Development and Substantiation of the Program for Preventing Oral Complications in Dental Tourism Settings

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Abstract

Dental tourism from abroad is actively developing in the Russian Federation today. Implantology services are most sought. Low costs of dental implantation as compared to western countries accounts for a high inflow of patients unless this procedure is covered by medical insurance. It should be noted that patients do not have to have follow-up dental visits as the condition of oral cavity and peri-implant area can be monitored remotely. This article analyzes the problem of clinical assessment of peri-implant tissue after dental implantation. All the participants of the dental tour adhered to the prevention programme developed by us after the surgery. Clinical and radiological examination was conducted before and 6 months after the implantation. Oral hygiene index, bleeding score, suppuration, and implant stability quotient were assessed. Florida Probe software was used to evaluate the condition of oral cavity. Treatment was provided according to treatment staging, after which the condition of oral cavity was assessed. The obtained results were analyzed to plan further procedures adjusted to new circumstances. Neither complications nor adverse effects were revealed in the participants of the dental tour, which has provided the evidence that the developed programme of preventing complications of dental implantation is justified and adjusted for dental tourists. Its use helps to reduce the financial costs of patients, the length and number of dental visits.

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Introduction

Dentistry has been one of the most sought areas of medical tourism worldwide in the past decades. A number of reasons account for increased demand for dental services, among which the reluctance to put up with oral cavity problems prevails. Oral diseases may result in cardiovascular, gastrointestinal, nervous and cerebral disorders [1,23].

This looming negative trend has given rise to a new social phenomenon – dental tourism. There are numerous reasons for seeking dental services abroad, while the most common of them consist in receiving high quality dental care, saving money and time. This also affects the distribution of the roles of dental tourism agents – dentists and travel companies. However, the growing importance of travel companies results in the commercialization of this type of tourism and therefore, lower quality of dental services, while the increasing importance of dentists may enhance the quality of dental services, but does not always make it possible to retain the high level of tourism services.

Dental implantation is one of the dominant dental areas both in private and municipal dental clinics[4,5]. Currently, dental implantation is one of the most costly dental procedures abroad[6]. For

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example, in Europe it costs about 80000 rubles, while it is 1.5 times cheaper in Russia. It should be noted that the quality of dental implantation in Russia remains high[7]. This fact makes dental tourism to the Russian Federation to have dentures and undergo dental arch restoration very appealing. However, the greater number of installed implants brings about higher incidence of postprosthetic complications, associated with peri-implant tissue inflammation[8]. Dental implant failures may be caused by various factors[9]. They include wound bed infections, quantitative or qualitative osteopenia, critical primary stability, premature loading of implants, parafunctional forces or dental implant overload[10]. The above-listed factors necessitate the development of the program for preventing inflammatory processes around dental implants[11]. Up-to-date diagnostic facilities will make it possible to tackle the problems associated with an implant, to work out simple measures for arresting pathologies and preventing tooth loss[12,13]. These measures have proved to be the most welcome for dental tourists when the patient cannot make an appointment with the dentist as soon as the early signs of a disease appear.

Objective of the study: To develop and substantiate the program for preventing postprosthetic complications of dental implantation in dental tourism settings.

Materials and methods

37 people from different countries (Hungary, Slovenia, Poland, Bulgaria, Turkey, and Canada) were engaged in the study. As dental tourists, they sought dental care in dental clinics of Volgograd, Russia, to have their dental arch restored by dental implantation. Dental care was provided to these patients according to the treatment plan below (fig.1).

A “zero stage” (preliminary stage) involved the evaluation of the general medical condition, gathering detailed information and findings, emergency treatment if necessary, oral hygiene assessment. All the data were verified and prognosis was made at the first stage. The second stage involved dental implantation proper. The third stage dealt with prevention measures, when life-long recommendations for oral care were provided to the patients on the basis of the prevention program developed by the authors. A schedule of subsequent follow-up steps was made up to monitor the condition of peri-implant tissue. All the patients were strongly recommended to have a dental visit, to make notes of the condition of peri-implant tissue using the Florida Probe System developed in the College of Dentistry of the University of Florida, which is currently considered the gold standard in this area [3]. This software enables dentists to observe patients online, assess the condition of their periodontal tissue on a computer screen remotely. If necessary, 4-colour screen printing can be used to make a paper copy to evaluate the clinical condition of patients. The software was used to assess the presence/absence of gum recession, clinical probing depth, detectable teeth mobility, bleeding or suppuration, dental plaque. Loss of peri-implant bone was revealed by X-ray.

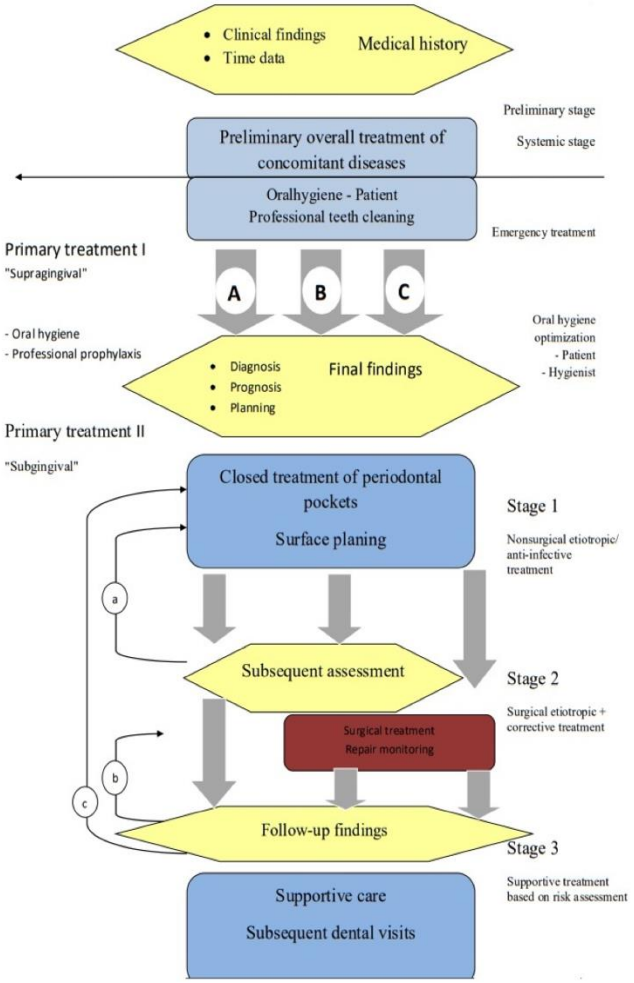

Figure 1. Treatment planning and staging.

The developed prevention program comprised the algorithm described below:

1. Education of the patient as to implantology issues.

2. Instructions on teeth cleaning and oral hygiene.
3. Use of agents making dental plaque visible in home settings, once daily for a week after teeth brushing to demonstrate how to use a toothbrush properly.
4. Instructing patients on interdental oral hygiene. Use of dental floss.
5. Use of low abrasive tooth pastes.
6. Administration of mouth rinses (CHG-containing).
7. Use of water flossers with chlorohexidine-containing solution (0.06%).
8. Tongue cleaning to prevent *foetor ex ore* pathology.
9. Administration of the sedative agent Tenoten, 1-2 tablets twice daily, in some cases up to four times daily. The treatment lasts from 1 to 3 months. A second course is recommended in 6 months [4].
10. A follow-up visit in 6 months.

The examination was based on the standardized method of comprehensive assessment of the condition of teeth, periodontal tissue and restorations. Based on the assessment of the condition of teeth, implant and adjacent tissues, caries lesions, abrasion defects, inadequate prosthetic try-in were documented. Oral hygiene indices were used to evaluate the quality of oral self-care. We calculated the plague control record (PCR), Svrakov iodine value and performed periodontal screening and recording (PSR). To assess pain sensitivity, the Hossley-Bergman pain intensity scale and the pain rating index (PRI) were used.

Pain was rated using a four point scale before and after treatment: no pain – 0, mild pain – 1 point, moderate pain – 2 points, severe pain – 3 points, unbearable pain – 4 points. The dental radiogram interpretation included the following procedure: the condition of cortical plate was assessed (no changes, cortical plate thinning, impaired integrity of cortical plate). Furthermore, the condition of peri-implant bone tissue was evaluated on the basis of the following criteria: no changes; horizontal and vertical resorption of the bone tissue of the alveolar process around the implant from 0.25 of its length to complete destruction.

Long-term outcomes were assessed (after 6 months' follow-up). This assessment entailed detection of any pathologies and complications, the evaluation of the peri-implant tissue condition dynamics with reference to the implemented prevention program.

Results

After the transplantation none of the patients required a dental visit within a 6 months' period. The Florida Probe System program detected neither signs of inflammation nor complications of peri-implant tissue. No exacerbation was detected at any stage apart from the fact that only after 3 months 9 people, whose examination revealed mild edema associated with hyperemic mucous lining of the peri-implant tissue, had complained of unbearable pain. It was likely due to improper cleaning of interdental spaces with interproximal brushes and subsequent occasional gum injuries. The further follow-up showed that the pain had quickly abated. The pain rating index amounted to 0.97±0.18 points.

The patients managed to practice satisfactory oral hygiene for 6 months. The plaque control record (PCR) reached 25.6±0.7% on average. Svrakov's iodine value was 0.4±0.1. Implant mobility was not revealed. ISQ amounted to 71.5±1.5. The periodontal screening was 0.2±0.01 points. No bleeding was detected, full mouth bleeding score was 5.5±0.5 only in 7 patients, and it had a zero value in other patients. Neither signs of suppuration nor bone tissue loss were revealed. A program for preventing postprosthetic complications was corrected if needed.

Six months later all the patients were invited for a dental check-up. A comprehensive assessment of the condition of peri-implant tissue, compliance with recommendations of the prevention program, treatment regimen and oral hygiene quality was performed in the participants of the dental tour.

Considering cumulative management of patients, their management protocol was drawn up based on CIST classes [3] and the developed management regimen (table 1).

Probing depth, mm	Hygiene index	Bleeding On Probing	Radiological signs of tooth loss
≤3	-/+	-/+	-
4-5	+	+	-
>5	+	+	≤2 мм
	+	+	>2 мм

Table 1. Clinical and radiological parameters.

A conclusion about the need for treatment was made on the basis of CIST classes (fig.2).

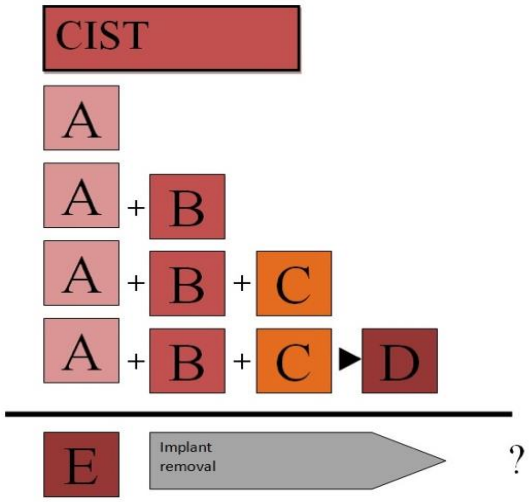

Figure 2. "Treatment cascade", CIST.

Procedure A is performed in case of peri-implant tissue inflammation and mucositis. It implies mechanical cleaning of an implant with a paste and a rubber tip, dental plaque removal with plastic tools.

Procedure A+B means that antiseptic medicamental treatment with CHG-containing solutions alongside with water flossing in home settings is added to procedure A.

A+B+C is used when the probing depth is more than 5mm and there are signs of bone loss, indicating peri-implantitis development. It involves antibiotic therapy.

A+B+C+D – regenerative or resective treatment (surgical intervention). This radical procedure helps to prevent the loss of dental implants.

Procedure E is performed when implantological treatment fails, osseointegration is lost and there are clinical and radiological signs of dental implant failure [3]. It should be noted that a new implant can still be installed at this stage [10].

The dental check-up of the participants of the dental tour yielded the following findings: the plaque control record (PCR) reached 13.9±1.2%, which was 1.8 times lower compared to the previous index value (25.6±0.7% with $p<0.05$). Svrakov's iodine value was zero. The implant stability quotient amounted to 70.5±1.0 ($p>0.05$). Based on these findings, a decision that procedure A had to be performed was made, there were no indications for performing other procedures.

Therefore, the developed program for preventing postprosthetic complications during dental implantation is well-grounded and can be recommended for dental patients. Moreover, in dental tourism settings comprehensive monitoring of preventive measures, oral hygiene and early complications can be performed. Owing to that, a need for surgical interventions is likely to decline. Complete and comprehensive follow-up dental care can be achievable and financially affordable in dental tourism settings.

Discussion

It is easier to prevent a disease than to cure it. At early stages, it is rather difficult to prognosticate the development of pathologies in patients with peri-implantitis. Besides, if initial signs of inflammation are registered quite early, the disease progression may be reversible. In other words, mucositis can be cured, whereas peri-impantitis associated with it, is irreversible; bone tissue resorption can only be suspended and long-lasting remission can be achieved.

Introduction of prevention programmes in dental tourism settings is an important and integral part of modern dentistry. Prevention is not only less costly than treatment (which is highly important today), but it is also more convenient, accessible and simple.

Periodontal pathogens forming a microbial film are the primary etiological factor in peri-implant inflammation development. If this does not occur, no inflammation of the tissue surrounding the implant develops. Therefore, the initial stage of prevention measures entails dental plague removal, rinsing with solutions containing chlorhexidine, enhancing the patient's motivation to maintain adequate oral hygiene. [14,15]Under current conditions, it is impossible to attain the optimal level of hygiene, however, the recent research has demonstrated that periodontal

inflammation does not aggravate if the interval between follow-up visits is adequately determined and strictly followed [14,15]. Moreover, the patient has to comply with all the dentist's recommendations. The prevention programmes must be implemented in a strictly defined succession, not occasionally but at specified time intervals. At this stage, this is required of both the dentist and the patient. The time allocated for a dental visit can be reduced in the dental tourism settings, however, the patient has to strictly adhere to all the dentist's recommendations at home. Only individual, comprehensive and sustainable implementation of all prevention measures can yield good outcomes. Moreover, the development of post-prosthetic complications of dental implantation will be impermissible in a dental visit context.

Conclusions

The conducted study has demonstrated that the prevention of peri-implantitis development may be successful only when all the therapeutic manipulations are performed at early stages, in a comprehensive and sustained manner. The elaborated programme for prevention in dental tourism settings is long-term and aims at maintaining oral health. The dentist must not only be updated about all the recent developments in implant diagnosis and pharmacotherapy opportunities, but also be aware of systemic medical relationships including somatic ones and promptly inform their patients about them.

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Declaration of Interest

The authors report no conflicts of interest pertaining to any of the products or companies discussed in this article.

References

1. Mikhalchenko D.V., Makedonova Yu.A., Poroysky S.V. Stress kak factor-predictor razvitiya periimplantita (obzor) [Text] / D.V. Mikhalchenko, Yu.A. Makedonova, S.V. Poroysky [in Russian] // Georgian medical news. 2019; 9 (294): 46-50
2. Soekanto S. A., Husniah N. N., Purwanti L., Sulistyani N., Hermansyah H., Wijanarko A., Sahlan M. Tooth Coating Gel with Casein Phosphopeptide–Amorphous Calcium Phosphate and Propolis to Prevent Dental Caries. Journal of International Dental and Medical Research 2019; 12 (4): 1298-1304.
3. Rexhepi A., Hamiti V., Agani Z., Kutllovci T., Xhemajli B., Loxha M. Efficacy of Antibiotic Prophylaxis in The Prevention of Bacterial Endocarditis in Dental Practice. Journal of International Dental and Medical Research 2019; 12 (3): 1011-1016.
4. Mardian A., Darwita R. R., Adiatman M. Factors Contributing to Oral Health Service Use by the Elderly in Payakumbuh City, West Sumatra. Journal of International Dental and Medical Research 2019; 12 (3): 1123-1130.
5. Darwita R., Setiawati F., Andiani S. Association of Propolis Fluoride with Arrested Dentinal Caries and Dental Plaque Levels. Journal of International Dental and Medical Research 2019; 12 (2): 622-627.
6. Santoso T., Djauharie N.K., Kamizar, Ahdi W., Latief F., Suprastiwi E. Carboxymethyl Chitosan/Amorphous Calcium Phosphate and Dentin Remineralization. Journal of International Dental and Medical Research 2019; 12 (1): 84-87.
7. Mikhalchenko D. V., Makedonova Yu. A., Yurkevich A. V., Ushnitskii I. D. Non-medicinal Methods of Treatment of Postprothetic Inflammatory Complications in dental Implantation [Text] D. V. Mikhalchenko, Yu. A. Makedonova, A. V. Yurkevich, I. D. Ushnitskii [in Russian] // . Far Eastern Medical Journal 2020; 1: 111-115.
8. Makedonova Yu. A., Mikhalchenko D. V., Vorob'ev A. A., Salyamov H.Yu. Pathogenetic Concepts of Development of postprothetic Complications (Review) [Text] Yu. A. Makedonova, D. V. Mikhalchenko, A. A. Vorob'ev, H.Yu. Salyamov [in Russian] // Georgian Medical News 2020; 3 (300): 38-42.
9. Zakia A, Zaura K. Anggraeni, Adiatman M. Association between Oral Health Status and Oral Health–Related Quality of Life in Diabetes Patients. Journal of International Dental and Medical Research 2018; 11 (1): 181-186.
10. Syahrial, Masulili C., Kusdhany L. Oral Health Knowledge, Denture Status, and Oral Health Related Quality of Life of the Elderly. Journal of International Dental and Medical Research 2018; 11 (3): 1044-1048.
11. Hussein A., Almoudi M., Zen S., Azmi N., Schroth R., Hassan M. Parental Awareness and Knowledge of Vitamin D and Its Health Benefits for Children. Journal of International Dental and Medical Research 2018; 11 (3): 916-924.
12. Adiba S., Effendy R., Zubaidah N. Fluoride Varnish Effect on Dental Erosion Immersed with Carbonated Beverages. Journal of International Dental and Medical Research 2018; 11 (1): 299-302.
13. Rahardjo A., Ramadhani A., Adiatman M., Wimardhani Y., Maharani D. Efficacy of Mouth Rinse Formulation Based On Cetyl Pyridinium Chloride in the Control of Plaque as an Early Onset of Dental Calculus Built Up. Journal of International Dental and Medical Research 2016; 9 (3): 184-188.
14. Sahbaz C., Adiguzel O. An Evaluation of the Efficiency of Different Irrigation Systems on the Smear Layer. Journal of International Dental and Medical Research 2014; 7 (1): 14-20.
15. Kridaningrat B., Soegyanto A., Wimardhani Y. Correlation of Oral Health Literacy with Demographic Factors and Oral Hygiene Among the Elderly. Journal of International Dental and Medical Research 2017; 10 (Special Issue): 460-464.