge and its everyday application into periodontal, restorative and implant treatment planning [2] becomes increasingly relevant, at least on a forensic basis. The dental staff is motivation trainer, health consultant and coach for oral hygiene. The results of interdisciplinary research and science promote new insights into periodontal medicine. Micro-incision techniques revolutionize our current approach to surgical therapy. Comfort, treatment duration, healing and esthetics display the attracting elements of todays periodontal and implant care. The implementation of these issues into the daily practice requires skills and a complex knowledge of anatomy, oral biology and immunology. This renewed spectrum from prevention to implant restoration and esthetics offer a basket of options and challenges for innovative periodontists and implant surgeons.

1.3. ECONOMICS

Periodontal therapy as part of general health improvement, micro-incision surgery, implant therapy, cosmetic gum surgery and esthetics are fast growing areas that advance routine and simple dental care into an interesting market place for patients, dentists and dental clinics. To reach enduring benefit, dental health care professionals should follow the logic line from health to esthetics stepwise, and handle each treatment step strigently. Controlled clinical investigations and single evidence-based studies indicate that the predictable implementation of treatment advances require a detailed microsurgical knowledge in defect anatomy and reconstruction, tissue management and healing. These are the contents of contemporary periodontal and implant education courses.

The principles of comprehensive economic periodontal and implant services (Figs. **1.1**, **1.2**) encompass the following issues:

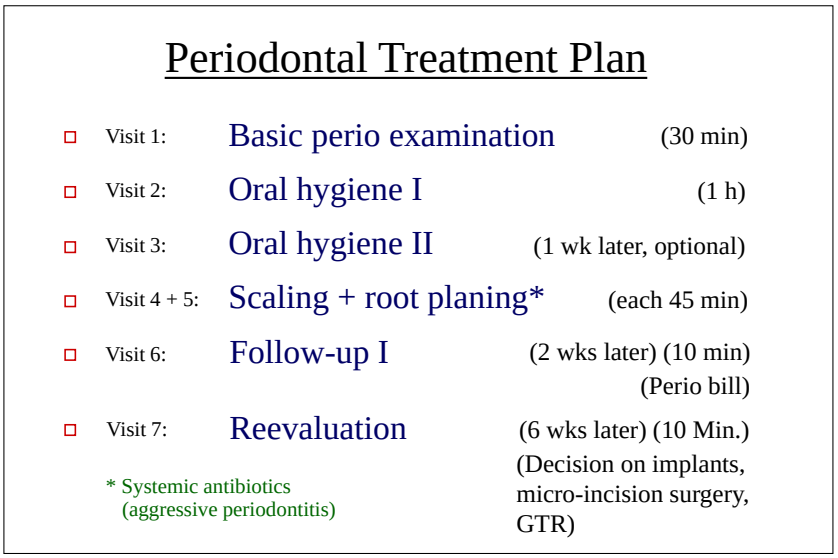

Fig. (1.1). A systematic treatment plan is the key to economic periodontal therapy.

1. **Patient Service**: Cost-benefit treatment plan.
2. **Case History**: Evaluation of relevant medical patient characteristics before, during and after treatment.
3. **Prophylaxis**: Prevention from oral hygiene, follow-up to maintenance [3], applied by dental hygiene professionals.
4. **Antiinfective Therapy**: Scaling and root planning including reduction of vascular risk factors such as diabetes, smoking, stress, oral dysfunctions *etc.*
5. **Restoration**: Defensive implant therapy with early decision-making to avoid time-, risk- and cost-intensive augmentation.

Periodontal regeneration may promote the stabilization of periodontally affected teeth. However, the treatment is (i) expensive, (ii) unpredictable in advanced clinical settings, and (iii) displays no immediate benefits adequate to patient expenses. The variable neoangiogenesis is an unknown risk factor with sustainable impact on wound healing and the outcomes of regenerative therapy. The surgical skills of dental providers and their staff require an intensive education and training. A regenerative approach can be utilized in motivated patients and single strategically important teeth. In advanced compromised

CHAPTER 2

Oral Biology

Abstract: Overall understanding of host responses is necessary if medical significance of oral infection and inflammation is to be appreciated and communicated to our patients. The aim of this education is to provide students and young dentists with the basics of periodontics from medical aspects. They will then always practice periodontal dentistry accordingly. If you want to improve your knowledge of the medical basis of today's periodontology, and provide your patients with comprehensive advice and care, the following informations about oral biology are exactly what you need.

Keywords: Attached gingiva, Biofilm, Biological width, Cellular turnover, Collagen matrix, Cytotoxity, Effector gen, Gingival sulcus, Immunglobulins, Inflammation, Innate host response, Internal sulcus epithelium, Leukocyte defect, Leukocyte migration, Lymphocyte infiltrat, Mucogingival border, Oral epithelium, Phagocytosis, Phenotype, Sharpey's fibers, Signaling molecule, Signal transduction anomaly, T- und B-lymphocyte.

2.1. INTRODUCTION

Oral biology deals with the macromorphology, biochemistry, histology and function of healthy and diseased periodontal tissue. The periodontium includes the gingiva, the periodontal ligament, the root cementum and the alveolar bone. Familiarity with these structures is essential for students and junior dentists if they are to understand the causes and dynamics of periodontal diseases, not only because of the practical need for accurate diagnosis and treatment but also because clinically relevant developments in applied periodontology are today derived from research in immune and molecular biology [1 - 4].

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2.2. ORAL CAVITY

The teeth, oral mucosa, microorganisms and saliva are components of the oral cavity. The oral cavity is a border zone between the environment and the body. It is in direct contact with the outside world, acts as a portal for the diet and is home to more than 300 microorganisms. Compared with other organs, the mouth is well equipped immunologically, by the tonsils at the tongue border, palate, pharyngeal ring and various receptors in the oral mucosa.

Note: *In the healthy mouth, there is a biological equilibrium between bacterial, viral or mechanical injury and local immune defenses. Visible damage occurs only when inflammatory reactions increase no longer be compensated by self-regulation.*

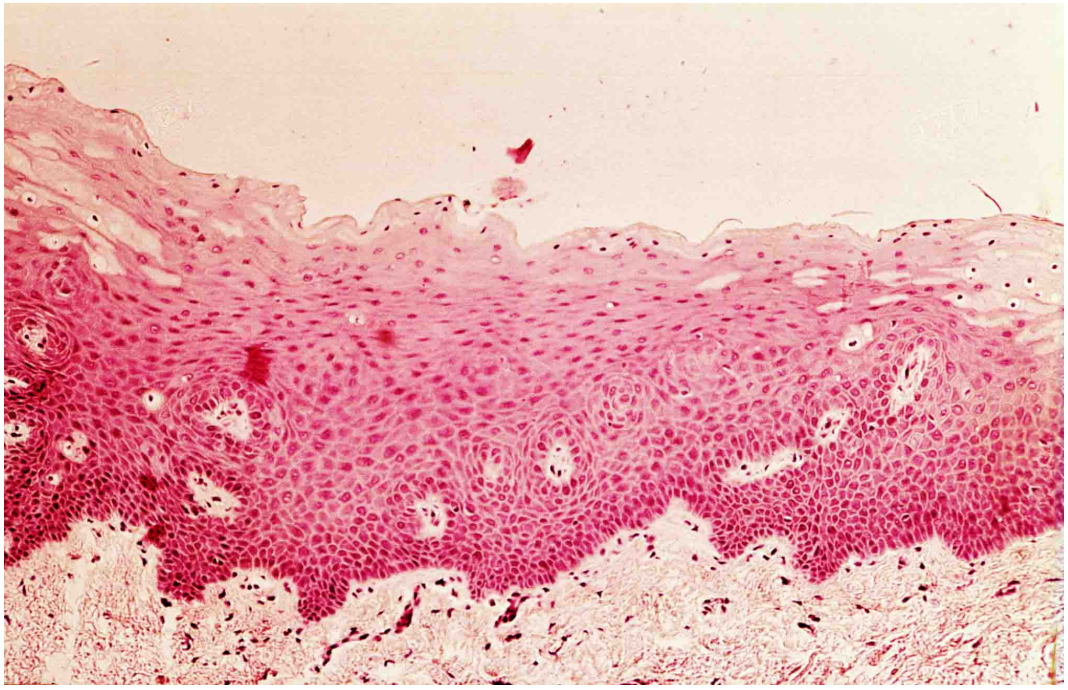

Fig. (2.1). Histological section of the oral mucosa epithelium in oral buccal mucosa.

Systemic diseases, nicotine, stress and hormonal changes can affect the immune system and also interfere with immune defenses in the mouth. This favors the development of chronic or aggressive cell reactions in the teeth, periodontal

tissues or oral mucosa (Figs. **2.1**, **2.2**).

The oral cavity is lined completely with mucosa. The thickness of the mucosal epithelium, which consists of several layers of cells, varies between 0.2 and 0.6 mm. In the regions subject to greater stress during mastication, the superficial epithelial cells become keratinized. Cells which no longer function are shed constantly into the oral cavity *via* the saliva. They are replaced by cells moving up from the deep layers of the epithelium. The top layer of the oral mucosa is replaced completely within 8 to 10 days. About 400 immune cells are present in each square millimeter of mucosa to allow prompt identification of viruses, bacteria or foreign bodies.

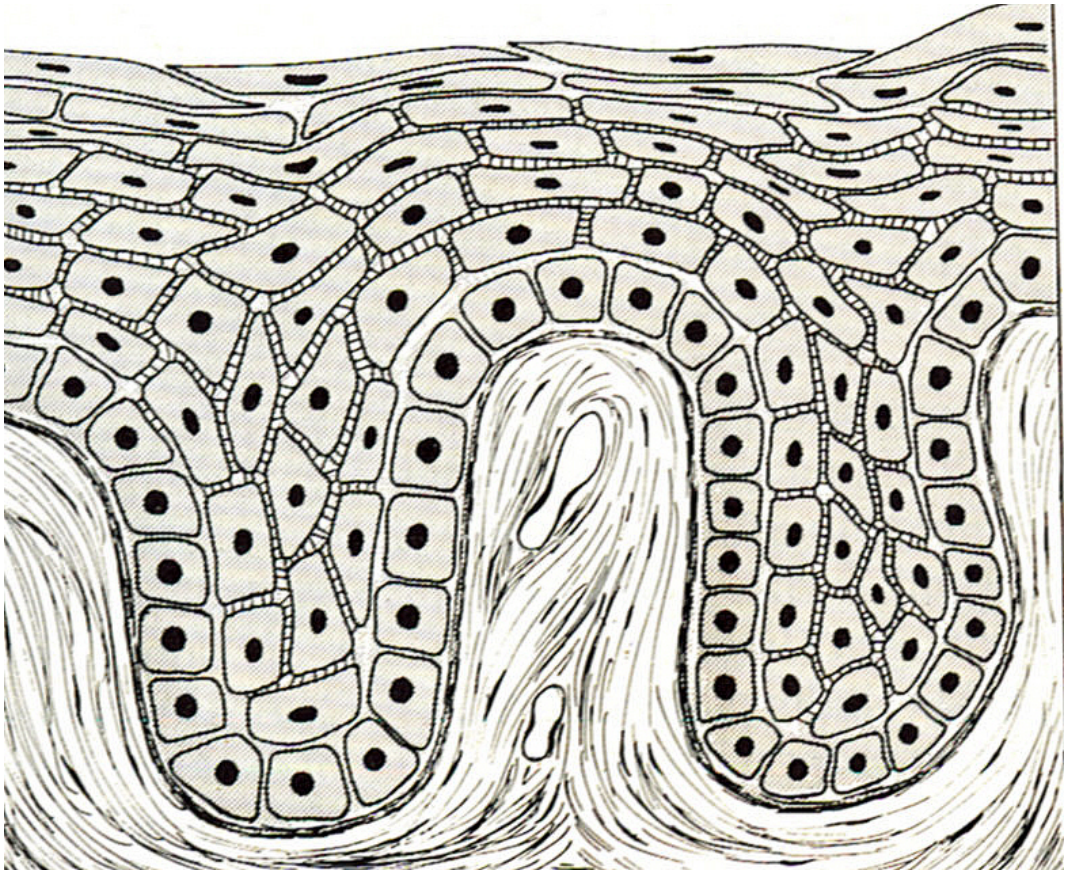

Fig. (2.2). Oral mucosal epithelium, oral buccal mucosa, schematic representation [12].

CHAPTER 3

Current Facts in Periodontology

Abstract: Periodontal dentistry represents a multi-tasked field to be realized successfully only in a collaborative team approach between dental professionals, patients and dental staff members. The enrollment of a rational periodontal treatment regimen into dental practices is a process requiring patience, sensitivity and corporate action. The dentist and dental hygienists are motivational trainer, health care consultants and coaches for prophylaxis and oral preventive therapy. You want to offer your patients an up-to-date periodontal treatment with focus on oral and body health? Then you should read this important contribution.

Keywords: *A. actinomycetemcomitans*, Aggressive periodontitis, Case history, Checklist, Chronic periodontitis, Connective tissue graft, Etiology, Hygiene, Infection control, Irrigation, Maintenance, Medication, Microbial testing, Microflora, Papilla preservation, Refractory periodontitis, Regenerative therapy, Smoking, Susceptibility, Treatment plan.

3.1. CONDITIONS IN EU, USA AND ASIA

In many dental partnerships periodontal therapy is frequency running behind implant and prosthetic care. Periodontics is not an independently organized profession to save the natural dentition or a reasonable alternative to implant dentistry in advanced clinical settings. Thus, basic patient needs preserving their own teeth are often going to be neglected. The shortcomings why an appropriate periodontal therapy is not available in dental practices are complex and summarized below:

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1. Lack of a comprehensive preventive treatment concept.
2. Lack of educated and trained dental staff employees.
3. Poor coverage of periodontal therapy in health care insurance plans.
4. Poor expected profit from periodontal therapy.
5. Lack of economic knowledge about gross profits, mixed calculations, controlling *etc*.

This is crucial both for dental professionals offering attractive treatment facilities as well as for patients needing optimal periodontal health care. This situation becomes worse since in daily practice the number of treatments for periodontal diseases is restricted due to the limited number of employed dental hygienists available in the health care market who offer periodontal therapy on a low-charge level. The needs for treatment in the EU, US and Asia are demanding and accumulate up to 80% of the entire population. Help can neither be expected from the politics, universities nor third party carriers reimbursing patient charges. A postgraduate education that exists in developed countries only provides a broad array of facilities improving periodontal therapy: From diagnostic software solutions, comfortable patient care with sonic scalers and powder jet instruments, antimicrobials, implementation of implant therapy up to teamwork and financial business lectures.

Usually, referrals of patients presenting with advanced forms of disease to a periodontist (board-certified) will be undertaken after several unsuccessful treatment trials only. Although a clinical partnership between the general dentist and the specialist is the best way to provide high-level patient care, a collaborative team approach between the general dentist and the periodontist is barely used.

The dental fees for full-mouth periodontal scaling with anesthesia range from 500 to 1000 euro. In many countries, reimbursement by insurance carriers and third party payers is unavailable or dependent on appropriate treatment plans before therapy. Since patient's insurance contracts contain co-payments and deductibles per year, patient motivation and education about the impact of healthy gums and beautiful teeth on oral and systemic health and overall quality of life must be promoted and implemented into marketing strategies of dental providers. Dependent on practice location, organization and patient's expectation, a cautious

approach is necessary to promote the agreement for co-payments. Hiring of additional dental employees is advisable. Even established dental practices do not accomplish these structural changes on their own.

Chronic periodontal disease does not cause pain. Embarking on direct-to consumer advertisement campaigns (McDonalds, Apple, AT&T) or public-relation campaigns (Wrigley Company, The National Heart Lung and Blood Institute *etc.*) striving to raise public awareness of periodontal health to achieve overall health and to promote the vital role of the periodontist in comprehensive oral care in the US had not the motivational effects anticipated. Increased communication skills, persuasiveness and educational counseling on an individual level are more useful to move patients forward to an active engagement in oral health. Only those dental professionals enforced by preventive and business skills achieve long-term success. Self-funded, product-independent advertisements in TV, on air, internet and newspapers are necessary to motivate patients. A further differentiation of health insurance benefits according to monthly fees, amount of co-payment, reimbursement schedule and personal disease risks is an additional motivator for oral prevention and helper limiting future dental restoration expenses.

Due to clearance of inflammation, stabilization of protecting biofilms and repair of underlying vascularisation, periodontal therapy exerts preventive effects on existing general diseases. An increasing appreciation of periodontal treatment in dentistry is evident. This will however not affect the reimbursement of treatment charges by third party insurances. Only direct information and payment allow the implementation of current knowledge into patient services.

Note: *A regular periodontal examination at 4 points per tooth with documentation of the records in the dental PC in each patient is recommended to early assess periodontal infections and their resulting body effects. In near future, screening and recording may become legal issues.*

The early control of periodontal bone loss in teenagers and young adults and the prevention of bacteremia and infection prophylaxis against oral pathogens in patients with general diseases is money-saving and will raise future legal, public

CHAPTER 4

Inflammation, Pain and Hygiene

Abstract: Inflammation, uncoped stress, smoking, malnutrition and lack of motion are common characteristics for chronic diseases in medicine and dentistry. Chronic diseases exert adverse effects on vascular permeability, circulation and metabolism. On a few pages, you get a comprehensive understanding of origin, course and adverse outcomes of chronic diseases to body health. Periodontal dentistry as preventive treatment complex promotes health and improves quality of life. Envisioning the future of dentistry and shaping a patient-centered care, the medical relevance is presented for periodontal and implant dentistry.

Keywords: Aging, Artherosclerosis, Biofilm, Coronary heart disease, Foreign body infection, General health, Hygiene, Hyperlipidemia, Hypertension, Inflammation, Insulin resistance, Life quality, Metabolism, Nutrition, Obesity, Oral cavity, Pain, Periodontitis, Prevention, Vascularization, Vascular permeability.

4.1. RELEVANCE OF MEDICAL KNOWLEDGE

The biological interrelationship between chronic diseases and the key factors inflammation, distress, smoking, malnutrition and lack of physical motion creates the fundament for the medical relevance of periodontal dentistry:

Inflammation: Long-term untreated inflammatory responses at various body sites lead to an accumulation of multiple edema and chronic liquid spaces (Figs. **4.1, 4.2**). They develop a burden for the host responses due to reabsorption. With aging, the body's responses decelerate according to the reduced cell turnover. Periodontal therapy is becoming increasingly important.

Biofilms: Microbial toxins and their degradation products enter directly into the

body by bacteremia and are indirectly absorbed through the intestine by resorption. Heart valves, medical implants and the not vascularized body fat as energy saver and regulator of endocrine metabolisms display anatomical vulnerabilities. Along with formation of protecting antibodies, they are susceptible to biofilm accumulation in particular. The control of biofilms reduces the potential risk.

Fig. (4.1). Patients with chronic disease conditions compensate for medical problems from aging with improved hygiene and defensive treatment.

Vascular damage: The burden of antigens, toxins, fats and reactive products of the host results in a chronic inflammation of the vascular walls (Fig. **4.3**). First, increased permeability, accumulation of perivascular liquids with subsequent circulation disorders occur. Later, deposits and counter-reactions of the vascular media create a thickening and hardening as initiators of arterial hypertension.

Note: *The value of periodontal treatment comprises the control of organ-induced inflammation with stabilization of life-essential biofilms and the reduction of premature vascular aging as a preventive medical complex to promote general health* (Figs. **4.4, 4.5**).

Fig. (4.2). Altered cellular responses within the oral tissues result in pain, discomfort and impaired quality of life.

Fig. (4.3). Increased vascular permeability facilitates the release of blood cells into the tissues causing inflammation and toxins into the blood (bacteremia).

CHAPTER 5

Systematic Diagnosis of Periodontal Diseases

Abstract: Comprehensive evaluation of periodontal diseases comprises the dental case history, the assessment of periodontal records, x-rays and the update of medical history, current medications, allergic disposition including treatment plan and preliminary charges. In advanced periodontal disease and implant planning, indepth advices for microbial testing and antibiotic treatment are presented. With the present chapter, dental practitioners and hygienists obtain a practical guide for a contemporary, patient-oriented diagnosis of periodontitis and assessment of implant placement.

Keywords: *A. actinomycetemcomitans*, Amoxicillin, Antibiotics, Bone loss, Case history, Clindamycin, Dentition, Determination, Diagnosis, Disease severity, Emergence profile, Endocarditis, Examination, Flap tension, Follow-up, Gingival phenotype, Immunosuppression, Initial therapy, Intervention, Metronidazole, Pathogen, Prediabetes, Pregnancy, Prepubertal periodontitis, Recording, Resistance, Risk, Sampling, Screening, Stroke, X-ray.

5.1. PERIODONTAL CASE HISTORY

The case history interview is always a responsibility of the dentist. Since dental patients rarely expect medical questioning, the initial consultation should be performed carefully and casually [1 - 5]. The evaluation of the periodontal history is valuable if (i) the dentist has adequate basic knowledge about the predominant general diseases of his patients, (ii) his/her expertise is demonstrated convincingly, and (iii) he/she is capable to explain the interrelationship to periodontitis mandatory. The medical issues relevant to periodontitis are summarized as questionaire below:

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1. **General diseases:**
   - Heart disease (heart rhythm abnormalities, cardiac insufficiency, valvular heart disease, endocarditis, bypass surgery).
   - Cardiovascular diseases (hypertension, arteriosclerosis).
   - Metabolic disorders (diabetes mellitus I and II, thyroid disease).
   - Joint diseases including joint replacement.
   - Infectious diseases (hepatitis A, B, C).
   - Conducted surgery.
2. **Regular medication:**
   - Hormone replacement therapy, antibiotics, cardiac drugs, antithrombotic agents, antihypertensives.
3. **Drug intolerance and allergic disposition:**
   - Penicillin, local anesthetics, iodine.
4. Previous periodontal treatment.
5. **Family history of periodontal disease** in siblings and parents
6. **Periodontal health of the spouse** (aggressive periodontitis only).
7. Smoking.
8. Individual patient complaints.

The routine assessment of the medical history requires a condensed periodontal questioning. According to periodontal disease severity, dentist's expertise and patient knowledge, 5 to 8 minutes are adequate. Thereby the dentist obtains a valuable prospect of patient's health and motivation for treatment. Fostering medical recognition and expertise promotes self-conception and patient confidence.

Note: *Periodontitis is a chronic disease of the oral cavity. On a local level, extent and severity are under survey of host cells in the gingiva, regionally by the lymphatic tissues of the tongue, tonsils and throat. Disease progression depends on patients individually varying susceptibility. A contemporary periodontal diagnosis includes the assessment of (i) existing general diseases, (ii) medications relevant to progression of periodontitis and (iii) harmful side effects. The periodontal evaluation comprises the clinical and radiographic assessment of inflammatory tissue damage and the patients awareness for disease. In aggressive periodontitis, microbial testing is advisable. Periodontal diagnosis is an inquiry*

focused on harmful medical and dental factors [6].

5.2. TRANSITION PERIOD

New patients frequently accept the medical approach gratefully. For long-standing patients, however, the reorientation is sometimes met with misunderstanding or even refusal, in particular if no periodontal therapy or only subgingival removal of calculus has previously been offered. In these situations, dentists should proceed as follows:

- Obtain information for own education and training.
- Inform patient about new developments in dentistry, with reference to print and online media.
- Promote cost-awareness among patients regarding affordable medical progress.

Due to the dentist's specialization, workload or social environment of the dental practice, individual patients may cancel appointments, move away or refrain from paying dental fees during the transition. In the long-run, the continuous reinforcement of a preventive and medically oriented periodontal treatment concept protects health care providers from frequently occurring dental burnout-syndromes. Each dentist must find an approach that is suitable for them and their patients.

5.3. PERIODONTAL RECORDING

The medically oriented periodontal anamnesis establishes a trustful relationship to the patient. According to the severity of periodontal disease, the following steps have proven effective for a systematic approach to the disease:

- **Periodontal Examination (Screening and Recording)**: Irrespective of patients' complaints, a screening with a rigid periodontal probe (PCP 11) is performed at important sites during the first visit, *i.e.* Ramfjord teeth 16, 21, 24, 36, 41, 44. In long-standing patients, the dentist knows the critical periodontal sites of their patients from preliminary examinations. For normal findings, an individual PC entry should be made using the abbreviation OPD 2–4 mm for Orienting Probing Depths measurement.
- **Initial Periodontal Status**: If the dental software contains a Perio Module, the

CHAPTER 6

Diagnosis of High Risk Periodontal Patients

Abstract: Accurate diagnosis, knowledge of treatment efficacy including limits of surgery with continuous interdisciplinary treatment exchange comprise the key factors in evaluating subjects at high periodontal risk. Premise is a logical and efficient treatment sequence based on biological fundamentals. Beside clinical and microbial parameters, patients at periodontal risk with general diseases additionally require laboratory analysis. The complete healing capacity enrolls if conventional treatment regimens with subsequent plaque control, comprehensive initial therapy, antibiotics and corrective surgery are implemented. If you want entering the borderlines of periodontics with your high risk periodontal patients, here is an overview for appropriate diagnosis.

Keywords: Betaisodona, Check-up, Chlorhexidine, Fluoridization, Furcation involvement, Gender, Genetics, Healing, Host response, Hyperplasia, Infection control, Morbus Down, Oral disinfection, Oral mucosa, Periodontal pathogens, Prognosis, Race, Risk factors, Tongue, Uncoped stress.

6.1. TREATMENT DESIGN

Like aggressive periodontitis patients that can be examined and treated successfully in dental units by specialty trained dentists, subjects with genetically periodontal risk enter the dental office routinely. These include individuals with

1. Down syndrome (trisomy 21) (Figs. **6.1**-**6.3**),
2. Diabetes mellitus type I (Figs. **6.4**, **6.5**) and
3. Idiopathic gingival hyperplasia (Figs. **6.6**-**6.9**).

Most frequently, periodontal settings can be improved sustainably. Due to time consumption, cost expenses and incalculability of prognosis, diagnosis and treatment should be conducted in specialty trained departments with an interdisci-

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plinary treatment approach. Beside clinical and microbial parameters, patients at periodontal risk with general diseases additionally require laboratory analysis. Today, medical evaluation is supported industrially by simplified home analysis of blood glucose (Glucometer, Accu-Chek) or clotting (CoaguChek®5) providing first evidence of general diseases or observing the course of disease.

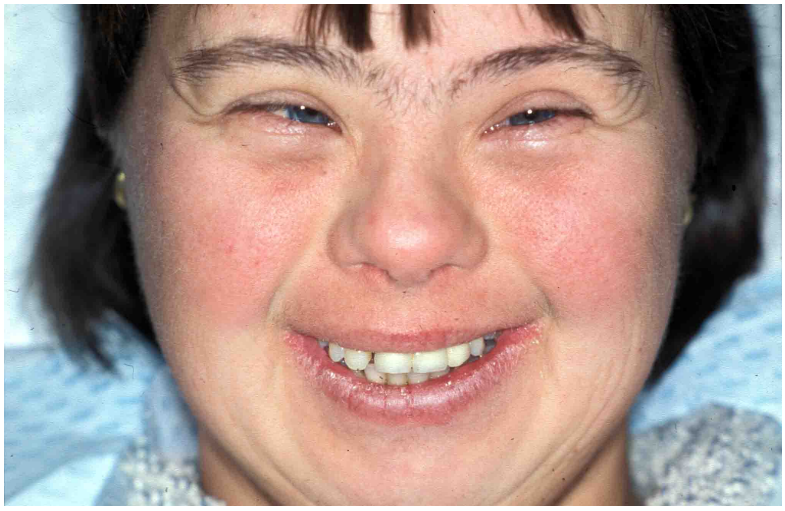

Fig. (6.1). 32-year-old hospitalized patient with Morbus Down and genetically determined severe generalized periodontal disease.

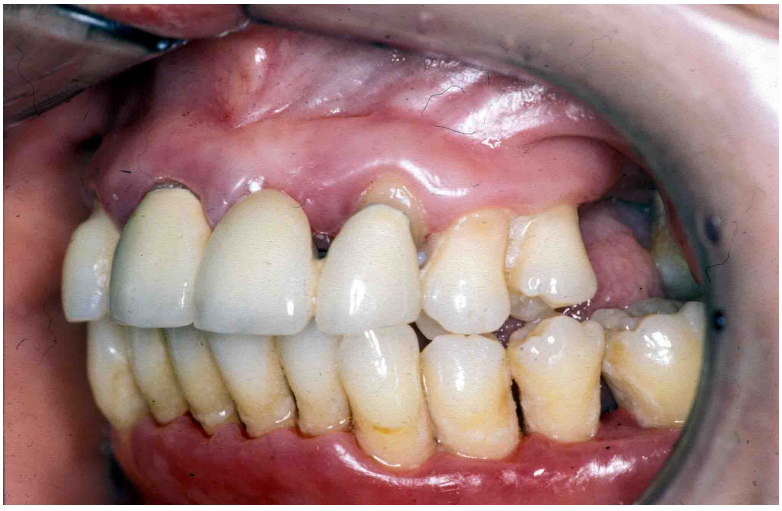

Fig. (6.2). Neglecting of intraoral cooperation and lack of home support leads to substantial disease of the periodontium that is disproportionate with the age of the patient.

Fig. (6.3). OPG setting with Morbus Down syndrome. Despite advanced degree of bone damage in relation to patient age, early tooth removal is not appropriate psychologically. Comprehensive periodontal therapy promotes persistence of the natural dentition.

Fig. (6.4). 28-year patient with uncontrollable juvenile diabetes mellitus type I. Impaired quality of life, frequent internistic check-ups and advanced staining of permanent teeth unnoticed by the physician and the patient.

CHAPTER 7

Treatment of Periodontal Diseases

Abstract: Appropriate periodontal treatment encompasses the full range from scaling and root planing, mucogingival, regenerative and esthetic surgery to implant planning, loading and adequate prosthetic restoration including establishment of front-canin--alignment. Safeguarding long-term preservation of natural teeth, detailed anatomic and surgical skills with clinical expertise are required to realizing the different periodontal treatment approaches. If you want improved safety in periodontal surgery with enhanced patient comfort and compliance, update your knowledge of tissue anatomy, vascularization and micro-surgical handling.

Keywords: Anesthesia, Appointment, Biomimetic proteins, Decision-making, Demineralization, Esthetic surgery, Expenses, function, Hypersensitivity, Medical therapy, Microsurgery, Mucogingival surgery, Natural dentition, Papilla preservation, Patient benefit, Pedicle flap, Prosthetics, Recession, Regeneration, Root dehiscence, Skill, Suturing, Treatment planning, Ultrasonic scaler, Vertical defect.

7.1. MEDICAL THERAPY

The aim of periodontal scaling and root planing, so-called medical therapy, comprises biofilm reduction from the exposed and diseased root surfaces [1 - 7]. Accessible, subgingivally located mineralized deposits (tartar) should also be removed. This must be preceded by at least 1 to 2 oral hygiene sessions by delegated skilled personnel.

Patient benefits consist of an improvement in general health, reduction of both oral malodor and acid taste resulting from inflammation, and smooth gums. Depending on severity of the disease and exposed root surfaces, temporary dentine hypersensitivity occurs that can easily be treated with fluorides (Elmex-

Gelée, Gaba GmbH, Lörrach, Germany). By remission of inflammation, little shrinkage of the gums occur below 1mm very tolerable by the patient (Figs. **7.1a-7.1f**).

Fig. (7.1a). Fortynine-year old patient with localized aggressive periodontitis, especially 31, 41. Prior to treatment: Edematous swollen gums with food impaction, acid taste at times.

The following procedure has been proven useful:

1. Surface anesthesia, then followed by local infiltration anesthesia, accompanied by intrapapillary anesthesia to achieve gingival ischemia. The periodontal gel Oraquix does not attain sufficient anesthesia.
2. In the apparent upper third pocket, cautious use of ultrasonic scalers (magnetostrictive/piezoelectric). Lower frequency range of 25,000 Hz to avoid heat damage and demineralization of the root dentine.
3. Persistent local deposits should be visually or tactilely identified and removed with hand instruments. For better overview, pockets are repeatedly rinsed with 0.9% sodium chloride (Figs. **7.2-7.9**).
4. Follow-up appointments are subjected to local debridement and subgingival irrigation of residual pockets [8].

Fig. (7.1b). Proper compliance, dental treatment conducted, myofunctional disorder (grinding: incisors, canines).

Fig. (7.1c). Soft tissue damage with severe bone loss 31.

CHAPTER 8

Treatment of High Risk Periodontal Patients

Abstract: High-risk periodontal patients respond susceptible to inflammation with the risk-determining factors occurring on a molecular level that cannot be altered. Successful therapy of periodontal risk patients requires medical assessment of clinical, microbial and immunological laboratory parameters including regular maintenance. High-risk patients are incorporated into a comprehensive medical and dental treatment plan with focus on preventive planning. If you need informations about treatment solutions for patients at medical or periodontal risk, if you want to advise your patients more comprehensively or simply want to refer your patients with more expertise and knowledge, then read on.

Keywords: Arachidonic acid, Betamethasone valerate, Chlorhexidine varnish, Client-centered, Collagenase, Copayment, Doxycyclin, Family members, Glycation, Halitosis, Hyperresponse, Immunomodulation, Leukocytes, Liability, Management, Oral dryness, Periostat, Priming, Prostaglandins, Snoring, Susceptibility, True risk factor.

8.1. PATIENT MANAGEMENT

In the dental office, risk patients afford cost, time and personnel invest and expenses that become hardly payed off economically. High-risk periodontal clients require:

1. Comprehensive medical diagnosis and information by the dentist.
2. Cautious treatment planning (doctor plus dental staff).
3. Long-term maintenance (doctor plus hygienists).

If you harbor knowledge of risk etiology and are familiar with the treatment regimen of risk patients, they become quickly identified and implemented into the

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practice work flow. Since the number of patients being treated **not client-centered** is increasing, you benefit from (i) a better reputation, (ii) additional referrals and (iii) growing income.

Note: *Treatment Regimen of High-Risk Patients.*

1. High-risk periodontal patients respond susceptible (early) to inflammation [1 - 8]. These interrelationships should be transferred to the patient at the first appointment.
2. Risk-determining effects occur on a molecular level and cannot be altered. Thus, a medically and defensively treatment approach is advisable, in contrast to normal patients.
3. Following medical therapy (SRP), high-risk patients remain susceptible. This requires regular maintenance from trained dental staff to minimize costs.

Fig. (8.1a). Medically high-risk patients with general diseases require defensive biologically-centered periodontal care (SRP) avoiding high-tech solutions. This is also mandatory for high-risk periodontal patients.

The case series in Figs. (**8.1a-8.1f**) displays a 65-year-old high-risk patient with multiple general diseases like fibromyalgia, Morbus Behcet, lupus erythematodes, lichen simplex and rosacea. The effects of the diseases on gingiva and alveolar bone permit initial periodontal therapy, solely. Due to the innate hyper responses (increased susceptibility), endodontic, implant and prosthetic dental care is

restricted to basic therapy. If mucous membranes are exposed, the following medication is advised for symptomatic therapy:

Rp. Betamethasonium valeranicum 0.02 g
Vitamin A palmitate 0.01 g
Candio Hermal Oral Gel ad 20.0 g

Fig. (8.1b). Gingival hyper responses invisible at natural teeth. Additional prosthetics aggravate innate responses to clinically apparent hyperplasia.

Fig. (8.1c). Following adequate prosthetics, soft tissue hyper responses prevail impeding patients reassurance.

CHAPTER 9

Economic Periodontal Therapy

Abstract: In the growing global health market, periodontal dentistry is subject to constant change. Special techniques with reduced treatment duration are emerging. Customers are becoming increasingly attracted to periodontal therapy if both economics and individual expectations for health, comfort and well-being are implemented into treatment planning. If you are you looking for a clinical guide to economic periodontal therapy with resulting charges, this chapter promotes your ideas and foster your skills. Please also read between lines.

Keywords: Billing, Blood count, Bone loss, Ceramics, Commitment, Confidence, Expertise, Furcation-involvement, General diseases, Health market, Indication, Knowledge, Marketing, Medical therapy, Microsurgery, Profit center, Scar formation, Tooth removal, Treatment fee, Tunnel technique.

9.1. PERIODONTAL TREATMENT PLAN

In focus of practice, science and industry, periodontal dentistry moves straightly towards general medicine. Application of medically relevant knowledge in everyday dental practice is becoming more and more important. Dental office staff members are motivation trainer, health care advisors and prophylaxis coaches for the clients, simultaneously. The mission is to maintain oral and body health providing defensive care.

Developments in clinical periodontology occur in 4 key areas:

1. Medical therapy (SRP) as defensive treatment protocol for oral health [1].
2. Regenerative surgery to preserve the natural dentition and ease oral hygiene.
3. Mucogingival and plastic periodontal surgery to treating exposed root surfaces and gingival dehiscencies following orthodontic protrusion.

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4. Adhesive bonding or ceramic restorations to close interdental bony defects meeting esthetic patient demands.

The implementation of patient-centered care into treatment planning is a major task of up-to-date dentistry, and self-evident for today's dental health care providers. It requires education and engagement, entailing variety into daily routine. The net effects on patients' expectations and onto the future of dental clinics vary and are difficult to calculate.

Note: *New technologies relate to less than 5 percent of all treatment regimens* [2 - 5]. *Prior to learning detailed knowledge in surgical defect restoration, tissue management and healing, it is mandatory - as in medicine - to acquire long-term expertise, promote knowledge and adhere to indications. There are numerous evidence-based trials on clinical decision-making in periodontology. In the dental office, selection of appropriate treatment regimen is subject to social and economic and factors.*

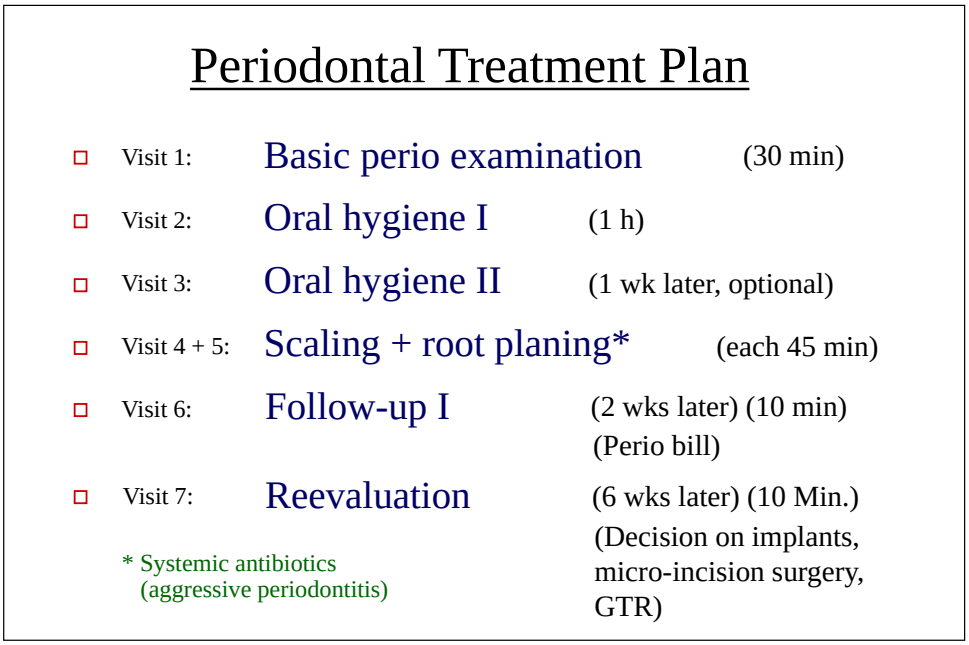

Fig. (9.1). An organized treatment protocol with adherence to response and healing times offers best guarantees of treatment success and client retention.

If a comprehensive periodontal treatment plan is provided, patients expect treatment safety and reliability as key dental services. To attain a confident relationsship to the patient and promote personal treatment skills, knowledge of following 3 keystones is recommendable:

A. Appropriate Treatment Planning: A thorough organization of the treatment plan with cost awareness of each visit is required. Advantages and disadvantages should be explained to the patient, otherwise he feels inadequately advised. If specialist referral is intended, the dentist should point out treatment fees to inform the patient correctly (Figs. **9.1, 9.2**).

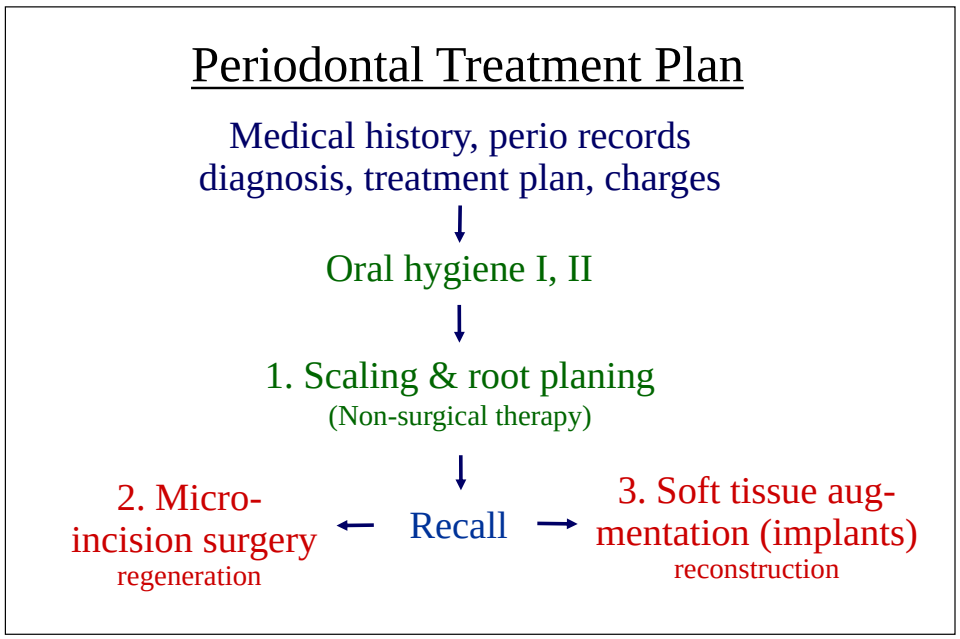

Fig. (9.2). Periodontal therapy comprises careful medical treatment. After 6 weeks, periodontal settings are reevaluated. Thereafter, microsurgical and esthetic therapy is conducted.

B. True Indications for:

1. **Oral Hygiene (Phase I)**: Oral hygiene therapy in preparation for SRP differs substantially from professional teeth cleaning. This effects implementation, time and expenses. Oral hygiene prior to root debridement is more complex and expensive.

CHAPTER 10

Esthetic Periodontal Surgery

Abstract: Defensive management, tissue quality and vascularization represent the fundamentals of successful esthetic and regenerative therapy. Key steps comprise split-flap techniques, connective tissue graft surgery and micro-suturing. The following factors involved in the tissue care concept should be carefully adjusted to each other: Lack of inflammation, perfusion, tissue volume, tissue stability and tissue fixation. If you already have experiences in micro-incision flap surgery and need a better knowledge and skills for soft tissue plastic surgery, then read on and explore your needs to improving minimal access surgery.

Keywords: Ceramics, Connective tissue, Dental implants, Dental technician, Documentation, Gingival phenotype, Naturalness, Perfusion, Periointegration, Photo, Plastic surgery, Prosthetics, Reputation, Restoration, Safeness, Stability, Surgical access, Tissue care, Vascularization, Volume.

10.1. MEDICAL RELEVANCE

Plastic surgery requires talent, long-term surgical expertise and responsibility. Plastic surgeons enjoy high reputation among the population. As in medicine, results of esthetic periodontal surgery display a high variety due to the large number of factors involved in surgical soft tissue management, in contrast to bone surgery. The following key factors significantly increase treatment success:

a. Oral: direct surgical access, solid bone, collagen-rich gingival phenotype, vascularization, lack of scar formation and dysfunctions.
b. Body: lack of general diseases, *i.e.* organ transplantation, tumor diseases, HIV, diabetes mellitus or medications such as cortisone, immune suppression or altered coagulation status.

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Since these conditions rarely apply at all once, results of esthetic surgery always display a compromise of biological feasibilities, especially in tissue reconstruction. Poorly vascularized, elastical, thin connective tissue frequently requires follow-up surgery to volume rebuilding or tissue repositioning after 2-5 years due to innate tissue instability. Case prognoses remain uncertain with limited predictability. Patient age, general diseases, dysfunctions and the regenerative potential of the tissues involved affect treatment result as medically relevant factors [1 - 3]. Prior to plastic surgery, periodontal health should have been accomplished according to treatment plan, (Fig. **10.1**).

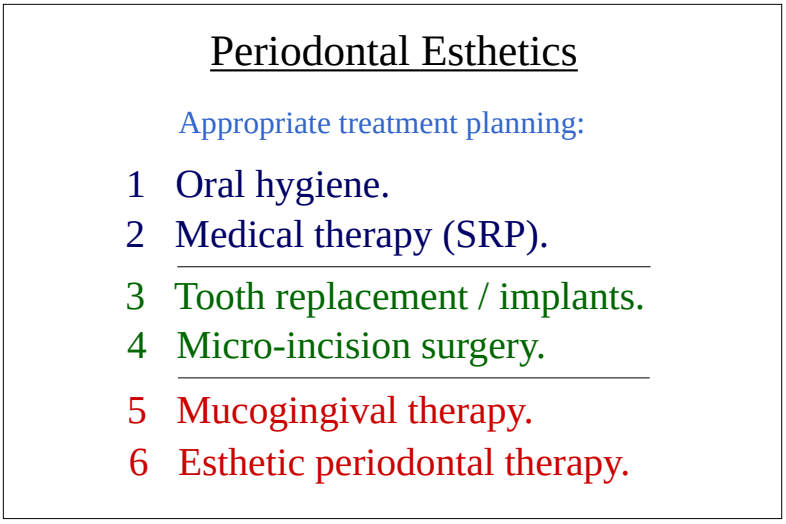

Fig. (10.1). Adherence to treatment logistics following modules 1 to 6 offers the fundament for successful esthetic therapy.

10.2. PLASTIC SURGERY

Following prosthetic restoration, life quality frequently improves, and patients develop demands for natural appearance. Plastic surgical results in:

a. Increased authenticity.
b. Naturalness of person's presence (speaking, smiling *etc.*), and
c. Ease of contact with other people.

Note: *Patient information in plastic periodontal surgery comprise communicating*

about treatment options, guiding expectations towards treatment feasibility and explaining treatment expenses. Undue expectations must be downsized to realistic levels. Dentists ought to have detailed knowledge of oral biology, tissue quality, vascularization and skills in soft-tissue surgery (split-flap technique, tissue mobilization, suturing etc.). Prior to surgery, a dental technician should be involved if additional ceramics are needed to achieve optimal esthetics.

10.3. PERIODONTICS AND ESTHETICS

Esthetic periodontal therapy restores the gingival emergence profile. Patients rarely ask for these treatments. Casts models and photo documentation are forensically indispensible. Advanced mucogingival damage with thin alveolar bone, gingival phenotype II, reduced vascularization and high proportion of elastic fibers should be palliatively treated (Fig. **10.2**).

Fig. (10.2). Advanced skeletal disorders with gingival phenotype II should be subjected to palliative treatment.

a. Functional defects: Mild dehiscences, *i.e.* mucogingival damage by frenulum, is resolved by dissection or laser separation (Phase I, Figs. **10.3**, **10.4**). In the second step, a bilateral rotated pedicle flap may be applied, supplemented by connective tissue graft (CTG) to achieve gingival volume, if necessary (Phase II).

CHAPTER 11

Natural Esthetics

Abstract: Esthetics are always natural and minimal. Integration of natural esthetics into dental routine requires commitment and empathy with the customers in an individual treatment environment. Leaving natural enamel improves cementing characteristics and supports natural enamel coloring. Please follow patient expectations, and apply predictable defensive treatment regimens instead of surgery when covering interdental dark spots. Read on and find out what is important.

Keywords: Authenticity, Biological width, Bonding, Ceramic additionals, Chips, Composites, Cover profile, Defensiveness, Durability, Enamel, Human nature, Integration, Interapproximal contact, Interdental spots, Mutual acknowledgement, Natural appearance, Supragingival preparation.

11.1. NATURALNESS AND DEFENSIVE THERAPY

Esthetic periodontal therapy rank from regeneration of intraalveolar bony defects and microsurgical compensation of functional and esthetic disorders to plastic periodontal surgery to covering exposed root surfaces. These treatments suggested by the dentist do not meet consent with the patient since they are surgically and expensive with minor predictability, particularly in advanced disease settings.

Realizing natural esthetics, authenticity towards the patient is increased if:

1. the dentist and his team are esthetically exemplary, *i.e.* have good-looking teeth.
2. interdental dark spots occurring after medical therapy are remedied with ceramic additionals, chips or composites using adhesive bonding techniques to omit surgery.

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3. natural appearance is created with striking crowns and distinct margins as fully ceramic restorations without dark metal shadows, especially in incisors and canines.

Note: *According to plastic surgery in medicine, prognosis of plastic periodontal surgery to compensate for soft tissue volume lack is difficult to calculate. In particular, advanced periodontal damage cannot be treated by regenerative protocols. If you follow patient expectations, defensive treatment approaches for esthetic coverage of open interproximal spacings is preferable to surgery. In dental routine, surgery can be avoided by skillful adhesive bonding of ceramic chips to cover esthetically interfering dark interdental areas* [1].

11.2. PATIENT BENEFITS

Customer advantages of esthetic soft tissue treatment with adhesive bonding techniques are obvious. They consist of

a. a defensive, low-stress treatment regimen.
b. the high treatment predictability.
c. a timely conceivable solution.
d. and manageable expenses.

Incisors, canines and premolars: In young patients, small interdental spacing within the natural dentition and missing structural disorders, torsions, caries *etc*. should be at first adhesively covered with composite restorations. Treatment success is frequently limited due to different long-term dimensional changes of composites and enamel. The following case series presents a 43-year-old patient with small shaped maxillary incisors, weak visual expression, interdental incisal spacing ≥ 2 mm, inappropriate length-width proportion, inadequate size related to mandibular incisors, interdental shading and immature enamel. The client decided for a ceramic restoration with additional veneers and chips. The practical procedure is presented step by step in the sequence of (Figs. **11.1-11.23**).

Biologically important key treatment issues are **i**. leaving enamel (chameleon effect), **ii**. clinical crown displacement (additional veneer technique), **iii**. imitation of natural appearance (structure), and **iv**. flat shaped interdental contact zones

(picket fence).

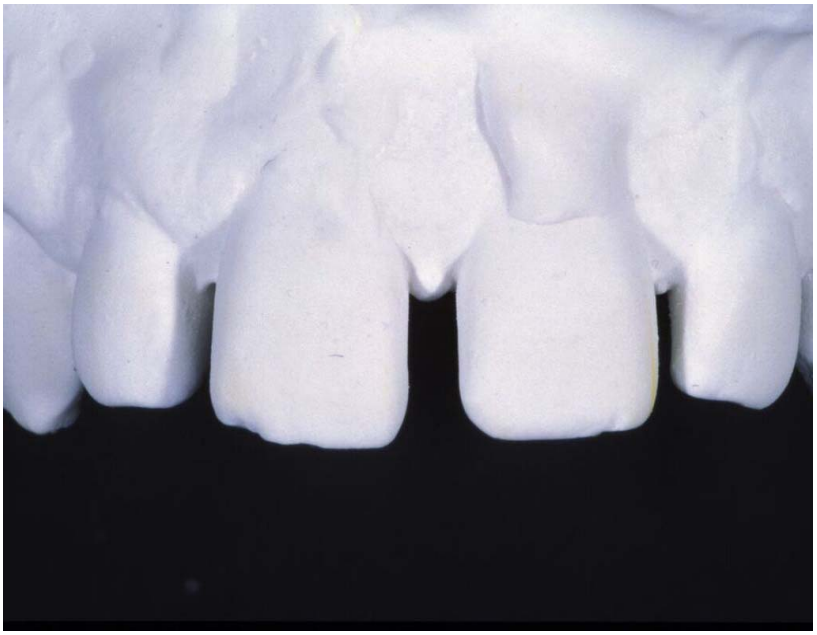

Fig. (11.1). Open interdental dark spots. Due to the transversal distance of 2 mm, esthetic improvement is achieved by combined orthodontic therapy and subsequent treatment with adhesive bondings or ceramics. Cast model prior to orthodontic therapy.

Fig. (11.2). The wax-up displays maximal resolution of the black spots after bi-maxillary segment modeling.

CHAPTER 12

General Diseases and Periodontal Therapy

Abstract: Current evidence-based studies describe a variety of medically relevant interactions that directly affect dental health care. Among all associations, the focus inflammation has the strongest impact on advanced periodontal diseases. If you want to inform your patients with medical expertise and reasonable advices for treatment planning with medical background, then update your knowledge and improve medical awareness. The present interdisciplinary treatment regimen is waiting for you.

Keywords: Blood count, Blood-placenta barrier, Cholesterol, Chronic disease, Coping, Diabetes mellitus, Gender-effects, Inflammation, Ischemia, Low birth weight, Metabolic syndrome, Microbial toxins, Obesity, Online marketplace, Overweight, Premature birth, Severe periodontitis, Stress, Stroke, Transischemic attack, Treatment needs.

12.1. MEDICAL KNOWLEGDE

An increasing number of patients are using online marketplaces for dental services, advisory services of regional dental authorities (2nd opinion model) or other rating media to compare pricing, treatment plans or treatment alternatives. Hurried, sales-driven dental services cause loss of trust in oral health care providers since they neglect the following 5 key factors of patient expectations:

1. **Benefit**: Advantages compared to other treatment regimens.
2. **Expenses**: Current patient needs, otherwise overtreatment.
3. **Body**: Patient expectations for comprehensive information and advice.
4. **Empathy**: Compassion for patient's personal life circumstances.
5. **Medicine**: Biologically relevant treatment factors [1 - 4].

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In addition to clinical expertise, additional core competences are required to inform the patient about his individual treatment needs and explain a comprehensive treatment plan understandable, compassionate and need-specific.

12.2. INFLAMMATION AND CHRONIC DISEASES

Healthy customers without general diseases are convenient to treat in dental routine since they are medically undemanding and somewhat clueless. As soon as patients acquire diseases and ask for dental treatment, the following rules apply:

a. **Diseased patients**: The impact of inflammation upon progression of chronic diseases is apparent. Due to patient's awareness, patients are motivated, but frequently not solvent.
b. **Normal Patients**: Usually, they present poor knowledge of medicine. Medical expertise of dental health care providers facilitates the dialog and establishes both medical authority and empathy. The dentist's personal knowledge and medical experience from family, relatives and friends regarding
   - stress management
   - cardiovascular management
   - prevention of stroke
   - overweight
   - pregnancy, premature birth, low birth weight, and
   - diabetes

supplement dental anamnesis, treatment information and annual follow-up visits.

12.3. COPING WITH STRESS

Due to the adverse effects of distress, advanced periodontal diseases undergo disease progression with chronic exacerbations in analogy to medicine. Periodontal patients who manage strains problem-focused experience low effects of vasoconstriction or reduced oxygen supply. If stress is poorly managed, emotional-focued or deferred, inflammatory periodontal disease progression occur. Prior to changes achieve clinical notice, odds ratios must exceed ≥ 10 revealing these effects are latent and of subclinical nature (Fig. **12.1**).

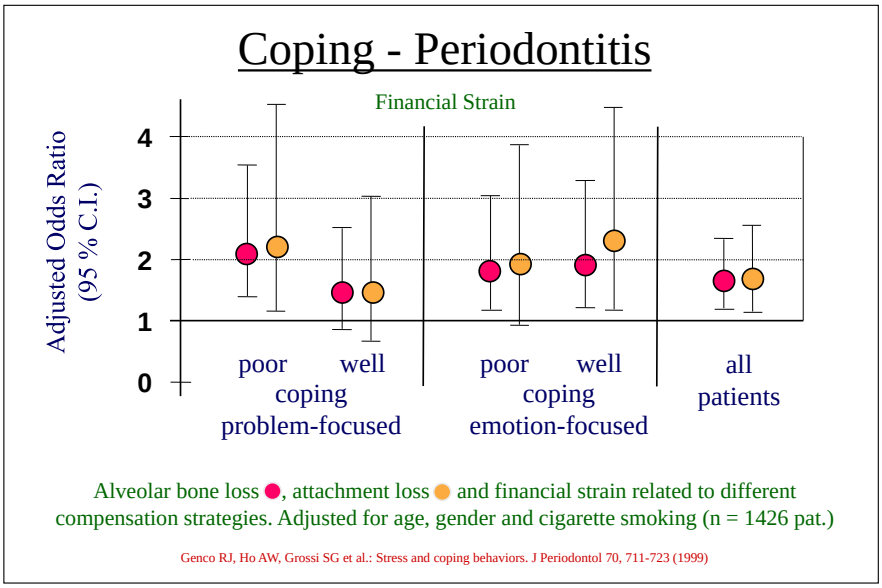

Fig. (12.1). Patients coping stress problem-focused suffer less from vasoconstriction, reduced oxygen supply and associated risks. If financial strains are emotion-focused, further inflammatory breakdown occurs. The effects displayed by odds ratio (OR) are latent and subclinical.

Effect of Age, Infection, Lifestyle and Stress on Periodontal Diseases

Parameter	Odds ratio	95 % C.I.
Age 65 - 74	11.21	7.39 – 17.02
Heavy smoker > 20 cig./day	4.74	3.34 – 6.73
Age 55 - 64	4.18	2.80 – 6.24
Smoker 10 - 20 cig./day	3.08	2.17 – 4.37
Age 45 - 54	3.07	2.08 – 4.54
T. forsythia	2.51	1.93 – 3.27
Diabetes	2.36	1.28 – 4.35
Social smoker < 10 cig./day	2.20	1.59 – 3.05

1.426 patients, 25 - 74 years, caucasians, Buffalo, USA

Genco RJ, Ho AW, Grossi SG et al.: Stress and coping behaviors. J Periodontol 70, 711-723 (1999)

Fig. (12.2). Stress as possible risk factor for periodontal diseases is less important than the effects of true risk factors age, smoking, oral hygiene or pathogen load.

CHAPTER 13

Periodontics Meet Implant Dentistry

Abstract: Preservation of natural teeth is the primary goal of dentistry. In severe periodontal settings, knowledge of patient expectations, case prognosis, properly diagnostic and surgical skills with delegation of basic services to dental hygienists are the key elements of long-term implant success. Implant dentistry in advanced periodontitis requires a 2 step, time-tested approach evaluating the outcomes of basic periodontal therapy prior to implant placement.

Keywords: Comfort, Decision, First molar, Fixed bridgeworks, Functional loading, Implant bone, Improvement, Interface, On-time, Periodontitis, Prognosis, Protection, Short implants, Sinus elevation, Time-tested, Tissue stability, Tooth survival, Treatment outcomes, Vascular stabilization, Volume enlargement.

13.1. IMPLANTS *VERSUS* PERIODONTALLY AFFECTED TEETH

Survival rates of teeth with severe periodontal diseases published in evidence-based trials cannot be applied to patients inquiring routine dental care (Fig. **13.1**).

General disorders, oral dysfunctions, stress, smoking, shortcomings in oral hygiene and lack in supportive care *etc*. abbreviate the function period of periodontally compromised teeth sustainably [1 - 4].

In advanced periodontitis in the maxilla, the advice to replace affected teeth with implants implicates early patient information of second and third molar removal: Implant placement and fixed bridgeworks are scheduled in the functional masticatory area until to the first molar. In the mandible, second molars can be preserved due to their beneficial root anatomy. They should be restored, but not included into implant planning. Following removal of the first molar in the

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maxilla with supporting bone less than 4 mm, implant therapy is often preceded or accompanied by simultaneous sinus elevation. The implant treatment plan in periodontally compromised patients results in a reduced dentition (Fig. **13.2**):

- Fixed bridgeworks in the maxilla and mandible up to the first molar.
- Maxilla: preservation of premolars and first molars. In furcation involvement level III, tooth removal and implant therapy with sinus floor elevation (Fig. **13.3**).
- Mandible: preservation of second molars, restoration, no inclusion into bridgeworks.
- Volume enlargement with free autogenous gingival grafts to enlarge initial small biotype settings (Fig. **13.4**).
- Short and diameter reduced implants in esthetically and functionally less demanding situations as alternative to surgical augmentation (Fig. **13.5**).

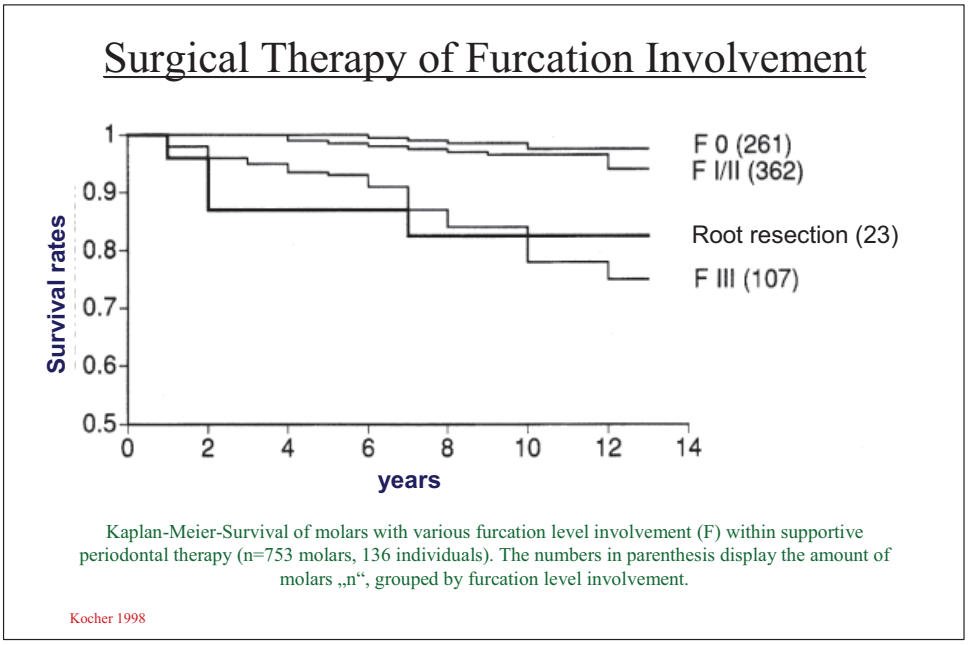

Fig. (13.1). Unexpected life-events halfcut the survival rates of teeth with advanced periodontal bone loss in daily practice down to 5 to 7 years.

Perio meets Implant Dentistry

- Fixed bridgeworks (maxilla, mandible) to 1. molar.
- Maxilla: on-time removal of 2. and 3. molars.
  preservation of 1. molar. In furcation involvement level III implant placement with sinus floor grafting.
- Mandible: preservation of 2. molars, no inclusion into bridgeworks.
- Volume enlargement with free gingival grafts.
- Short implants in functionally and esthetically less demanding settings.

Fig. (13.2). Guidelines to a safe implant treatment protocol in advanced periodontal disease.

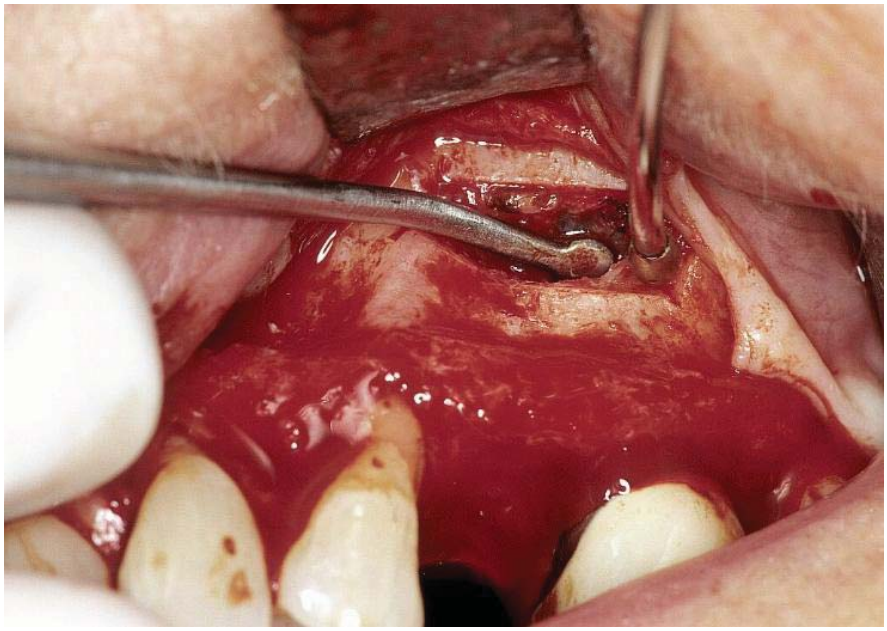

Fig. (13.3). Piezosurgical access to the lateral sinus is an appropriate approach to promote implant supported bone in the maxilla. Short implants are not advocated, internal lifts technique-sensitive.

CHAPTER 14

Implant Planning

Abstract: Implants are becoming increasingly popular with low-cost offers promoting this development. The number of customers preferring implants to customary restorations is expanding. The variety of client demands, individual settings, treatment options and risks related to inflammation and bone damage following implant treatment advocate evident, comprehensible and durable solutions. Safeguarding implant treatment includes careful tooth removal, pre-implant treatment and defensive implant planning respecting oral tissues, function and health.

Keywords: Anatomy, Augmentation, Craniocaudal function, Digital imaging, Dues, Dysfunction, Function, Gingival enlargement, Gingival thickening, Habit, Homeostasis, Implant planning, Inflammation, Mastication, Microsurgery, Mucositis, Muscles, Oral comfort, Osteopathy, Perfusion, Periimplant tissue, Periimplantitis, Preimplant treatment, Relaxation, Success, Surgical revision.

14.1. EARLY DECISION MAKING

Safeguarding implant treatment commences with careful tooth removal, pre-implant treatment and implant planning respecting 4 key issues:

1. Early decision making to ensure implant bone support with limited number of implant placements.
2. Sound tooth removal to protect bone loss by intraalveolar root dissection.
3. Accuracy of implant diagnosis and implant placement by 3D-visualization (DVT) of implant surgical access.
4. Minimal surgical involvement with short and low diameter implants while restricting augmentation to prosthetic relevant settings.

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Early implant decision making comprises anatomical, functional and economic issues:

a. **Anatomy**: Treated severe periodontitis usually displays clinical stability with further drawbacks around implant supported bone at buccal plates or interproximal sites by inflammation (Figs. **14.1, 14.2**) [1].
b. **Function**: Following untreated periodontal diseases or tooth removal, shifting of a single tooth initiates due to myofunctional imbalance. By loss of front-canine equilibration, a group side shift emerges with further bite reduction as result of age and misusage [2].
c. **Dues**: Periodontal therapy of severely compromised teeth with bone loss > 50% often results in a later date implant treatment that doubles dental efforts and bills. Economic issues should downregulate this strategy.
d. **Oral comfort**: Stability, oral hygiene and esthetics become fostered by timely implant placement and optimized implant prosthetics.

Fig. (14.1). Severe periodontitis, residual inflammation and bacteremia. Poor hygienic capability, comfort and esthetics with furcation caries.

Clinical practice emphasis a time-tested planning with (i) removal of severely compromised teeth, (ii) periodontal therapy securing the residual dentition, supplemented by (iii) microsurgical revision of deep intrabony pockets prior to

implant placement to safeguard inflammation (Figs. **14.3, 14.4**). Implant planning resides tentatively. A final quotation will be drawn after completion of functional relief and 3D digital evaluation of the implant bone anatomy.

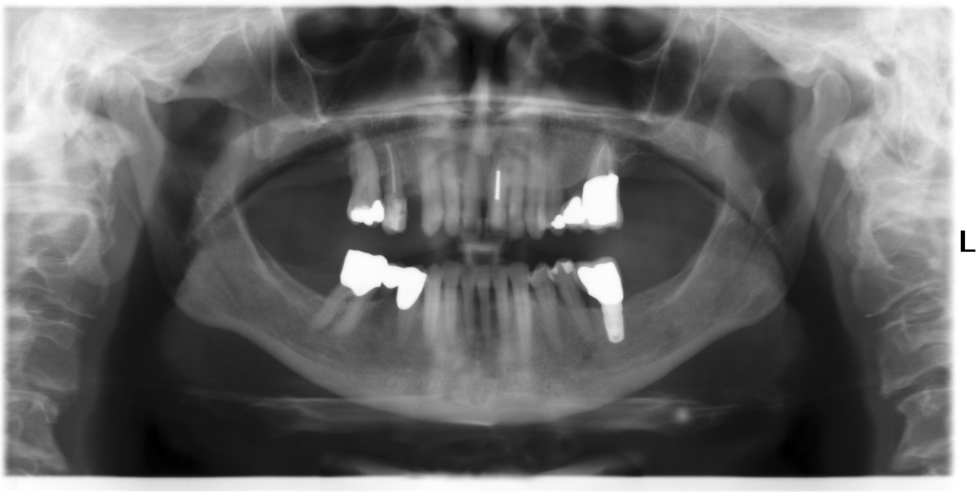

Fig. (14.2). Drawn-out expectation period in advanced periodontal disease at 15, 16 with horizontal alveolar bone resorption at assigned implant site (see Fig. **14.30**).

Fig. (14.3). Surgical access to deep intrabony periodontal pockets securing the residual dentition and safeguarding inflammation prior to implant placement following completion of non-surgical periodontal therapy.

CHAPTER 15

Economic Implant Dentistry

Abstract: Developments in practice, science and industry together with the new economics being accelerated by global markets necessitate dental treatment strategies focused both on medical and economic basis. As in orthopedics, cardiology or vascular medicine, implants are indispensible for rehabilitation, especially in advanced organ or functional damage. These benefits known from medicine represent the fundamentals for today's dentistry. The new economics call for a comprehensive, cost-effective treatment with focus on patient expectations.

Keywords: Bacteremia, Body health, Case prognosis, Cell turnover, Cost-effectiveness, Digital imaging, Economy, Focus medicine, Function, Healing, Implant abutment, Low diameter implant, Microsurgery, Mixed calculation, Overload, Patient expectation, Periointegration, Piezosurgery, Prosthetic restoration, Responsibility, Root morphology, Shorties, Sinus lift, Vascular permeability, Vertical dimension.

15.1. NEW ECONOMY

The basis for a trustful doctor-patient relationship is not the expectation of sales, but the appraisal of patients' expectations. In daily business, information about feasible treatment options with explanation of resulting treatment fees are key services. Responsibility for the oral cavity and the importance of oral health is well anchored in the dental profession. Since physicians distance themselves deliberately from the responsibility for oral health with health insurance plans and political organizations assisting inadequately, the dentist faces extensive medical challenges.

Successful dental business owners provide confidence, an organized treatment regimen and awareness of treatment fees. Customers anticipate clear, understand-

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able and financially attractive solutions. Disease severity, patient expectations and the proposed treatment plan with the resulting expenses need to be coordinated [1, 2]. This package, consisting of empathy, medical expertise, concept and charges is realized in a team approach.

15.2. PRACTICAL IMPLANT DENTISTRY

Advances in implant dentistry are summarized as follows:

- **Medical-centrered treatment plan**
- **Economical treatment regimen**
- **Microsurgical realization**

The integration of these areas into dental implant practice and its networking is creative, challenging and successful if the dental office does not depend exclusively upon implantology for its revenue or maximization of profits.

Medicine is incorporated into the practice by implementation of :

1. Periodontal therapy prior to implant placement.

Cost-effective realization is achieved with treatment focus on reduced molar support. Two fundamental rules apply here:

2. Avoid removable prostheses in prosthetically untreated patients, and
3. Relieve periodontally compromised teeth from enhanced prosthetic loading by increasing the number of implant abutments. Treatment target is single-tooth restoration, supplemented with implants.

Microsurgical implementation (defensive therapy) comprises the following key issues:

4. Early implant therapy to avoid cost-intensive surgical augmentation stressful for the patient.
5. Soft tissue management to promote additional volume support during implantation or implant exposure (usually), and
6. Application of micro-incision and suturing techniques.

The treatment regimen above, with consistent implementation of the keystones enumerated, prior to implantation (1), during implant planning (2-3) and surgical implant placement, (4-6) enables a medical, economical and patient-appropriate integration of implant dentistry into restoration.

15.3. PERIODONTAL AND IMPLANT THERAPY

With arrival of medicine in daily periodontics and the advances of current implant dentistry, periodontal surgery such as tunneling, root amputation and re-sectioning are no longer justified. Their cost-benefit ratio is not acceptable: they are too expensive, subsequent functional loading with dental prostheses is inadequate, and their esthetics are unsatisfactory. Removable prostheses should be avoided in favor of better quality of life by using the patient's own teeth or implants. Dental health care providers should point this out to the patient in the basic examination (1st visit) and make attractive pricing offers.

Note: *Up-to-date implant dentistry combines preserving the natural dentition while increasing the number of implant abutments for prosthetic restorations.*

15.4. FOCUS OF TREATMENT: MEDICINE

Periodontitis is a chronic disease of the oral cavity with complex causal and developmental factors. As with chronic body diseases, these factors include susceptibility to inflammation, stress, smoking and pathogen load. Other stress factors comprise increased blood glucose and circulating blood lipids, hypertension, overweight and the accumulation of perivascular tissue fluids (edema) resulting from long-term inflammation. Treatment of advanced periodontal disease with focus upon inflammation and resulting adverse effects upon vascular permeability, perfusion (blood flow) and metabolic status gains direct clinical importance.

The medical relevance of periodontal dentistry consists of 4 keystones recommended prior to final implant planning:

a. **Inflammation**: Multiple inflammatory responses in the body lead to congestion of edemas and chronic tissue fluid spaces representing a burden for the host due to reabsorption. As patient's age increases (50 and above), the host

CHAPTER 16

Soft Tissue Surgery and Augmentation

Abstract: Soft tissue surgery includes a two-stage approach with primary surgery (phase I) for securing and stabilization of periodontal and periimplant soft tissues, and secondary surgery (phase II, optional) with appropriate tools to reconstructing the defect site. Clinical outcomes of phase II therapy are frequently overestimated. This chapter applies the basic rules of reconstructive surgery to periodontal and implant dentistry.

Keywords: Allogenic graft, Autogenous bone, Blood supply, Bone chips, Bone shield, Cancellous bone, Edlan-Mejchar, Emergence profile, Free gingival graft, Full flap, Gingival phenotype, Interdental close-up, Keratinized gingiva, Mucoginigval surgery, Orthodontics, Pedicle flap, Periostal incision, Protrusion, Revascularization, Screw-fixation, Transgingival healing, Vestibuloplastic surgery.

16.1. MUCOGINGIVAL THERAPY

Primary mucogingival surgery (phase I) is aimed to functional secure and stabilize gingival tensile zones as border areas of vascularization. Due to anastomosis and direction of circulation, the mandible becomes more frequently affected. Gingival extension according to Edlan Mejchar is the most functionally predictable pedicle flap in the mandible promoted with blood supply from the subpapillary vascular plexus. Surgery is performed at minimum in the area of 3 teeth resulting in enlargement of the attached mucosa (Fig. **16.1**) with 3 advantages compared to free gingival grafts:

- Vascular supply is retained.
- Gingival extension results in a more esthetic entity within the adjacent tissues.

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- Gingival enlargement is predictable since it is not affected from healing by free diffusion.

Fig. (16.1). Dehiscence 31 following orthodontic protrusion and phase I therapy achieved by vestibuloplastic surgery according to Edlan-Mejchar.

16.2. PERIIMPLANT TISSUE STABILIZATION

In contrast to natural teeth, implants require presence of periimplant keratinized gingiva that functionally secures periimplant health [1 - 6].

- Periimplant enlargement is carried out as primary therapy (phase I) during implant healing with vestibuloplastic surgery and apical fixation. The additional application of a free gingival graft at the implant site safeguards periimplant widening. The esthetic appearance of free gingival grafts in color, texture and thickness are disadvantageous.
- Periimplant thickening by roll flap plastic surgery is of minor clinical concern. (1) During implant placement in the maxilla, a full connective tissue flap stretching as split flap under the palate is raised from buccal. Primary closure is secured by rotating the split portion from the palate in the direction of the vestibule following periostal incision of the buccal flap. (2) Upon implant

exposure and transgingival healing with the gingiva former, a full flap is elevated, partially deepithelialized and rotated inward (easier).

16.3. RECONSTRUCTION AND FUNCTION

Lack of dental space (a), inadequate orthodontic loading (b) and protrusion beyond the anatomic bone contour (c) using the multiband technique display clinical settings that stress the vascularisation of buccal bone. If the applied orthodontic forces are not adjusted, loss of the thin vestibular alveolar bone plate emerges. This is followed by soft tissue dehiscences, at times down to the apical third of the root, predominantly in the mandible. Orthodontic retrusion is hardly possible and rarely desired. Although the dentition is not endangered, these situations challenge reconstructive functional surgery as secondary intervention (phase II) (Figs. **16.2 - 16.11**). If the multiband technique in the mandible should be applied in thin gingival phenotype I settings, soft tissue surgery is emphasized to protect the fragile gingiva prior to orthodontic protrusion.

Fig. (16.2). Partial closure of the gingival dehiscence resulting from creeping attachment 9 months after plastic surgery 32-42 with residual inflammation and removal of the lingual retainer (phase I).

CHAPTER 17

Periimplant Treatment

Abstract: Dental health care providers use dental implants for rehabilitation and improvement of life quality. Periimplant therapy is developing to a key service in today's dentistry. It includes regular patient information and motivation, cost transparency and economic incentives with discounts, installment payment options and refunds. Providing long-term implant success requires a comprehensive periimplant treatment regimen prior to implant placement and during implant maintenance. Read what you can do to prevent and manage both implant and periimplant failures.

Keywords: Amoxicillin plus metronidazole, Antimicrobials, Barrier, Biomaterials, Bone quality, Bone sounding, Cheek mucosa, Chlorhexidine, Conditioning, Debridement, Defect closure, Foreign body, Gingival stability, Guided bone regeneration, Implant loss, Infection, Inflammation, Innate susceptibility, Intrabony defect, Irrigation, Laser, Loading, Maintenance, Mucositis, Pathogens, Periimplant probing, Periimplantitis, Periotest, Periotron, Platform switching, Suprastructure, Tetracyclines, X-ray.

17.1. GOAL OF RESTORATION

Implant dentistry is a rapidly developing, interconnecting and complex market place. All treatment steps from periodontal and surgical planning to implantoprosthetic restoration demand careful evaluation, exact planning and on-time realization. A comprehensive periimplant treatment concept **benefits** the:

Patient:

1. through long-term securing of implant biomaterials within the oral cavity,
2. increased protection against biofilm-related diseases by foreign body infections (implant),

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3. improved quality of life due to inflammatory-free bone and soft tissues,
4. and long-term reduction of follow-up expenses from implantoprosthetic restorations.

Dentist:

1. through enhanced "on-site" surgical tissue conditions,
2. forensic safeguarding against legal complaints by the patient (mistreatment),
3. prompt settling of bills by satisfied patients,
4. and less follow-up needs during periimplant maintenance.

Note: *The usage of biomaterials for organ replacement in today's medicine is increasing due to increased life expectancy and rapid growth of chronically ill people. The rise in implant-associated infections has become a main cause of hospital infections with follow-up costs of more than 5 billion dollars per year in the USA, according to estimates. Further both medically and economically relevant complications of "implant treatment" include foreign body-related disorders in the surrounding tissues. Vascular prostheses, catheters, endoprostheses and the artificial heart are most at risk. The insertion of implant materials into the body induces persistent biomaterial-associated infections. An interdisciplinary networking of biomaterial sciences, infectiology, immunology and clinical observation of bio-compatible materials may reduce the number of complications (Caesar, Center of Advanced European Studies and Research 2009).*

The medical challenges described for hospitals also apply to dental implants. Due to the rising number of periimplant failures, they are already spreading into dental practice. For prevention, it is mandatory to realize an interdisciplinary treatment concept [1 - 9]. Restoration of the oral cavity with implants encompasses an improved mastication associated with a long-term biofilm reduction. For successful implant dentistry, the following issues should be addressed, (Fig. **17.1**, Table **17.1**):

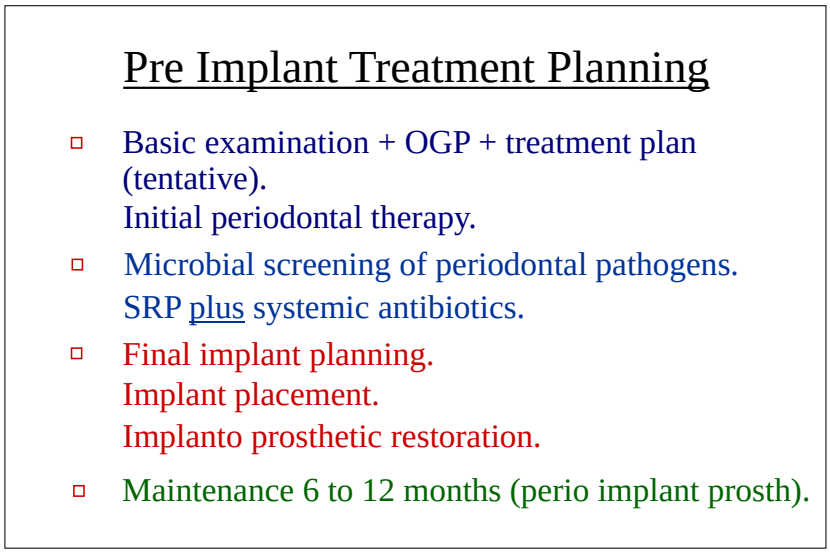

Fig. (17.1). Periimplant evaluation prior to implant placement to safeguard biomaterial-related infections.

Table 17.1. Implant planning under the objective of long-term implant success is a multi-issue subject. Since the realization of osseointegration is largely solved, today's treatment planning is focused on periointegration to optimize implant survival.

Endogenous Factors	Exogenous Factors
(a) ***Local***	*(a)* ***Surgical-, Technique-associated***
Bone quality	Surgical expertise
Implantat site	Surgical technique (trauma, microbial contamination, medication)
Bone grafts	Immediate implant placement
Parafunction	Immediate loading
Radiatio	One-, two-stage procedure
Keratinized gingiva (stability)	Design of suprastructures
(b) ***Systemic***	*(b)* ***Biomaterial-associated***
Age	Biocompatibility
General diseases	Implant system, -type
Smoking	

a. **Patient**: Motivated, compliant, manually skilfull, solvent.
b. **Inflammation**: In partially edentulous patients with periodontal pockets, perform pathogen testing with SRP and systemic antibiotics to suppress target microbes below the detection limit (*A. actinomycetemcomitans*). Usually, implant placement is more promising in edentulous subjects.

CHAPTER 18

Implants from the Patient's Perspective

Abstract: The patient's personal responsibility for oral health is increasingly determined by offers from media, industry, healthcare providers and health insurance plans. Full cost coverage, high-tech promises and loans present a portfolio of opportunities for patients "tired" about teeth. Patient expectations of dental implants include the values comfort, appearance, function, hygiene and health. The decision for implant placement is determined by patient's dental awareness and well-being with their natural teeth. If implant surgery is safe, free of complications, and the implantprosthetic restoration appears naturally, many customers are satisfied over the long term.

Keywords: Augmentation, Body health, Copayment, Front-canine alignment, Gingival lining, Health insurance, Implant survival, Information, Life quality, Local bone, Metabolism, Minimal surgery, Molar support, Motion, Natural dentition, Patient satisfaction, Preservation, Profitability, Rehabilitation, Zirconium dioxide.

18.1. PATIENT AND DENTAL IMPLANTS

People are aware that oral health is associated with body health. However, the responsibility for oral health and its treatment is trustfully transferred to the dentist. In orthopedic, cardiac and vascular medicine, implants are essential for rehabilitation in the event of advanced organ and functional damage. Patients attribute these issues that are well known for years entirely to the treatment of the diseased oral cavity. In the dental office, this leads to the following problems:

- Patients display very or excessively high expectations of care (costs, healing, appearance, maintenance *etc.*) (Figs. **18.1, 18.2**).

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- Clients are negligent towards health of their natural teeth hoping of a better life with implants.
- Customers receive excessive treatment due to their faith in implant dentistry (Fig. **18.3**).

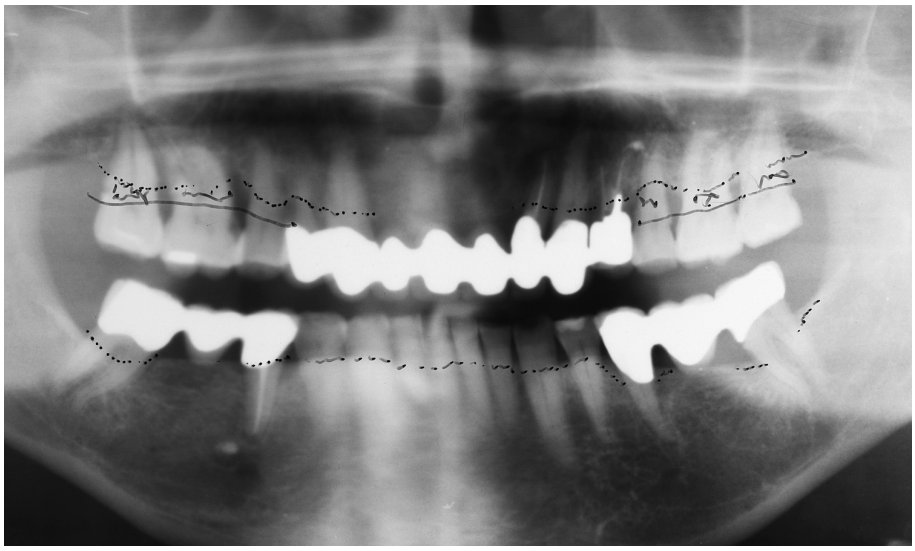

Fig. (18.1). Patient's request for fixed dental prosthesis with overloading of the prosthetic abutments, age and use-related bite reduction, periodontal damage and dysfunction.

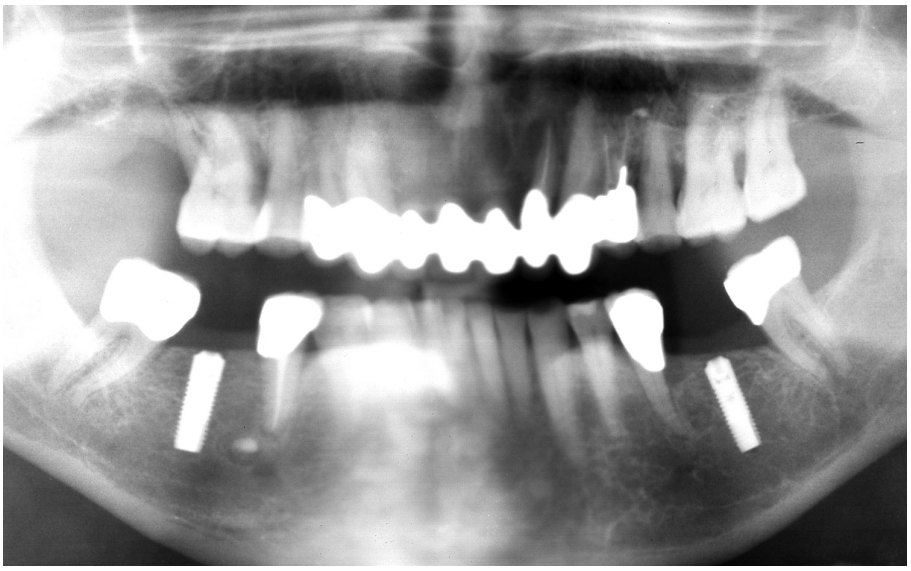

Fig. (18.2). Functional rehabilitation to achieve single tooth and implant restoration.

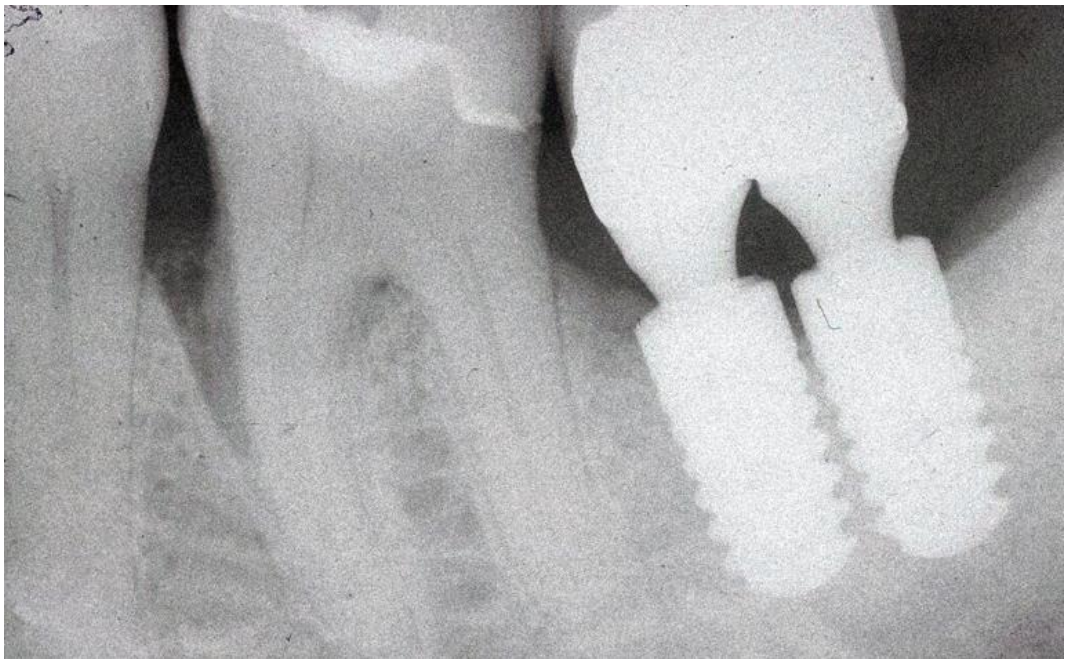

Fig. (18.3). Mistreatment with crowded implants in untreated periodontal disease.

Unlike to medicine, dental implants are no *must* indications for maintaining of vital function, metabolism or motion. With few exclusions following tumor surgery, jaw anomalies (*i.e.* cysts), congenital disorders and aplasias, implants are regarded as *can* indications in daily routine. Economic rethinking and understanding of cost-effective treatment regimens that meet patient needs are required.

18.2. NATURAL TEETH *VERSUS* IMPLANTS

Preservation of natural teeth has priority. Patients decide to receiving implants:

a. for improvement of comfort and hygiene in the case of edentulism, advanced periodontitis *etc*.
b. for protection of natural teeth against tooth preparation (Figs. **18.4, 18.5**),
c. economically if treatment costs to preserve natural teeth exceed charges for implant placing, *e.g.* after endodontic failure or trauma, and
d. due to long-term survey for dental implants for more than 15 years.

CHAPTER 19

Dental Hygiene Professionals

Abstract: Turnover of skilled dental personnel usually reach approximately one third of the dentist's revenues per hour. Economic assessment of dental clinics display that consistent delegated services by qualified employees result in a sustained annual turnover increase. This guarantees basic economical securing of the dental office as business company. Both patients and dentists benefit from a trained, qualified team. This chapter includes guidelines to organize your dental clinic in a economical and customer-driven perspective with help of qualified dental assistants.

Keywords: Business company, Communication, Debridement, Delegation, Dental hygienist, Diagnosis, Digital technology, Direct sale, Discounts, Education, Hygiene, Initial therapy, Installment payments, Maintenance, Periochip, Personnel manager, Practice manager, Prophylaxis, Quality management, Saftey precaution, Service, Skills, Soft laser, Training.

19.1. PREREQUISITE EDUCATION

The fundamentals securing dental business encompass 3 key issues: **delegation**, **implant dentistry** and **prosthetics**.

In periodontics, delegated services include the following treatment package, depending on training and qualification [1], among others:

1. Quality management, safety precautions and hygiene.
2. Initial periodontal status (pockets, bleeding upon probing, recessions, furcations *etc.*)
3. Information about treatment expenses.
4. Prearrangement of pathogen testing [2].
5. Initial therapy, *i.e.* prevention, hygiene and prophylaxis.

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6. Subgingival debridement (SRP), mild periodontitis.
7. Periodontal maintenance, need-based.
8. Organization of implant maintenance, removal of superstructure, cleaning *etc*.

Opportunities to acquire practically relevant qualifications are emerging. Open-minded dental employees attend team courses, and take part in further training lectures for dentists independently. Dental practitioners must be aware of the following developments:

a. Periodontal treatment as improved medical care for the world population can be achieved only together with qualified dental assistants.
b. Increasing specialization, development of digital technologies, micromedicine, and altered job descriptions in dentistry, *i.e.* dentist as entrepreneur, require partitioning of daily workload with qualified dental staff employees.
c. Board-certified training of qualified dental assistants is indispensible for economic survival.
d. The dental health care clinic benefits financially from delegation.

19.2. ECONOMIC PERIODONTAL THERAPY

Both qualified assistants and employees received board-certified training are acting as link between dentist and patient [3, 4]. Their services are focused on client needs. To comply with patient expectations, 4 different categories should be included in the service portfolio of each dental office. They receive the following denotations, (Fig. **19.1**):

1. **Prophylaxis**.
2. **Initial therapy (phase I)**.
3. **Debridement (phase II)**.
4. **Maintenance (phase III)**.

Note: *These categories are private services with the benefits medical awareness, life quality and health. According to request, dentists may offer discounts at less busy surgery hours, installment payment agreements (2 at maximun) for financially weak patients, and teasers for children and young people. Dentists may also combine high-end treatment solutions with a fully comprehensive right*

to implant recall for 1 year free of charge as mixed calculation. There is need for creativity and imagination, developing from inspiring teamwork (Fig. **19.2**).

Categories of Work for Dental Assistants (DA)

- Prophylaxis
- Initial Therapy (Phase I)
- Debridement (Phase II)
- Maintenance (Phase III)

Fig. (19.1). Delegated services satisfy customer's needs, and communicate benefits to the patient.

Fig. (19.2). Discounts at less busy surgery hours, installment payments as well as offers for kids and adolescents provide attractive financial incentives for many patients (mixed calculation).

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