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COMPARATIVE ASSESSMENT OF METHODS OF INCLUDED DENTITION DEFECTS REPLACEMENT IN PATIENTS WITH STAGE I GENERALIZED PERIODONTITIS

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Several ways exist to restore the missing teeth in the presence of included defects. These include implantation, removable prosthetics and the manufacturing of dental bridges. The purpose of the study was to perform a comparative characterization of various restoration methods of the tooth row, including defects in patients with stage I generalized periodontitis. 61 patients with subsequent replacement of the dentition defect were examined, namely, 19 patients, with the help of removable structures. In 20 patients, dental implants were used, and in 22 patients, fixed dental bridges were made to replace the defect. The condition of the abutment teeth was assessed before the restoration, after 6, 12 and 24 months. The study's results (the amount of epithelial attachment loss, periotestometry data, and the level of bone tissue resorption) testify to the advantages of using dental implants to replace included dentition defects. Installing dental implants creates conditions for a uniform chewing load, which promotes stable remission and stabilization of the inflammatory and dystrophic process in periodontal tissues, creates comfort for the patient and improves his quality of life.

Key words: dentition defect, generalized periodontitis, dental implantation, tooth mobility, tooth restoration.

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ПОРІВНЯЛЬНА ОЦІНКА СПОСОБІВ ЗАМІЩЕННЯ ВКЛЮЧЕНИХ ДЕФЕКТІВ ЗУБНИХ РЯДІВ У ПАЦІЄНТІВ ІЗ ГЕНЕРАЛІЗОВАНИМ ПАРОДОНТИТОМ І СТУПЕНЯ

Натепер існує декілька способів відновлення втрачених зубів при наявності включених дефектів. До них належать: імплантація, знімне протезування та виготовлення мостоподібних конструкцій. Метою роботи була порівняльна характеристика різних способів відновлення зубного ряду при його включених дефектах у пацієнтів із генералізованим пародонтитом І ступеня. Обстежені 61 пацієнт із подальшим заміщенням дефекту зубного ряду, а саме у 19 пацієнтів - за допомогою знімних конструкцій, у 20 пацієнтів використовували дентальні імплантати та у 22 пацієнтів для заміщення дефекту були виготовлені незнімні мостоподібні конструкції. Оцінку стану опорних зубів проводили перед початком відновлення, через 6, 12 та 24 місяці. Результати дослідження (ВЕП, дані періотестометрії, рівень резорбції кісткової тканини) свідчать про переваги використання дентальних імплантатів для заміщення включених дефектів зубних рядів. Інсталяція дентальних імплантів створює умови для рівномірного жувального навантаження, що сприяє стійкій ремісії та стабілізації запально-дистрофічного процесу в тканинах пародонта, створює комфорт для пацієнта та покращує його якість життя.

Ключові слова: дефект зубного ряду, генералізований пародонтит, дентальна імплантація, рухомість зубів, відновлення зуба.

The study is a fragment of the research project "Development of pathogenetic prevention of pathological changes in the oral cavity of people with internal diseases", state registration No. 0121U108263.

Today, the number of patients with secondary edentulism who have lost one or two teeth is increasing [7]. The reasons for the loss of the latter can be complicated caries, periodontal tissue diseases, traumatic lesions, etc. [2, 4]. Periodontal tissue diseases currently occupy one of the leading places in developing secondary edentulism [5, 10]. The first molars in the lateral area (class III, according to Kennedy) and the lower central and lateral incisors in the frontal section (class IV, according to Kennedy) are significantly often removed first. The process of replacing these dentition defects is relevant, especially in patients with generalized periodontitis [3].

Several ways exist to restore the missing teeth in the presence of included defects. These include implantation, removable prosthetics and the manufacturing of dental bridges. Each of them has its advantages and disadvantages. Using removable dentures allows you to reduce the chewing load on the teeth located next to the defect. Still, at the same time, they are pretty often unaesthetic due to their fixation elements and require daily removal [8]. Dental bridges involve the preparation of hard tissues of abutment teeth, sometimes their devitalization. Fixed dentures in patients with generalized periodontitis often lead to increased mobility of abutment teeth [9]. Dental implantation allows you to preserve the teeth bordering the tooth defect without preparation and to ensure a more even load on the existing teeth.

The purpose of the study was to perform a comparative characterization of various restoration methods of the tooth row, including defects in patients with stage I generalized periodontitis.

Material and methods. To achieve this purpose, we replaced Kennedy Class III and IV dentition defects with the help of various orthopedic structures in patients with stage I generalized periodontitis.

Group 1 of examinees included 19 patients with dentition defects restored with removable structures fixed with clamps. Group 2 consisted of 20 patients who were fitted with Alpha dent active bio dental implants. Our previous studies show that Alpha dent active bio dental implants were highly efficient in restoring lost teeth in patients with chronic generalized periodontitis [6]. Dentition defects in 22 patients of Group 3 were replaced with metal-ceramic dental bridges.

The criteria for inclusion in the study were: men and women aged 25 to 65; stage I chronic generalized periodontitis; dentition of Class III and IV according to Kennedy; voluntary signing of the informed consent for participation in the study.

Exclusion criteria: lack of voluntary informed consent to participate in the study; acute or aggravated course of somatic diseases; manifestations of diseases of the oral mucosa.

In individuals of all three groups, a generally accepted clinical dental examination was performed with details of the periodontal status (hygienic and periodontal indices), laboratory assessment of clinical and biochemical blood tests, the content of vitamin D, thyroid hormones, trace elements in the blood, as well as X-ray examination. The assessment of the condition of the abutment teeth bordering the defect was analyzed with the help of a functional examination using the automated system “Pa-on parometer” (digital objectification of the amount of epithelial attachment loss (EAL), the depth of the periodontal pocket, the amount of gum recession, etc..), a device for measuring the mobility of teeth “Periotester M” and X-ray examination methods (computed tomography, orthopantomogram, intraoral photos) before prosthetics and after 6, 12 and 24 months. If necessary, patients were referred to internists for consultation. The diagnosis was verified based on the classification of M.F. Danylevsky (2004).

Before starting the replacement of dental defects by the Standards for the diagnosis and treatment of dental patients (order of the Ministry of Health of Ukraine “On approval of protocols for providing medical care” dated 11/23/2004 No. 566), a comprehensive examination (local and general) was conducted for all patients, if necessary, with the consultation of internists, as well as drawing up a treatment plan and algorithm of the dentist's actions. Prosthetics of teeth included in the lateral area were carried out according to general rules at the stages of comprehensive rehabilitation of periodontal patients.

All study results were processed using variational statistics methods for small samples.

Results of the study and their discussion. Patients of all three groups at the beginning of clinical studies complained about defects in the dental rows and bleeding gums during brushing and eating. The general condition of the patients was not impaired. During the objective examination, no exacerbation was detected in the periodontal tissues. Tooth mobility according to the values of the “Periotest M” device corresponded to 0–1 degree of pathological mobility. The values of the EAL level in all three groups were the same and were within the stage I severity of generalized periodontitis. On the cone-beam CT image performed on all patients before the study, resorption of the alveolar ridge was noted up to 1/3 of the length of the tooth roots. The results of digital objectification of the condition of the abutment teeth of the three groups of patients before the replacement of tooth rows are presented in Table 1.

Table 1

Initial condition of abutment teeth of patients of experimental groups

Parameters	Group 1 n=19	Group 2 n=20	Group 3 n=22	p
EAL, mm	2.8 (2.0–3.4)	2.7 (2.0–3.4)	2.9 (2.4–3.4)	p_{1-2} =0.695 p_{1-3} =0.361
Mobility level	15.7 (13.1–19.3)	15.5 (11.0–19.0)	22 (12.8–18.9)	p_{1-2} =0.776 p_{1-3} =0.567
Level of exposure of the tooth root length, %	23.7 (15.0–28.0)	18.4 (12.0–27.0)	21.4 (16.0–27.0)	p_{1-2} ≤0.001 p_{1-3}=0.046

6 months after the performed orthopedic treatment, people of the first group had complaints of slight bleeding of the gums in the area of the teeth bordering the defect when brushing their teeth. The condition of the orthopedic structures was satisfactory. Objective examination revealed the presence of congestive-hyperemic gums in the area of attachment of the clamps of removable dentures. The EAL of the abutment teeth increased insignificantly (median by 0.1), while the periotestometry indicators increased slightly (by 3 units). In the intraoral photos, there was no increase in resorption of the alveolar process in the area of the abutment teeth.

Group 2 patients, whose teeth defects were replaced with Alpha dent active bio dental implants, had no complaints after 6 months. The values of EAL and periotestometry did not change. The bone tissue's state was unchanged on an intraoral X-ray in the abutment teeth area.

Group 3 patients, whose tooth row defect was replaced by the production of metal-ceramic dental bridges, also had no complaints after 6 months. The values of EAL fluctuated within 3.5 mm. The median level of mobility of abutment teeth almost did not change, but the upper limit of mobility increased slightly to 2 units. No changes in alveolar process resorption were observed on intraoral photos.

12 months after the end of orthopedic treatment, patients in Group 1 continued to have complaints of periodic bleeding of the gums in the area of the abutment teeth. The EAL median values increased by 0.8 mm, while the upper mobility limit increased by 1 mm. Periotestometry values of abutment teeth increased (median by 5 units), while the upper limit of mobility increased by 6 units. According to the analysis of abutment teeth' intraoral photos, the alveolar process's resorption also increased by 4 % (median and upper limit).

The patients of Group 2 did not complain after one year in the dynamics of observation. Their EAL values (median and upper limit) in the areas of the studied teeth were unchanged. In contrast, the values of periotestometry became slightly better (the median decreased by 1.1 units and the upper limit by 0.7). The intraoral radiography showed no changes in the upper limit of resorption, while the median increased by 0.3 %.

After 12 months of observation, the subjects of Group 3 complained about periodic bleeding of the gums in the area of the abutment teeth and a slight increase in the mobility of the teeth. EAL values increased (median by 0.8 mm, upper limit by 1.3 mm). Periotestometry indicators had some changes, with an unchanged median and an increase in the upper limit by 6.4 units. The X-ray showed increased bone resorption of the jaws in the area of the abutment teeth (median by 8.1 %, upper value by 10 %).

The patients of groups 1 and 3, 2 years after the completion of the treatment and replacement of the defects of the dental rows, complained of bleeding gums and a slight increase in the mobility of some teeth, while the patients of the 2nd group had no complaints. Clinical examination showed the EAL increase in patients of Group 1 (median by 1.1 mm, upper value by 1 mm), in Group 3 (median and upper value by 1.5 mm), in contrast to the EAL in patients of Group 2, which remained unchanged (Table 2).

Table 2

Condition of abutment teeth of patients of experimental groups

Parameters	Group 1 n=19	Group 2 n=20	Group 3 n=22	p
EAL, mm	3.9 (3.2–4.4)	2.8 (2.1–3.4)	4.4 (4.0–4.9)	$p_{1-2} \leq 0.001$ $p_{1-3} \leq 0.001$
Mobility level	22.6 (19.3–27.5)	14.7 (11.2–18.4)	25.5 (22.4–29.3)	$p_{1-2} \leq 0.001$ $p_{1-3} = \leq 0.001$
Level of exposure of the tooth root length, %	33.3 (26.0–38.0)	18.4 (12.0–27.0)	38.6 (33.0–43.0)	$p_{1-2} \leq 0.001$ $p_{1-3} = \leq 0.001$

After 24 months, periotestometry parameters in Group 1 increased by 6.9 units of the median and 8.2 units of the upper limit. The mobility of the abutment teeth of Group 2 decreased by 0.8 units and the upper limit by 0.6 units. Dental periotestometry indicators of patients in Group 3 increased by 3.5 units of the median and by 10.4 units of the upper limit.

X-ray data of bone tissues of the jaws in patients in Groups 1 and 3 indicated an increase in the amount of the alveolar process resorption in the area of the abutment teeth (median by 9.6 % in Group 1 and by 17.2 % in Group 3, while the upper limit increased by 10 % and 16 %, respectively). The bone tissue in the area of the teeth bordering the defect in patients of Group 2 remained unchanged.

According to Kennedy, the study results indicate a significant advantage of replacing included defects of the tooth row of class III and IV with the help of dental implants. They allow you to distribute the chewing load evenly. In turn, this increases the period of use of this orthopedic structure and has a more favorable prognosis for teeth bordering on a dentition defect than removable prostheses and metal-ceramic dental bridges. Our data coincide with the research conducted by O.M. Doroshenko and O.V. Bida (2021), who also prefer replacing dentition defects in patients with generalized periodontitis with the help of dental implants[1, 3].

Based on the results of the examination of the specified patients, as well as previously conducted studies with patients with stages II and III generalized periodontitis (a total of 204 patients) [6], as well as 26 patients without signs of generalized periodontitis, we calculated the durability of teeth depending on the EAL value, tooth mobility and the amount of resorption of the alveolar process in the area of each tooth. This allowed us to develop a program that predicts the personalized, most appropriate way to replace the included dentition defect [5, 6]. To obtain such a prognosis for the replacement of the included dentition

defect, it is necessary to select the teeth bordering the defect, enter their parameters of the clinical state, namely the amount of resorption of the alveolar process around the root, EAL and the degree of tooth mobility according to the "Periotest M" data. As a result of processing by the program, a value is obtained, which will glow green in the presence of favorable conditions for permanent prosthetics with dental bridges. Otherwise, the color will be red, which indicates that it is impossible to use fixed dental bridges in this case.

Conclusion

Thus, the results of the conducted study indicate the practicality of using dental implants in the replacement of included defects of tooth rows of Classes III and IV, according to Kennedy, in patients with stage I chronic generalized periodontitis in the absence of local and general contraindications to their use. Installing dental implants creates conditions for a uniform chewing load, which promotes stable remission and stabilization of the inflammatory and dystrophic process in periodontal tissues, creates comfort for the patient and improves his quality of life.

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