
Oral Status of Patients with Untreated Periodontitis. A Clinical-Radiological Analysis

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Consequences of untreated periodontitis are various and irreversible with regard to the maintenance of natural dentition. Teeth may be lost due to untreated periodontitis, as well as due to untreated caries. Dental arches are rehabilitated by means of prosthetic treatment.

The aim of the present study was to assess the oral status, especially periodontal status, of middle-aged adults with untreated periodontitis.

Twenty adults with untreated periodontitis were chosen randomly from a total sample of middle-aged Lithuanians who sought periodontal treatment or were referred to a specialist in periodontology. One part of clinical examination included the diagnosis of caries and the estimation of the quality of fixed prostheses, and the second included estimation of the plaque index (OHI-s), the gingival index (GI), bleeding on probing, and periodontal pocket depth. The radiological examination from panoramic radiographs included assessment of the marginal bone level, detection of vertical bone defect, furcation defect and root filling. Marginal bone level was analyzed with regard to tooth type and gender and with regard to side (right vs. left) and the jaw (upper vs. lower). The groups were compared by means of t test, one-way ANOVA and cross-tabulation. The second assessment of marginal bone level was made and compared by means of correlation analysis. A high level of intra-observer agreement was found with Spearman's correlation $r = 0.97$ ($p < 0.01$).

DMFT was 12.9 ± 6.9 . Only 39.4% of the root fillings were of acceptable quality and 88.5% of prostheses were found unacceptable. Oral hygiene was fair for 75% of the sample (OHI-s > 1.0 with mean \pm SD, 1.4 ± 0.5). The overall marginal bone level was $40.1 \pm 8.2\%$, ranging from 20.5% to 53.7%, furcation defects comprised $5.9 \pm 2.2\%$, and 150 vertical bone defects were detected.

The oral status of middle-aged adults with untreated periodontitis is unsatisfactory. Caries, large numbers of teeth with apical pathology due inadequate endodontic treatment, an inadequate quality of fixed prostheses and insufficient oral hygiene can be the reasons for a more rapid progression of periodontitis. It may be suggested that for successful treatment of middle-aged adults with untreated periodontitis an integral approach is needed.

Key words: periodontitis, middle-aged adults, marginal bone level, vertical bone defect, furcation defect

INTRODUCTION

The burst theory of periodontitis indicates intermittent disease progression, where short periods of active disease or breakdown are interspaced with long periods of stability (1). Numerous studies of population from different countries have shown quite similar results. About 80% of the population was susceptible to periodontitis, which progresses rather

slowly and rarely results in tooth loss. While, around 10% of the population has referred to a high-risk group (2). For individuals from high-risk group inflammation may spread quickly and may involve deeper portions of the periodontium, consequently the loss of attachment and the loss of supporting bone proceed and end in a tooth loss ultimately (3). Periodontitis is site-specific, and periodontal breakdown may affect different teeth in the same mouth at different rate (4). In addition to site variations, it is apparent that different people show

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varying degrees of susceptibility to destructive periodontal disease (5). The difficulty to distinguish the actively progressing side from the non-progressing side has been reported, too (6).

Rapidly progressive (aggressive) periodontitis is most frequent in young and middle-aged adults. In these patients destruction of periodontium is rapid, and in most severe cases loss of the alveolar bone can occur within a few weeks or months. The disease may progress without remission to tooth loss or, alternatively, it may subside and become quiescent without or with therapy. If periodontitis progresses, most of patients respond favourably to periodontal treatment. However, without an adequate follow-up, it is not possible to distinguish which individuals will respond to therapy and which will not (7). Also, if the periodontium is untreated, such patients are susceptible to a rapid tooth loss, a serious complication such as a periodontal abscess, which has been noted as the 3rd most frequent dental emergency, and it is especially prevalent among untreated periodontal patients (8). Studies of periodontitis have shown that untreated patients compared with regular patients receiving prophylactic dental care exhibited a much higher bleeding tendency on probing and were more liable to develop severe periodontitis (9).

A number of local factors such as caries, bad oral hygiene, poor proximal restorations, abutments for fixed bridges and root fillings without and with pins and post-cores have been suggested as possible risk factors for a more rapid progression of periodontal diseases (10–13). However, some studies did not confirm a relationship between the quality of prosthodontic treatment and periodontal status (14). Also, it has been shown that if the treatment of teeth with apical pathoses is retarded, it impairs the periodontal status of patients with untreated periodontitis even if had impaired healing of periodontium after periodontal treatment, and consequently it is resulting in tooth loss (14).

It is important to note that in the mentioned studies from other countries the standard of the prosthetic treatment is high, therefore conclusions from these studies cannot be applied to the countries with a lower quality of prosthetic treatment. Although in Lithuania the prostheses have substantially improved in the recent years, many Lithuanians still wear fixed prostheses of an unacceptable quality and it may pose a risk for their periodontal health. Considering other local risk factors for periodontal disease, Lithuanians have not established either an efficient self-employed dental care or preventive attitude towards dental visit. Moreover, the

periodontal treatment was not comprehensive and it often included just scaling. The treatment modalities of periodontal disease have been started recently.

Thus, the consequences of untreated periodontitis in Lithuanians due to the lack of proper treatment and uncontrolled risk factors may be serious and irreversible. Teeth may be lost due to untreated periodontitis, as well as due to untreated caries. Unacceptable quality of prosthodontic treatment could induce the loss of teeth.

The present study aimed at analyzing the oral status of middle-aged adults with untreated periodontitis. Caries and the quality of endodontic and prosthodontic treatment are considered. The plaque index (OHI-s), the gingival index (GI), bleeding on probing and periodontal pocket depth are estimated. The marginal bone level is analyzed with regard to tooth type, gender, side (right vs. left), and jaw (upper vs. lower) with detection of vertical bone and furcation defects.

MATERIALS AND METHODS

Twenty adults (11 female and 9 male) with untreated periodontitis who sought periodontal treatment or were referred to the specialist in periodontology were chosen randomly from a total sample of middle-aged Lithuanians. The mean age of the patients was 36.3 years (range 26 to 37 years).

The clinical examination included caries prevalence (DMFT), where caries was diagnosed as the number of teeth with caries (DT), missing (MT), filled teeth (FT), teeth with secondary caries and root caries, assessment of the quality of fixed prostheses, when the quality of prostheses was estimated as unacceptable (crown overhanging, marginal fit discrepancy) or acceptable (needless of treatment).

The periodontal status was estimated both clinically and radiologically. The clinical examination included estimation of the plaque index (by Greene–Vermillion OHI-s index), gingival index (by Loë & Silness), bleeding on probing and periodontal pocket depth (15). Panoramic radiography was performed for each patient with ORTHORALIX SD 2 (Gendex, Dental System S.r.l., Milano, Italy), using the screen/film combination Lanex medium/T-mat G (Eastman Kodak Co., Rochester, N. Y., USA). The panoramic radiographs were enlarged 2 times with an enlarger (E. Leitz GmbH Wetzlar Germany, Hector f-8.5 cm 1:2.5) on a digitizing table (Bit Pad Plus, Summagraphics Corporation, Fairfield, CO) and analyzed with the aid a personal computer (Macin-

tosh Iici, Apple Computer, Inc., Cupertino Ca) with an image analysis program (Image version 1.31, NIH, Bethesda, MD, USA). Marginal bone level was assessed and expressed as a percentage of total root length. Marginal bone level was analyzed with regard to tooth type, gender, side (right vs. left) and jaw (upper vs. lower). The groups were compared by means of t test, one-way ANOVA and cross-tabulation. The second assessment of marginal bone level was made and compared by means of correlation analysis. A high level of intra-observer agreement was found with Spearman's correlation $r = 0.97$ ($p < 0.01$).

Also, from panoramic radiographs vertical bone and furcation defects were detected and the estimation of endodontic treatment was made, when the quality of root filling was evaluated as acceptable (no apical radiolucency, consistent root filling without voids) or unacceptable (necessitating treatment).

RESULTS

For caries diagnosis the mean value of decayed, missing and filled teeth (DMFT) was 12.9 ± 6.9 , were $DT = 2.4 \pm 2.0$ and $FT = 6.6 \pm 4.2$. There were 0.9 ± 1.6 teeth with secondary caries and 0.5 ± 1.0 of teeth with root caries. From panoramic radiographs was found the total number of root fillings – 63 (3.2 ± 3.6 per person). On the average, per patient 2.9 ± 2.3 teeth with an apical pathology were observed. The radiological evaluation revealed that only 39.4% of the root fillings were acceptable. Ten teeth were with pins and 7 teeth were with post-cores. Eighteen patients (90%) were with fixed prostheses; 26 prostheses were crowns and 11 fixed bridges. When the quality of prostheses was estimated, 88.5% prostheses were found to be unacceptable.

The plaque index OHI-s > 1.0 was found in 75% of patients with a mean \pm SD, 1.4 ± 0.5 . The gingival index $GI > 1$ was found in 85% patients, mean \pm SD, 1.8 ± 0.7 , bleeding on probing was found in 62.2% of sites, pus was found in $27.3 \pm 2.40\%$ of sites. The mean depth of periodontal pocket was 6 mm. Pockets deeper than 6 mm were found in 28.5% of the sites.

In the middle-aged group of patients with untreated periodontitis the overall marginal bone level was $40.1 \pm 8.2\%$, ranging from 20.5% to 53.7%. Figure 1 presents data on the marginal bone level (MBL) according to tooth type. A significant difference ($p < 0.01$) was found between molars and premolars, where MBL for molars was $34.4 \pm 8.6\%$ and for premolars $44.6 \pm 8.5\%$. The difference ($p < 0.01$) was significant between canines and molars too, as MBL for canines was $53.7 \pm$

$\pm 10.5\%$, while there was no significant difference ($p > 0.05$) between incisors and molars as MBL for incisors was $34.8 \pm 9.0\%$. Figure 2 presents data on MBL by tooth type and jaw. The MBL in the lower jaw was significantly higher than in the upper jaw for canines and incisors ($p < 0.001$), where as for canines in the lower jaw was $53.3 \pm 11.4\%$ and in the upper jaw $38.1 \pm 10.8\%$ and for incisors $31.5 \pm 9.7\%$ and $24.2 \pm 7.4\%$, respectively. No significant difference ($p > 0.05$) in MBL was found between males and females (Fig. 3) and between the right and left sides (Fig. 4).

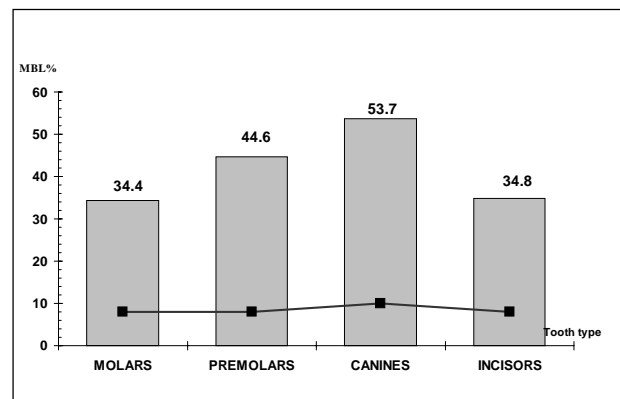


Fig. 1. Marginal bone level (MBL) according to tooth type

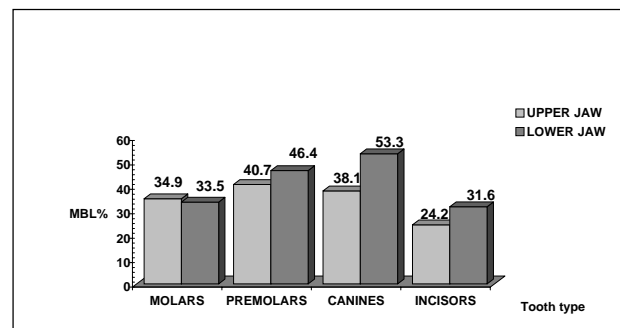


Fig. 2. Marginal bone level (MBL) by tooth type according to jaw

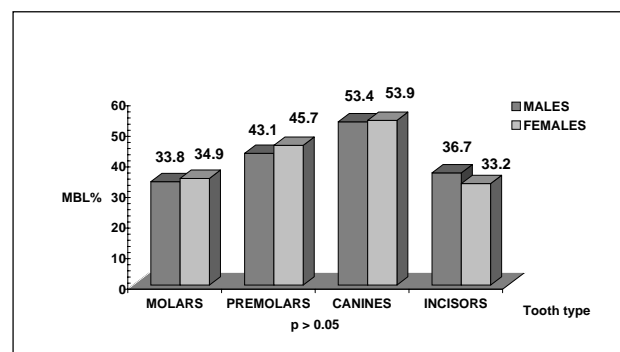


Fig. 3. Marginal bone level (MBL) by tooth type according to gender

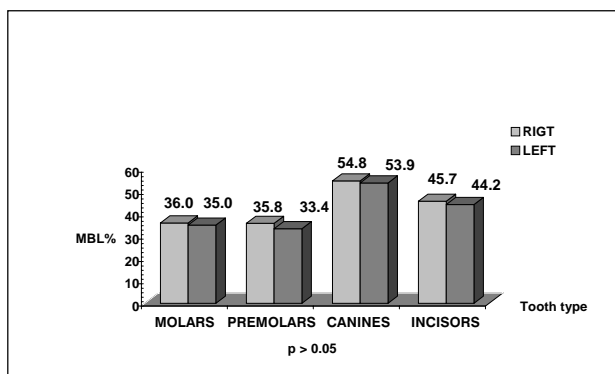


Fig. 4. Marginal bone level (MBL) by tooth type according to side

All patients had at least one vertical bone defect (range, 1 to 14) and the mean value was 6.2 ± 3.4 . Among 150 vertical bone defects, 123 were found with a different degree of vertical bone resorption, and the number of defects according to tooth type is shown in Fig. 5. In molars, 55 (42.6%) vertical bone defects were found, and 74 defects (60.2%) were found in intact teeth. The rest of defects (27 of 150) were found with vertical bone resorption to the apical bone area, 9 were molars or premolars and 18 were incisors. According to the site, vertical bone defects were found in the mesial ($4.8 \pm 2.1\%$) and distal sites ($3.9 \pm 2.6\%$), and more frequently on mesial surfaces (4.3 ± 2.3) than on distal surfaces (1.9 ± 1.4) ($p < 0.004$). The most frequently affected tooth site was the mesial side of the first molar in the upper jaw (13, or 10.6%). No significant difference ($p > 0.05$) was found in the number of vertical bone defects between females (67) and males (56) and between the upper (63) and lower jaw (60). The angle between the root surface and the alveolar bone ranged from 11.4° to 45.3° with a mean \pm SD $25.1^\circ \pm 3.3^\circ$. In Fig. 6 the mean angles for vertical bone defect of each patient are shown. The mean value of furcation defect was $5.9 \pm 2.2\%$.

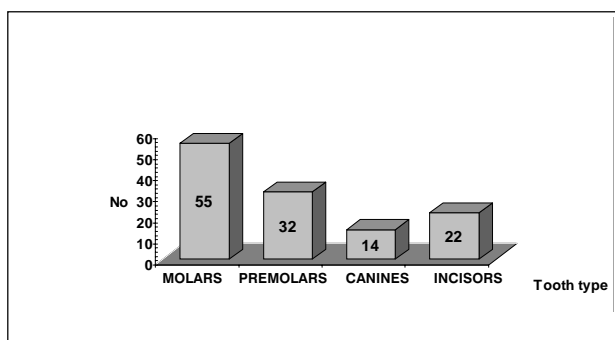


Fig. 5. Number (No) of vertical bone defects according to tooth type

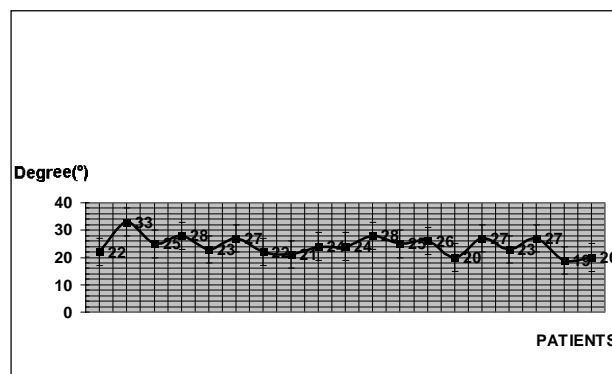


Fig. 6. Mean value of angles for vertical bone defects of each patient

DISCUSSION

The prevalence of periodontal disease in Lithuania is high, reaching 98% as known from the existing studies (16–17). However, in this study the oral status of 20 middle-aged patients with untreated periodontitis was analyzed. Middle-aged patients were chosen, because this group is active in the life (occupation, family, public activity, ect.). These patients were selected from the general population who were seeking periodontal treatment or referred to the specialist in periodontology. The small number of patients cannot reflect the real situation in all population or the middle-aged group, but preliminary findings about oral health and especially on periodontal status were found.

The quality of endodontic and prosthodontic treatment was estimated too. Although it has substantially improved in Lithuania in the recent years, most of the study patients needed re-treatment. As might have been expected for the patients of the present study, the average values of caries (18) and the quality of endodontic treatment (19) were found to be worse than in the general population of Lithuanian adults. Moreover, the number of teeth with untreated caries was high and the quality of both endodontic and prosthodontic treatment for the majority of patients was unacceptable. These patients will have just a few teeth left, which may be insufficient for constructing new fixed prostheses, as they already have substantially compromised dentitions. The basic principles for constructing fixed prostheses for patients with few available abutments and reduced periodontal tissue support do differ from those in patients with many available abutments. The clinical and technical difficulties are more pronounced (12).

Thus, the present study showed that the periodontal status in the group of patients studied was

unsatisfactory. The majority of patients presented a fair oral hygiene, *i.e.* 75% of patients had OHI-s > 1. Insufficient oral hygiene obviously plays a role in the progression of periodontal disease, and not without reason the gingival index GI > 1 was found in 85% of patients. Also, insufficient oral hygiene plays a role in a rapid progression of periodontitis, which could result either in a substantial vertical bone defect or even marginal bone resorption with tooth loss followed. The overall marginal bone level was 40.1% in this study; it means that the patients had already lost half of supporting tissue. The patients had lost a substantial number of their teeth and all of them had at least one vertical bone defect; one of the patients had even 14 vertical bone defects. Even 18% of vertical bone defects were characterized by a total destruction that reached the apical areas. A pattern of alveolar bone loss was observed, and about half of the vertical bone defects were found in molars; the mesial site of the first molar of the upper jaw was the most frequently affected tooth surface. The high number (150) and severity (27 with bone resorption up to the apex) of vertical bone defects could be indicative of active periodontitis. Also, the presence of vertical bone defects and insufficient oral hygiene make the prognosis at least uncertain. It is important to note that the spontaneous progression of periodontitis for middle-aged Lithuanians with untreated periodontitis seems to be rapid or aggressive, with loss of supporting tissue and substantial number of teeth.

CONCLUSIONS

The oral status of middle-aged adults with untreated periodontitis is unsatisfactory. Caries, large numbers of teeth with apical pathology due inadequate endodontic treatment, an inadequate quality of fixed prostheses and insufficient oral hygiene may be the reasons for a rapid progression of periodontitis. Successful treatment of middle-aged adults with untreated periodontitis implies the need of an integral approach.

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PACIENTŲ, NEGYDYTŲ DĖL PERIODONTITO, BURNOS BŪKLĖ. KLINIKINIS-RADIOLOGINIS TYRIMAS

S a n t r a u k a

Dėl periodontito stebime įvairius ir negrįžtamus pokyčius burnoje. Dantų netenkama dėl negydomo periodontito, kaip ir dėl negydomo ėduonies. Tuomet dantų lankai yra atstatomi protezais.

Šio tyrimo tikslas – įvertinti burnos būklę, ypač kraštinių periodonto, vidutinio amžiaus pacientams, negydytiems dėl periodontito – apydančio audinių uždegimo.

Iš Lietuvos vidutinio amžiaus suaugusiųjų, kurie kreipėsi į gydytoją periodontologą, buvo atsitiktinai pasirinkta 20 pacientų, negydytų dėl periodontito. Viena iš klinikinio tyrimo dalių – ėduonies diagnozė bei nenuimamų protezų kokybės vertinimas, kita – nustatomas supaprastintas burnos higienos indeksas (OHI-s), dantų indeksas, kraujavimas po zondavimo bei zonduojamos periodontinės kišenės. Panoraminėse radiogramose buvo vertinamas kraštinių kaulo lygis, vertikalūs kaulo defektai, furkacijų pažeidimas

bei gydytos dantų šaknys. Kraštinis kaulas vertintas pasitelkus ANOVA (kompiuterinės analizės sistema); čia kraštinių kaulo lygis buvo analizuojamas atsižvelgiant į dantų grupę ir lytį, taip pat į žandikaulį (viršutinis vs. apatinis) ir pusę (dešinė vs. kairė); statistinė analizė atlikta apskaičiuojant Studento *t* kriterijų. Apskaičiuotas dvigubo ištyrimo koreliacijos koeficientas $r = 0,97$ ($p < 0,01$).

Rezultatai ir išvados. KPI indeksas $12,9 \pm 6,9$. Tik 39,4% dantų šaknų gydytos kokybiškai, rasta 88,5% nekokybiškų nenuimamų protezų. 75% tiriamųjų burnos higiena nėra gera (OHI-s $> 1,0$, vidurkis $1,4 \pm 0,5$). Kraštinių kaulo lygis buvo $40,1\% \pm 8,2\%$, (čia min. 20,5% ir maks. 53,7%) bei $5,9\% \pm 2,2\%$ pažeistų furkacijų. Buvo rasta 150 vertikalų kaulo defektų.

Periodontitu sergančių suaugusiųjų burnos sveikata nepakankama. Ėduonis, nekokybiškas dantų šaknų kanalų gydymas, nekokybiškas protezavimas nenuimamais protezais ir, be abejonės, nepakankama burnos higiena gali būti greitai progresuojančio periodontito priežastys. Manome, kad vidutinio amžiaus pacientams, negydytiems dėl periodontito, reikalingas kompleksinis gydymas.

Raktažodžiai: suaugusiųjų periodontitas, kraštinių kaulo lygis, vertikalus kaulo defektas, furkacijos pažeidimas