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Ich bedanke mich bei den unten aufgeführten Kolleginnen und Kollegen für ihre wertvolle Mitarbeit, die sie in den vergangenen zwei Jahren geleistet haben.

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Evaluation of periodontal therapy in undergraduate courses of the University of Basle

A retrospective study

Key words: periodontitis, undergraduate courses, non-surgical periodontal therapy

Summary The aim of this retrospective study was to evaluate the periodontal therapy performed in the undergraduate curriculum (master level) at the School of Dental Medicine at the University of Basle, Basle, Switzerland. Patients diagnosed with advanced chronic or aggressive periodontitis were included in the study, provided that they were ≤ 40 years of age at the initial examination and had undergone a non-surgical periodontal therapy (scaling and root planing). In the 19 patients included, a statistically significant improvement of oral hygiene (plaque index; $p=0.015$) and a reduction of inflammatory parameters (bleeding index; $p=0.009$; bleeding on probing⁺; $p<0.0001$) were documented during supportive periodontal therapy (SPT). Sites with moderate ($PD \geq 5$ mm; $p<0.0001$ and $PD \geq 6$ mm; $p=0.001$) and high probing depths ($PD \geq 7$ mm; $p=0.002$) were significantly reduced in number, while $PD < 5$ mm ($p=0.014$) increased. Counts of single- and multi-rooted teeth could largely be maintained. The periodontal therapy in the undergraduate curriculum is a valuable treatment option for periodontally diseased patients.

Introduction

Periodontitis is a frequent disease in the general population (LÖE ET AL. 1986, ALBANDAR & TINOCO 2002, INSTITUT DER DEUTSCHEN ZAHNÄRZTE 2006). In Switzerland, 81.5% of individuals exhibit periodontal attachment loss of ≥ 6 mm at up to 10% of tooth sites (SCHÜRCH & LANG 2004). Periodontitis constitutes a multifactorial disease of the periodontium. Its onset and progression are affected by both modifiable and non-modifiable factors (PAGE ET AL. 1997, KINANE & HART 2003). Recent investigations reveal that a low socioeconomic status represents a significant risk factor for periodontal disease (PAPANOU & WENNSTRÖM 1990, KOCHER & MEISEL 2003, ZINI ET AL. 2011). Insufficient oral hygiene and smoking are additional substantial and modifiable risk factors which are found particularly often among socially handicapped patient groups (HUBER & RÖTHLISBERGER 1975, IMPERIALI ET AL. 1984, MARTHALER 2004, SAXER ET AL. 2007, WALTER ET AL. 2007, WARNAKULA-

SURIYA ET AL. 2010, ISLAS-GRANILLO ET AL. 2012, NAGELHOUT ET AL. 2012). This accumulation of risk factors impedes with periodontal therapy.

At the Department of Periodontology, Endodontology, and Cariology (PEC) of the University of Basle, treatment of periodontally diseased patients is provided by specialists, graduates attending the postgraduate program in periodontology (SSO/SSP), or dental students in clinical courses of the master curriculum (prior to the Bologna reform referred to as 4th or 5th academic years). For many patients, treatment in undergraduate courses is attractive mainly for financial reasons. In these courses provided by students who are thoroughly supervised by experienced dentists, low-priced therapy can be offered at the expense of increased treatment time.

The aim of the present retrospective study was to evaluate the periodontal therapy in undergraduate courses provided by the Department of PEC at the School of Dental Medicine in Basle (University of Basle, Switzerland).

Materials and Methods

Our analysis involved medical records from patients of the Department of PEC, who had obtained a periodontal therapy in undergraduate courses and were treated since the year 2005. The following criteria for inclusion in the evaluation were applied:

- non-surgical therapy of an aggressive or severe chronic periodontitis during the semester (2005–2011) or as part of the final university examination (2007–2011) (ARMITAGE 1999, TONETTI & MOMBELLI 2008)
- age ≤ 40 at the initial examination in the clinic (KANER ET AL. 2007A, KANER ET AL. 2007B)
- complete clinical, dental, radiographic, and periodontal documentation
- at least one periodontal re-evaluation after completion of the non-surgical scaling and root planing (BADERSTEN ET AL. 1981)

This retrospective investigation was approved by the ethics committee of both cantons of Basle (EK: 279/09). The detailed procedure of patient recruitment is illustrated in Figure 1. As a result, 19 patients were included in the study. They had chosen to be treated in the undergraduate course for financial reasons. Seventy-three patients were excluded because they were older than 40 years of age at the initial examination, and in the case of eight patients, the documentation was incomplete (Fig. 1).

Collection of patient data

Medical records were examined by two independent investigators (LT und SB). The following general data were assessed for this study: systemic diseases (yes/no), regular use of medications (yes/no), smoking status (current smoker/former smok-

er/never-smoker), periodontal diagnosis (ARMITAGE 1999), and systemic administration of adjuvant antibiotics during the non-surgical therapy. The ethnic background of the patients was recorded as caucasian or non-caucasian. Clinical data were assessed at three points of time, i.e. at the initial examination, at a first re-evaluation usually not earlier than three months after completion of the systematic scaling and root planing, and at a second re-evaluation usually not earlier than six months after completion of the non-surgical therapy. These clinical data comprised the total number of teeth and the number of molars (excluding wisdom teeth), plaque and bleeding indexes (O'LEARY ET AL. 1972, AINAMO & BAY 1975) as well as probing depths and bleeding on probing (BOP+) recorded at six sites.

Details of the medical history and clinical data taken from the medical records were entered into Excel 2010 spread-sheets (Microsoft, Redmond WA, USA).

Procedure of periodontal therapy

The periodontal therapy in the undergraduate courses was carried out according to the preventive and biology-oriented treatment concept of the PEC Clinic (WALTER ET AL. 2009, WALTER & ZITZMANN 2010). All clinical findings and treatment steps were verified by certified assistant dentists (residents) and, if necessary, modified and attested.

In accordance with the treatment concept mentioned above, the clinical examination started with an oral review of the medical and dental history. In the case of smoking patients, a brief intervention aiming at cessation of tobacco use was performed (RAMSEIER ET AL. 2007). Following the analysis of extraoral and intraoral findings, plaque and bleeding indexes were assessed. In addition, patients received instructions for oral hygiene according to individual needs, which constituted

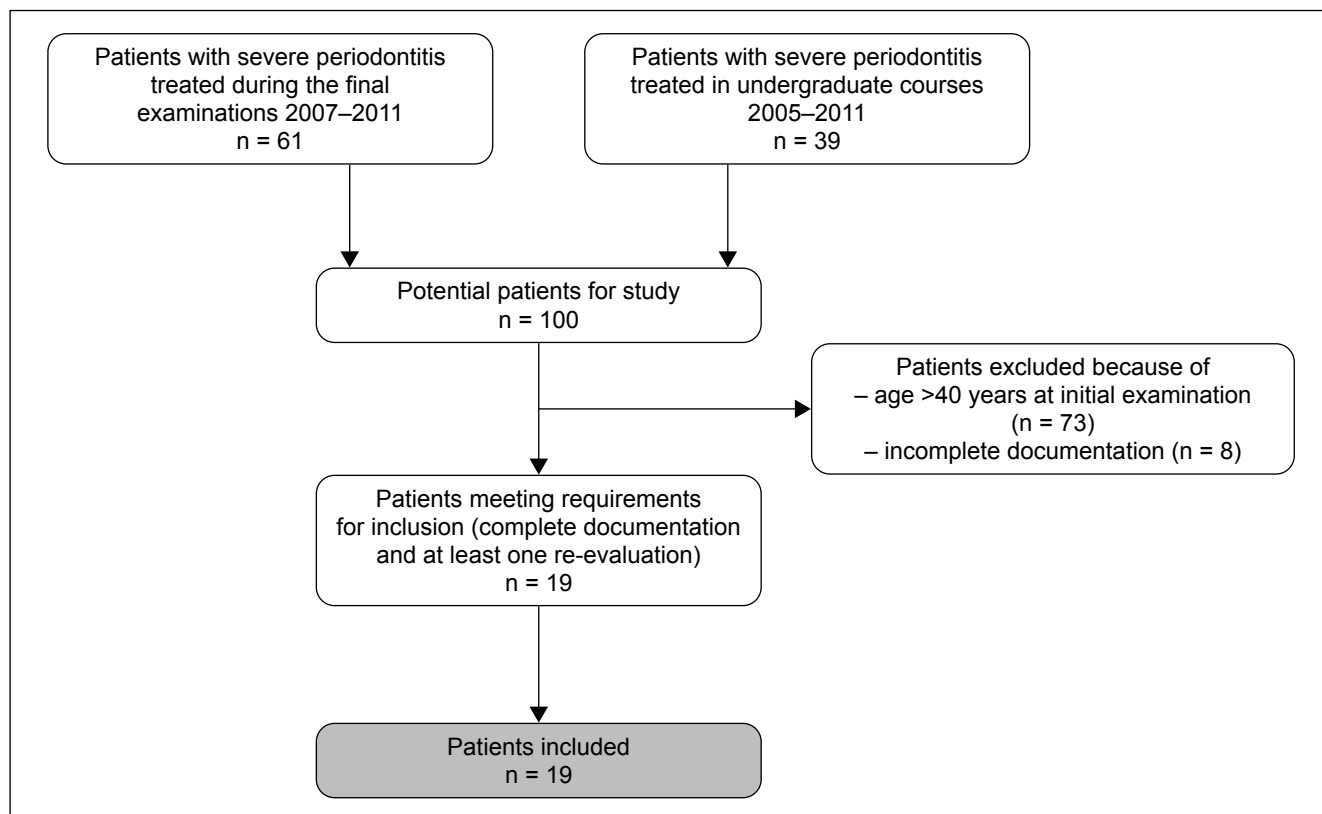


Fig. 1 Systematic procedure upon selection of patients

an integral element of the periodontal therapy. Dental and periodontal features were assessed following supragingival tooth cleaning and entered into standardized forms. A complete periodontal status including observed recessions was recorded at six sites per tooth. About 30 seconds after periodontal probing of either the buccal or lingual aspect of a quadrant, bleeding on probing (BOP⁺) was assessed. Involvement of furcations in all multi-rooted teeth was examined using a graduated probe (Nabers-probe PQ2N; Hu-Friedy, Chicago, IL, USA) and classified as grade 0–III (WALTER ET AL. 2009). Tooth mobility was measured using tactile pressure and recorded as grade 0–3 (MILLER 1938). If there were clinical indications for oral pathologic processes, suitable radiographs were made. In the case of periodontitis patients, an X-ray status consisting of 14 periapical films was prepared. Taking into account the entire evidence, a diagnosis was made, which comprised the pre-therapeutic assessment of individual teeth (MC GUIRE 1991, MC GUIRE & NUNN 1996A, MC GUIRE & NUNN 1996B, MC GUIRE & NUNN 1999), the condition of the whole dentition, the classification of interdental spaces and reductions in dental arch length (KENNEDY 1932, CHARYEVA ET AL. 2012), as well as the principal periodontal diagnosis (ARMITAGE 1999, TONETTI & MOMBELLI 2008). Based on these diagnoses, a treatment plan was made and treatment costs were estimated.

Initial treatment

The goal of the initial treatment was to prepare the subsequent therapy as well as to facilitate and implement an effective supragingival plaque control by the patient. An important element of the initial periodontal treatment was the motivation for and re-instruction of adequate oral hygiene (SNEHOTTA ET AL. 2007). If oral hygiene was insufficient, individual alterations in the patients' habits were sought for, including for example the adoption of alternative tooth cleaning techniques or the use of electrical tooth brushes. Among these, sonic devices were preferred because of their hydrodynamic effects (HOPE ET AL. 2003, BUSSCHER ET AL. 2010, SCHMIDT ET AL. 2012A), which promise an additional removal of biofilms at sites such as approximal spaces that are not directly accessible by bristles. As auxiliaries for interdental hygiene, soft interdental brushes, selected according to individual conditions, were recommended (CHRISTOU ET AL. 1998, SLOT ET AL. 2008, ROSEMA ET AL. 2011). If appropriate, the initial treatment comprised an intervention aiming at the cessation of tobacco use, the elimination of iatrogenic or developmental niches for plaque retention, the restoration of carious lesions and endodontic treatments, splinting of hypermobile teeth when function was impaired, extractions, and temporary dental prostheses if required. In accordance with the treatment concept of the PEC Clinic, single- and multi-rooted teeth were extracted with restraint. Consequently, also initially questionable teeth were included in the non-surgical periodontal therapy, if possible.

Scaling and root planing (Sc & Rp)

Systematic instrumentation of diseased periodontia started following the initial periodontal treatment and after plaque and bleeding indexes of <25%, each, had been attained. Non-surgical Sc & Rp under local anaesthesia was carried out using ultrasound (EMS, Nyon, Switzerland) and Gracey-curettes (Deppeler, Rolle, Switzerland) in one quadrant or on one side of the dentition without setting a time-limit. Between sessions, there were intervals of few days. Instrumented areas had to exhibit smooth and hard root surfaces (detected using a fine manual probe, EXD 11/12) and were finally rinsed with chlor-

hexidine (0.2%) or hydrogen peroxide (3%). Following Sc & Rp, patients rinsed twice daily with chlorhexidine (0.2%) for one week if indicated. If a localized or generalized aggressive periodontitis was diagnosed, Sc & Rp was followed by a systemic antibiotic treatment, which started on the last day of Sc & Rp and consisted of three daily doses of 375 mg amoxicillin and 250 mg metronidazole for seven days (VAN WINKELHOFF ET AL. 1989, ARMITAGE 1999, WALTER & WEIGER 2006, HERRERA ET AL. 2008). Also in the last session of Sc & Rp, previously instrumented quadrants were treated once more using ultrasonic devices to thoroughly remove any subgingival biofilm.

Microbiological tests were not applied, neither for distinguishing between chronic and aggressive periodontitis nor for selecting specific antibiotics (MOMBELLI ET AL. 2002, WALTER ET AL. 2005). After one week and four weeks, oral hygiene was monitored and supragingival tooth surfaces were polished.

Re-evaluation and supportive periodontal therapy (SPT)

Periodontal parameters assessed routinely at the re-evaluations included plaque and bleeding indexes, probing depths, and BOP⁺. Once yearly a complete periodontal status was recorded. Usually not earlier than three months after the non-surgical therapy, the first re-evaluation of periodontal conditions took place. It was accompanied by professional tooth cleaning and selective subgingival instrumentation of sites exhibiting persisting probing depths of ≥ 4 mm. If elevated probing depths of ≥ 6 mm or involvement of furcations \geq grade II were still observed at the second re-evaluation (at the earliest after six months), additional interventions, if necessary surgically, were taken into consideration and discussed with the patients. When the active periodontal therapy was finished, the oral rehabilitation was completed and the patients referred to supportive periodontal therapy (SPT).

Statistical methods and analysis

Patient characteristics were first evaluated descriptively using means and standard deviations (\pm SD) or percentage distributions (Tab. I). For each patient, the following data recorded at all three points of time (first examination, first and second re-evaluation) were taken into account:

- Number of teeth and number of molars (except third molars)
- Number of regions (tooth sites) as well as number of teeth exhibiting probing depths (PD) of <5 mm, ≥ 5 mm, ≥ 6 mm, and ≥ 7 mm. For the analysis by teeth, the highest value was taken. The group of teeth characterized by PD ≥ 6 mm constituted a subgroup of PD ≥ 5 mm, and similarly the group of teeth with PD ≥ 7 mm represented a subgroup of PD ≥ 5 mm and ≥ 6 mm. Means and standard errors (\pm SE) were graphically represented as bar plots.
- Percentage proportions of tooth sites positive with respect to plaque, gingival bleeding, or bleeding on probing

The reduction of probing depths to PD <5 mm as well as the number of persisting PD ≥ 5 mm ("not closed periodontal pockets") were defined as the primary outcome (WENNSTRÖM ET AL. 2005). This was determined by calculating the average percentage reduction of elevated PD in groups PD ≥ 5 mm, PD ≥ 6 mm, PD ≥ 7 mm during the intervals between first examination and first re-evaluation as well as between first examination and second re-evaluation. The significance of differences was tested using a linear mixed effects model and a level of significance of $\alpha=0.05$. For the analysis of effects exerted by systemic or therapeutic parameters (gender, age, ethnical background, systemic diseases, intake of medications, diagnosis, and smoking habits) on the reduction in PD, the systemic or therapeutic

Tab. I Characteristics of the study population at first examination

Parameter	n (%)	Mean ± SD
Patients	19	
Age, in years		32.9 ± 5.7
Gender	Female	10 (52.6)
	Male	9 (47.4)
Ethnic background	Caucasian	16 (84.2)
	Non-caucasian	3 (15.8)
Systemic diseases	Yes	15 (78.9)
	No	4 (21.1)
Regular consumption of medication	Yes	9 (47.4)
	No	10 (52.6)
Aggressive periodontitis	Yes	9 (47.4)
	No	10 (52.6)
Adjuvant systemic antibiotic therapy	Yes	8 (42.1)
	No	11 (57.9)
Number of teeth per patient		27.7 ± 3.03
Number of molars (excluding wisdom teeth) per patient		6.9 ± 1.5
Number of tooth sites per patient		166 ± 18.2
PI (% positive tooth sites)		35.1 ± 25.6
BI (% positive tooth sites)		17.7 ± 21.7
BOP+ (% positive tooth sites)		53.4 ± 30.4
Number of teeth per patient	exhibiting PD < 5 mm	12.5 ± 9.0
	exhibiting PD ≥ 5 mm	15.3 ± 8.0
	exhibiting PD ≥ 6 mm	10.7 ± 9.0
	exhibiting PD ≥ 7 mm	5.9 ± 6.8
Number of tooth sites per patient	exhibiting PD < 5 mm	123 ± 44.4
	exhibiting PD ≥ 5 mm	43.5 ± 37.3
	exhibiting PD ≥ 6 mm	25.8 ± 29.4
	exhibiting PD ≥ 7 mm	11.9 ± 16.9
Smoking status	Current smoker	10 (52.6)
	Former smoker	2 (10.5)
	Never-smoker	7 (36.8)

PD = probing depth, PI = plaque index, BI = bleeding index (gingival inflammation), BOP+ = bleeding on probing, ±SD = standard deviation

parameter recorded at a specific examination served as the fixed variable, while the percentage part of tooth sites or teeth in a particular PD-group was considered the dependent variable. The average percentage reduction in PD was indicated with 95%-confidence intervals. A multiple regression was not applied to the data because of the small sample size. All analyses were made using the statistic program R version 2.13.1 (R DEVELOPMENT CORE TEAM 2009).

Results

Among the 19 included patients who were treated by undergraduate students, ten were females (age 34.2 ± 5.2 years) and nine males (age 31.4 ± 6.2 years). Characteristics of the study population are summarized in Table I. There were no gender-specific differences regarding any general or clinical findings. Fourteen patients had been re-evaluated at least twice,

while complete findings from one recall were available in five patients. Ten participants of the study indicated that they were current smokers, while seven patients never smoked and two were former smokers. Medical histories revealed systemic diseases (allergies, asthma, arthritis, diabetes mellitus, dyslipidemia, iron deficiency, hay fever, hypertension, hypotension, food hypersensitivity, kidney stones, sleep apnoea) in 15 patients, and nine patients indicated regular consumption of medications (paracetamol, ibuprofen, contraceptives, iron supplements, insulin, metformin or sitagliptin). Upon initial examination of eight patients, localized and generalized aggressive periodontitis were diagnosed in one and seven cases, respectively. Consequently, the mechanical therapy was supported by adjuvant administration of antibiotics. After the second recall, one patient was retrospectively re-classified as a case of generalized aggressive periodontitis. Generalized and localized severe chronic periodontitis were found in four and six patients, respectively (ARMITAGE 1999).

Oral hygiene

The presence of supragingival plaque (PI) and the periodontal inflammatory parameters (BI, BOP+) decreased continuously over the study period (Fig. 2). The improvement between initial examination (PI 35.1 ± 25.6; BI 17.7 ± 21.7; BOP+ 53.4 ± 30.4) and first re-evaluation (PI 28.1 ± 25.3; BI 5.5 ± 6.6; BOP+ 23.8 ± 18.7) proved statistically significant with respect to BI (p=0.009) and BOP+ (p<0.0001), while the reductions from initial examination to second re-evaluation were significant for all of the three parameters (PI 22.9 ± 21.3; p=0.015, BI 4.3 ± 6.1; p=0.009, BOP+ 22.1 ± 12.6; p<0.0001).

Probing depths

Figures 3a and 3b show numbers of teeth and tooth sites per patient, which were assigned to the various classes of probing depths. Expressed as both counts of teeth and sites, the size of group PD <5 mm (“closed periodontal pockets”) increased significantly (p=0.014) from the initial examination (12.5 ± 9.0

and 123 ± 44.4) to the first (19.2 ± 8.0 and 146 ± 28.7) and second re-evaluation (20.8 ± 8.3 and 148 ± 30.9). In contrast, the proportions of both teeth and sites exhibiting PD ≥ 5 mm decreased significantly (p=0.001) from 15.3 ± 8.0 and 43.5 ± 37.3 at the initial examination to 7.5 ± 7.5 and 14.6 ± 20.2 at the first and to 5.4 ± 6.4 and 9.4 ± 12.4 at the second re-evaluation. A similar reduction was also observed in the subgroups PD ≥ 6 mm (p=0.001) and PD ≥ 7 mm (p=0.001; Fig. 3a, b). In three patients, more than three teeth showed persisting elevated probing depths after the second re-evaluation.

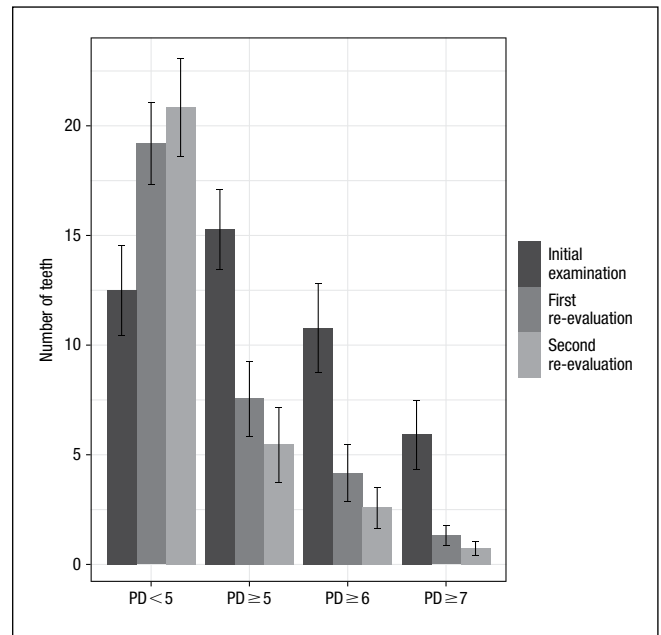


Fig. 3a Number of teeth per patient (means ± SE) exhibiting probing depths (PD) of <5 mm, ≥5 mm, ≥6 mm, ≥7 mm at initial examination as well as at first and second re-evaluation

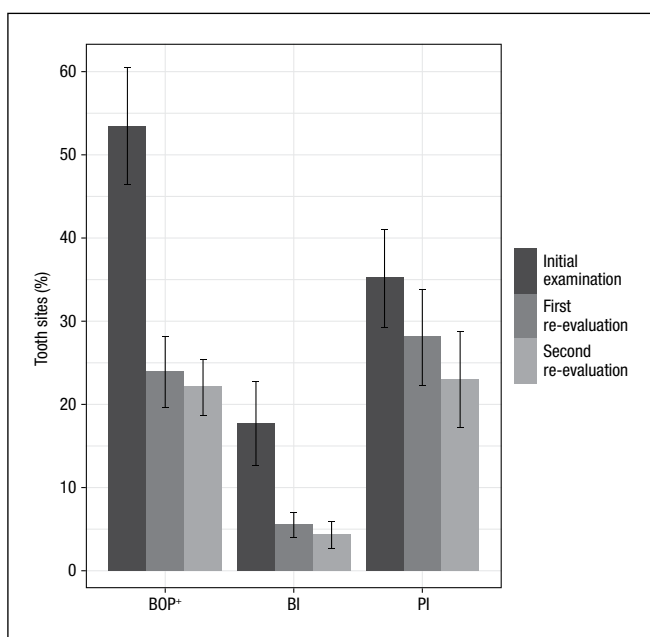


Fig. 2 Oral hygiene (plaque index – PI; means ± SE) and periodontal inflammatory parameters (bleeding on probing – BOP+, bleeding index – BI; means ± SE) at initial examination as well as at first and second re-evaluation

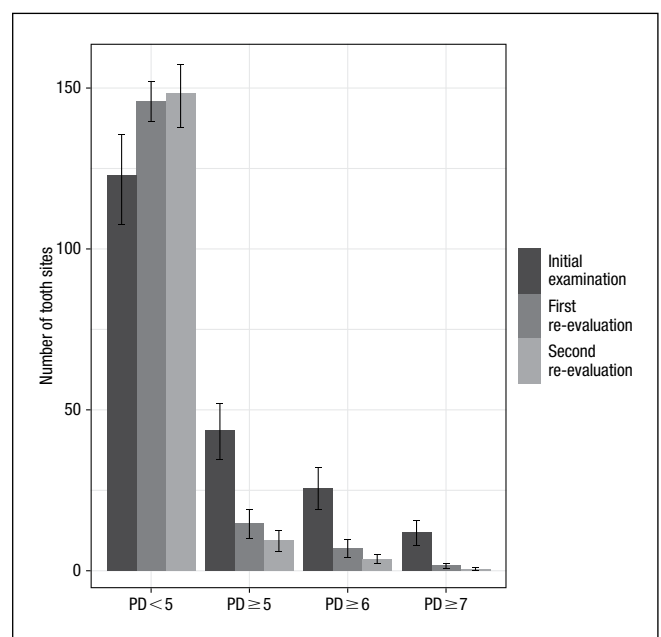


Fig. 3b Number of tooth sites per patient (means ± SE) exhibiting probing depths (PD) of <5 mm, ≥5 mm, ≥6 mm, ≥7 mm at initial examination as well as at first and second re-evaluation

Tab. II Influence of systemic and therapeutic parameters on the reduction of probing depths (in % of counts recorded at first examination) in the various PD-groups

PD group	Parameter	Mean difference of percentage reduction	95%CI	p-value
PD ≥ 5 mm	Antibiotics (yes – no)	32.40	17.22; 47.59	< 0.001
	Smoking (current vs. never-smoker)	11.98	-8.42; 32.37	0.239
	Background (non-caucasian vs. caucasian)	43.52	30.33; 56.72	< 0.001
PD ≥ 6 mm	Antibiotics (yes – no)	24.37	11.92; 56.72	< 0.001
	Smoking (current vs. never-smoker)	6.57	-10.06; 23.19	0.425
	Background (non-caucasian vs. caucasian)	29.56	15.92; 43.20	< 0.001
PD ≥ 7 mm	Antibiotics (yes – no)	12.03	4.45; 19.60	0.003
	Smoking (current vs. never-smoker)	2.68	-7.01; 12.37	0.575
	Background (non-caucasian vs. caucasian)	14.34	5.24; 23.44	0.003

95%CI = 95% confidence interval

The analysis of the influence exerted by systemic, diagnostic, and therapeutic factors on the changes in size of the PD groups revealed a clear effect of the administration of systemic antibiotics. Thus, at the second re-evaluation, greater reductions of PD were found in all of the three groups (PD ≥ 5 mm, ≥ 6 mm, and ≥ 7 mm) when the active therapy had been supported by the administration of antibiotics (Tab. II). Similarly, at both re-evaluations, patients initially diagnosed with aggressive periodontitis exhibited significantly fewer sites with increased probing depths than patients suffering from a chronic form of the disease. As far as the effect of the ethnical background was concerned, probing depths were reduced more extensively in non-caucasians than caucasians (Tab. II).

Numbers of teeth

Regarding both the total number of teeth and the number of multi-rooted teeth, no differences between the initial examination and the second re-evaluation were found (p=0.473 and p=0.746; Fig. 4). Most patients initially showed a more or less complete dentition comprising on average a total of 27.7 (±3.0) teeth and 6.9 (±1.5) molars. At the start of treatment and until the second re-evaluation usually not earlier than six months later, on average only 1.2 (95%CI 0.3; 2.0) of initially present teeth were extracted. Concerning first and second molars, the respective mean was 0.1 (95%CI -0.1; 0.4).

Discussion

This retrospective investigation from the University of Basle shows that a successful periodontal therapy is feasible also in undergraduate courses. In the present study, only patients were included who had been diagnosed with severe chronic or aggressive periodontitis and were not older than 40 years of age. In this group of patients showing a high risk of periodontal disease, a significant improvement of oral hygiene and a reduction of periodontal inflammatory parameters could be achieved. Tooth sites exhibiting moderate (≥ 5 mm, ≥ 6 mm) and high (≥ 7 mm) probing depths significantly decreased, while probing depths of < 5 mm increased in number, and num-

bers of single- and multi-rooted teeth could largely be maintained.

A consistently applied therapeutic concept and an individual patient management are essential for a successful periodontal therapy (AXELSSON ET AL. 2004). On the other hand, the degree of training and experience of the treating dentist can have a significant influence on the treatment outcome. Thus, BRAYER ET AL. (1989) showed that the efficiency of the removal of hard debris from pockets deeper than 4 mm raises with the experience of the clinician.

Investigations on periodontal therapy in undergraduate courses are rare. RÜHLING ET AL. (2003) demonstrated that systematically trained students are able to successfully treat peri-

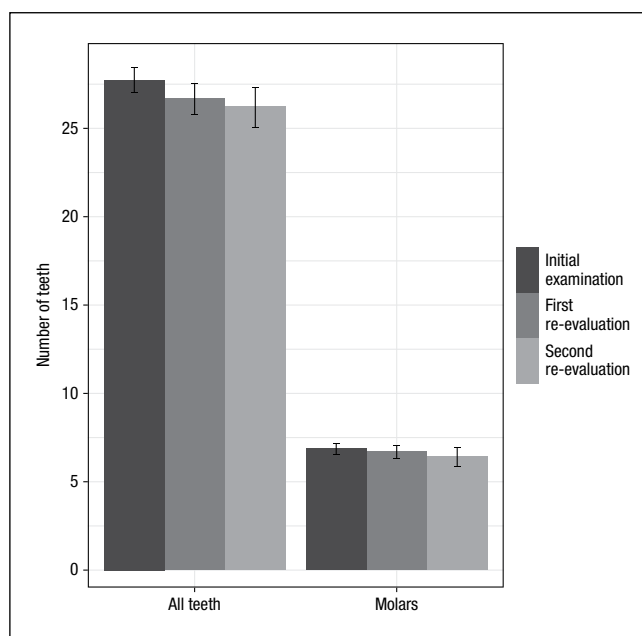


Fig. 4 Total number of teeth and number of molars per patient (means ± SE) at initial examination as well as at first and second re-evaluation

odontally diseased patients using both manual instruments (Gracey-curettes) and mechanical procedures (peripolisher). VOUROU ET AL. (1992) also documented successful non-surgical therapy of patients with severe periodontitis, which was performed during the undergraduate training. The evaluation of these investigators twelve months after the periodontal treatment revealed a reduction in bleeding on probing and diminished numbers of sites with elevated probing depths.

Since tobacco consumption has been recognized as an important risk factor, a brief intervention aimed at smoking cessation is currently an essential component of a periodontal therapy (RAMSEIER ET AL. 2006, RAMSEIER ET AL. 2007, SAXER ET AL. 2007). The success of this measure is well established provided that the intervention is carried out by dentists or dental hygienists (CARR & EBBERT 2012). Data from undergraduate courses are not yet available, but an analysis of a prospective study made at the University of Basle is expected for the year 2013.

In accordance with the treatment concept of the Department of PEC, as many teeth as possible were included in the therapy of the studied patient group, even if attachment loss was severe (MC GUIRE & NUNN 1996A, MC GUIRE & NUNN 1996B). Numbers of initial extractions immediately affect the necessity of subsequent extractions (MC GUIRE & NUNN 1996A, MC GUIRE & NUNN 1996B, ZITZMANN ET AL. 2010). MATULIENE ET AL. (2008) reported that 14.4% of initially present teeth were extracted. Half of these were removed already during the active initial phase of the therapy, while the remaining 49% were lost during the supportive phase, which on average lasted eleven years, and most extractions occurred after more than ten years. In the patient group investigated, loss of teeth was minor, both initially and during the short phase of supportive periodontal therapy (SPT). It should be noted, however, that the reduction in probing depth was considered the most important parameter for evaluating the non-surgical therapy of periodontitis (WENNSTRÖM ET AL. 2005), and the time of the second re-evaluation was defined as the end of this investigation. Nevertheless, the few remaining sites with probing depths ≥ 5 mm require continued therapy (MATULIENE ET AL. 2008).

Differentiation between aggressive and chronic periodontitis is still difficult and possible only based on the clinical and radiographic findings as well as on the clinical course (MEYER ET AL. 2004). Even microbiological tests currently do not allow a differentiation (MOMBELLI ET AL. 2002, WALTER ET AL. 2005). Whereas chronic periodontitis can be treated with good long-term results (AXELSSON ET AL. 2004) without antibiotics, an adjuvant administration of a combination of amoxicillin and metronidazole is indicated in cases of the rarer aggressive periodontitis (GUERRERO ET AL. 2005, WALTER & WEIGER 2006, KANER ET AL. 2007A, KANER ET AL. 2007B). This combination of antibiotics, also known as “van Winkelhoff-cocktail”, is effective against the expected spectrum of gram-negative, anaerobic bacteria and is superior in efficacy to the individual preparations (ROONEY ET AL. 2002, WALTER ET AL. 2011). After positive effects exerted by an adjuvant administration of variable doses of metronidazole and amoxicillin could be established with respect to the therapy of aggressive periodontitis (GUERRERO ET AL. 2005, WALTER & WEIGER 2006, KANER ET AL. 2007A, KANER ET AL. 2007B), current debates concern the necessary dosages and an extension in the spectrum of indications (CIONCA ET AL. 2009, MOMBELLI ET AL. 2011). Additional indications discussed include patients exhibiting periodontitis associated with smoking (SAXER ET AL. 2007, MATARAZZO ET AL. 2008) or systemic diseases (SCHMIDT ET AL. 2012B) as well as patients under bis-

phosphonate medication. As an increased risk of osteonecrosis exists in this group of patients (BRAUN & IACONO 2006), supportive antibiotic medication should already accompany the non-surgical therapy (WALTER & ZITZMANN 2010, MAWARDI ET AL. 2011).

When the new structure of the dental curriculum according to the guidelines of the Bologna declaration was designed in the year 2008, a catalogue of learning goals “Dental Medicine Switzerland” was compiled as an obligatory guide for all Swiss universities (ZITZMANN & WEIGER 2011). With respect to periodontology, this catalogue specifies that the highest level of competence in both theory and practice of non-surgical periodontal therapy is expected from the graduates. This ambitious claim requires that at the end of the master curriculum, students have a broad theoretical knowledge and can explain the goals, indications, scientific background, and procedure of the clinical concept. In addition, they must be able to carry out the clinical treatment autonomously. Therefore, the present work attempted to analyze whether a systematic non-surgical periodontal therapy could be successfully performed in undergraduate courses of the master curriculum (formerly 4th and 5th academic years). The patients evaluated suffered from severe forms of chronic or aggressive periodontitis and were taken care of by master students. The present investigation demonstrates that a successful non-surgical periodontal therapy is feasible in undergraduate courses. However, the long-term success of treatment depends on various factors, including the elimination of persisting elevated probing depths (MATULIENE ET AL. 2008) and a continued aftercare during SPT (AXELSSON ET AL. 2004, MATULIENE ET AL. 2008). The possibilities to comply with these claims in the undergraduate course are necessarily limited. For a sustained reduction, residual elevated probing depths often require periodontal surgery. In particular, demanding procedures in the molar region can entail considerable treatment costs (WALTER ET AL. 2012). However, limited financial resources of some patients treated in undergraduate courses often do not allow surgical periodontal options as well as expensive reconstructive therapies. As a consequence, the maintenance of as many teeth as possible becomes even more critical. Another aspect concerns the alteration of the treating clinician, which is inevitable when undergraduates completed their training and is possibly accompanied by changing the attending resident. A change of the clinician in general represents a risk regarding adaptations of the treatment plan and new prognostic assessments. This risk can be avoided using various measures. Most important are a clearly defined therapeutic concept and assistants calibrated in this respect.

In summary, this retrospective study evaluating the non-surgical therapy of severe periodontitis in patients treated for financial reasons by dental students demonstrated that a significant improvement of periodontal conditions can be achieved and that the periodontal therapy in undergraduate courses constitutes a valuable treatment option.

Annotations

Part of the data of the present study was analyzed by Mrs. Lojitha Thillainathan, when she prepared her master thesis at the University Clinics for Dental Medicine, Basle, Switzerland. Some aspects of this work were presented as a poster by Sabrina Buset (Buset S, Zitzmann N U, Thillainathan L, Weiger R, Walter C: Retrospective evaluation of non-surgical periodontal therapy in undergraduate education in Switzerland – an extended case series. *Europerio7*, June 6–9,

2012, Vienna, Austria; J Clin Periodontol 39 [Suppl s13]: 107, 2012; PO 347) in partial fulfilment of the requirements for her MAS in Periodontology of the University of Zurich, Switzerland.

Résumé

Le but de cette étude rétrospective était d'évaluer le succès thérapeutique parodontal de patients intégrés aux cours des étudiants de la Clinique de parodontologie, endodontologie et carologie de l'Université de Bâle (Suisse), dans le cadre du Master en parodontologie.

Dans cette étude, des patients souffrant d'une parodontite locale ou généralisée de type chronique ou agressive étant âgés de moins de 40 ans lors du premier examen ont été inclus. De

plus, seul les patients ayant eu une thérapie non chirurgicale (scaling et root planing) ont été considérés. Dans le cadre de la réévaluation de la thérapie parodontale, on a pu constater pour les 19 patients une amélioration significative de l'hygiène buccale (index de plaque $p=0,015$) ainsi qu'une réduction des paramètres de l'inflammation parodontale (indice de saignement $p=0,009$; saignement au sondage⁺ $p<0,0001$). Les sondages très profonds (STP ≥ 7 mm $p=0,002$) et de profondeur modérée (SPM ≥ 5 mm $p<0,0001$; SPM ≥ 6 mm $p=0,001$) ont diminué de façon significative, tandis que les sondages de <5 mm ($p=0,014$) ont augmenté. Le nombre de dents à une ou plusieurs racines a pu être presque intégralement conservé.

Le traitement parodontal pratiqué dans le cadre du cours des étudiants présente donc une possibilité thérapeutique pour le patient souffrant de parodontite.

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