American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)
ISSN (Print) 2313-4410, ISSN (Online) 2313-4402

http://asrjetsjournal.org/

Treatment Options of Periodontal Disease and its Complications in Patient with Type 2 Diabetes Mellitus

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Abstract

Diabetes mellitus type 2 is the most commonly diagnosed metabolic disorder, and its prevalence is expected to increase so much, that by 2030 approximately 10% of the population will have diabetes (especially type 2). The aim of this study: is to assess the treatment methods used for oral odontogenic infections in patients with type 2 diabetes, as well as postoperative complications depending on the applied treatment method. Materials and methods: a group of 112 patients with marginal inflammatory pathology was selected and evaluated. The followed parameters were: age, gender, inflammatory lesions, treatment type, one week, three and six months postoperative evolution. Data were centralized in electronic format using Microsoft Excel software. Results: The average age of patients was 57.3, and gender distribution was almost equal (51.78% males vs. 48.21% females). The majority of patients (47.32%) underwent a conservative treatment, while almost 68% had a very good postoperative healing at the 7 day postoperative recall. There was also a significant improvement of the values of glycated hemoglobin at both the three and the six months recall, with almost 2/3 of the patients presenting a normal gingival status. Conclusion : Periodontal disease has a negatively impact on diabetes control, and can worsen its complications, but periodical periodontal treatment improves glycemic status, the latter contributing further to better oral status and lower the incidence of complications.

Keywords: diabetes mellitus; periodontitis; odontogenic infection; complications; HbA1c.

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1. Introduction

Diabetes mellitus type 2 is the most commonly diagnosed metabolic disorder, that requires extensive self-care education and management [1,2]. Its prevalence is expected to increase; being predicted that by 2030 almost 10% of the world's population will have diabetes mellitus (DM) (overwhelmingly type 2) [3].

Epidemiological studies have revealed excess mortality associated with DM2, as well as an increased risk of DM2-related chronic complications with consequent decreased life span, the anticipated impact on global health and health care costs is enormous. The International Diabetes Federation estimated that in 2012, more than 371 million people worldwide had DM and that treating DM accounted for at least $471 billion (11% of total health care expenditures in adults) [3].

It is known that daily exercise, a healthy diet, weight loss, and a range of medications have shown benefits in keeping the disease under control and preventing its complications.

Prediction of the disease in asymptomatic patients as well as its harsh complications in patients already diagnosed is becoming a necessity, with the considerable increase in the cost of the treatment [2].

Although the prevalence of all types of chronic conditions is increasing, diabetes is one of the few long-term metabolic disorders that individuals can successfully manage, monitor and control on a day-to-day basis [4].

The metabolic state of DM2 is characterized by elevated blood levels of glucose resulting from: reduced effectiveness of insulin on its target tissues (insulin resistance) and a relative reduction in secretion of insulin. The exact glucose levels at which DM2 is diagnosed are necessarily arbitrary (based mainly on the threshold for presence of background retinopathy in epidemiologic studies); many people without being diagnosed with DM2 nevertheless have abnormally elevated levels of glucose, along with a degree of insulin resistance and inadequate insulin secretion [3].

Methods for determining the evolution of DM2 have changed with time and have been based on fasting or post challenge glucose or, most recently, hemoglobin A1c (HbA1c) testing [3], which gives an average of the blood glucose over 3 months. If it is high then control needs to be improved [5].

Good control of blood glucose level is important in preventing or delaying the complications of DM2, such as heart disease, peripheral vascular disease, visual loss and renal failure [5].

Current American Diabetes Association (ADA) diabetes mellitus management guidelines recommend a base target of HbA1c <7.0%. This target is most validated for microvascular complication risk reduction and has unclear implications for optimal macrovascular risk reductions. Long-term follow-up studies of 2 randomized controlled trials (RCTs) have demonstrated beneficial effects on long-term macrovascular outcomes with more intensive glycemic control, thereby suggesting a metabolic memory effect for hyperglycemia [6].

However, HbA1c level does not tell patients what their blood glucose is doing on a daily basis. Self-monitoring

of blood glucose (SMBG) is considered an essential component of diabetes self-care management, which is done by pricking the skin to get a drop of blood, putting that blood on a testing strip, and reading the result with a small meter.

This can be done at different times of day, before or after meals, or before or after physical activity.

When used appropriately, SMBG can help to identify factors associated with hyper- and hypoglycemia, facilitate learning, and encourage people with diabetes to improve their glycemic control [4,5].

The aim of this study is to assess the treatment methods used for oral odontogenic infections in patients with type 2 diabetes, as well as postoperative complications depending on the applied treatment method.

2. Material and methods

A total of 128 patients with diabetes type 2 treated in Maxilomed Clinic in Oradea, Romania were available for this study.

The selection was made in a period of 4 months, and all patients presented oral inflammatory odontogenic pathology.

Out of the total number, a subgroup of 112 patients which had marginal inflammatory pathology was selected.

The protocol was approved by the Ethical Committee of University of Oradea, Romania (no. 4/20.04.2018) and all the patients had signed the informed consent.

The inclusion criteria in the study were: confirmed diagnostic of type 2 diabetes, the presence of marginal inflammatory disease, signed informed consent and adult age (at least 18 years old).

Exclusion criteria was: non diabetic patients, patients without marginal inflammatory disease or who didn't sign the informed consent, patients younger than 18 years, associated diseases interfering with surgical treatment options (chemotherapy, bisphosphonate treatment, etc.), patients treated in other services, absence of postoperative follow-up.

Data was noted in patients' observation charts and the following variables were monitored: age, gender, inflammatory lesions, treatment type, one week, three and six months postoperative evolution.

Data were centralized in electronic format using Microsoft Excel software. Descriptive statistics of the assessed cases was performed with a two decimal accuracy.

For treatment of inflammatory lesions the following techniques were used: conservative (root scaling, apical resection, professional brushing), radical (complete tooth extraction and curettage of the alveola), mixed (extraction only of a few teeth).

3. Results

Most patients included in the study were aged between 60-69 years and male gender. (**Figure 1, 2**).

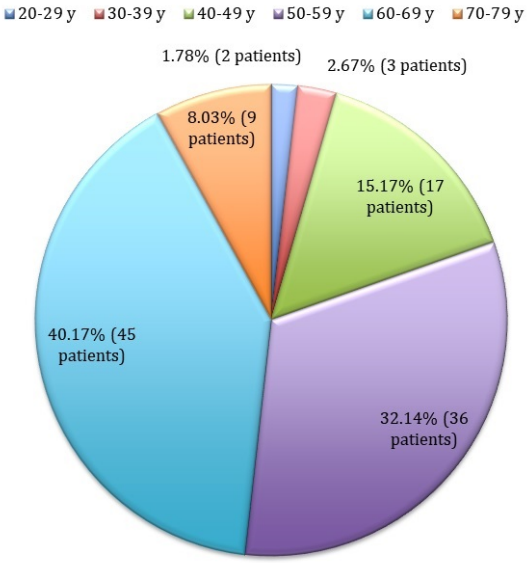

Figure 1: Number of patients distributed by age

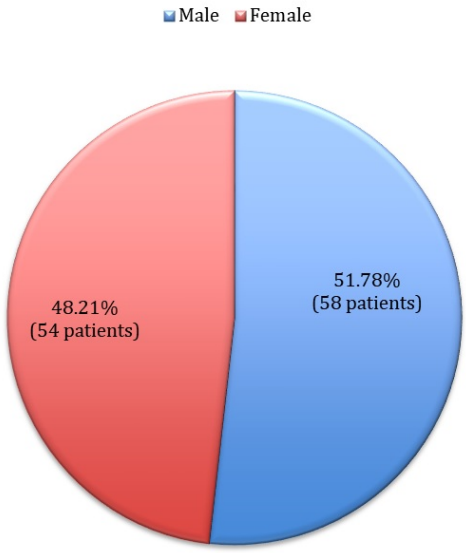

Figure 2: Patients distribution by gender

Besides the marginal inflammatory disease, two patients had also maxillary sinusitis, and 5 presented residual soft tissue after extractions prior the beginning of the study.

The majority of patients underwent a conservative treatment, followed by the mixed treatment. Four apical

resections were made (3 patients) and 120 teeth were extracted (40 patients). The radical treatment was applied only on 12 patients. (**Figure 3**).

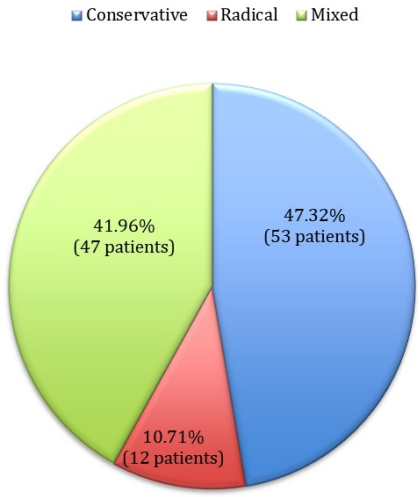

Figure 3: Treatment type

The one week postoperative recall concluded that: almost 68% of the patients had a good postoperative healing, 28.57% presented dehiscence and 3.57% had alveolitis. (**Figure 4**).

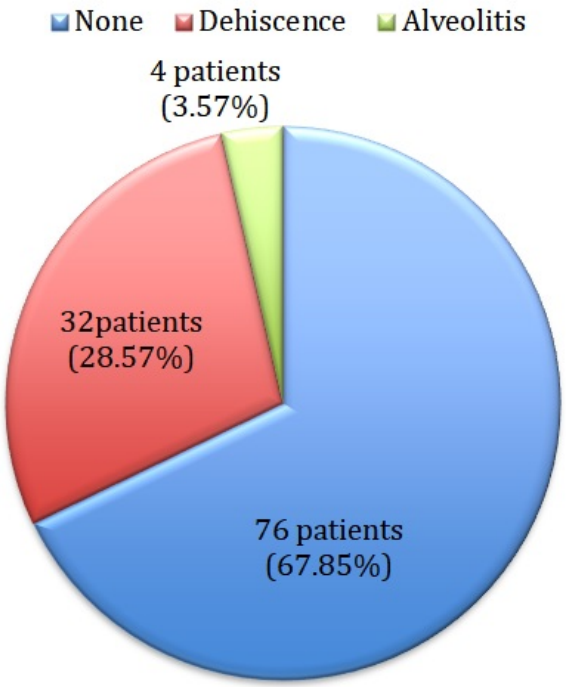

Figure 4: Complications at one week postoperative recall

Further recalls were scheduled three and six months later. We encountered a total of 21 drop-outs, 18 at the first

recall and 3 more at the second.

We found a significant improvement of all the values of glycated hemoglobin (average, maximal and minimal) at the three months recall, with more than half of the patients presenting a normal gingival status. 8 patients needed further surgical treatment.

The six months recall revealed an slightly increased value of glycated hemoglobin (+0.19) and similar oral status compared to values of the previous recall; only three patients needing further surgical treatment. (**Table 1**, **Figure 5** and **Figure 6**).

Table1: Glycated hemoglobin values (initial and at each recall)

Hba1c Value	Minimal	Average	Maximal
Initial	5.6	7.715	12.4
At 3 months	4.65	7.18	12
At 6 months	4.85	7.37	12.4

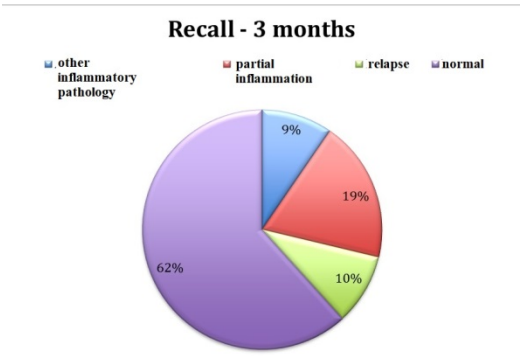

Figure 5: Oral status at the 3 months recall

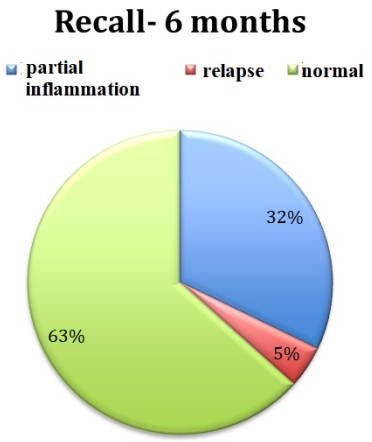

Figure 6: Oral status at the 6 months recall

4. Discussion

Very few patients were aware of the bidirectional relationship between oral health and general health status. Due to the fact that all of the patients included in the study group presented at least gingivitis if not periodontitis, and these were approximately 90% out of the total type 2 diabetic persons treated in our clinic, we can safely assume that they had no appropriate oral health behaviors. These behaviors are also influenced by socio-economic status; patients from lower socio economic groups showing often poor knowledge and attitude regarding oral health and services, having unhealthy habits, and being more likely to suffer from various oral diseases and oral health complications, including periodontal disease [7]. Besides lack of oral health knowledge, the cost of dental care and difficulty in scheduling appointments, contributed to discouraging people from seeking dental care.

After an excellent collaboration with diabetes care providers, we managed to increase the awareness among patients about their increased risk of oral health complications and motivated them to have regulated dental visits and better oral hygiene behaviors.

The high percentage of absence of complications at the 7 day postoperative recall shows the importance of oral health care education; the results of the 3 and 6 months recall sustaining this statement, with about 2/3 of the patients maintaining the good oral status on a longer period of time (lack of complications). Improving knowledge, attitudes and practices regarding oral health [8], plays a vital role in successful diabetes complications care [9]. The recurrence ratio was 10% at the 3 months recall, and only 5% 3 months later, despite maintaining the glycated hemoglobin average value at the same level.

Our results are suggesting that periodontal treatment improves glycemic status, the latter being effective in reducing periodontal inflammation and maintaining it at lowered levels throughout the period of observation.

In adults, periodontitis is the primary reason for tooth loss, and is an important public health problem due to its influence on life quality and its effects on both oral and overall health [10].

Despite having advanced periodontal disease, patients receiving radical treatment had a very good healing, explained by a significant reduction of local and systemic inflammatory and glycemic markers. This is in concordance with other studies in literature, that showed that patients with advanced periodontitis requiring extraction of all compromised teeth, reported a significant reduction of glycated hemoglobin levels after 3 (by 6.93%) and 6 months (by 4.47%), compared with the patients which did not have any teeth extracted [11,12].

The overall good final outcome suggests that no periodontal therapy is better than another regarding the improvement of glycemic control. Scaling and root planning alone slightly improves glycemic control, by reducing HbA1c levels only by 0.29% at 3-4 months. Periodic professional periodontal treatment and good oral hygiene preserved the oral health status and glycemic values achieved after therapy, proving their importance in maintaining clinical improvements for more than half an year [13].

The limitation of our study would be the number of the patients. Our sample was limited to patients with diabetes type 2 treated in Maxilomed Clinic in Oradea, Romania.

5. Conclusion

Despite type 2 diabetes having many complications, including slower healing rates, our study showed that although approximately ¼ of the patients presented postoperative complications, these were not severe and were easily treated. Conservative treatment is a good alternative, but only when oral health care education is done, patients showing positive health behaviors if informed about the consequences and risks of poor oral health.

6. Recommendations

Periodontal disease has a negatively impact on diabetes control, and can worsen its complications, but periodical periodontal treatment improves glycemic status, the latter contributing further to better oral status and lower the incidence of complications.

Acknowledgement

This study was supported through the Competitiveness Operational Program within the project entitled "Odontogenic infection in the patient with type 2 diabetes mellitus, an effective therapeutical approach", through contract no. 99/09.09.2016 ID P_38_632 Cod SMIS 2014+

Acest studiu a fost realizat prin Programul Operațional Competitivitate în cadrul proiectului intitulat: "Infecția de origine odontogene la pacientul cu diabet zaharat tip II, o abordare terapeutică eficientă", prin contractual nr 99/09.09.2016 ID P_38_632 Cod SMIS 2014+

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