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Analysis of using the method of immediate dental implantation

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Introduction. Immediate dental implantation makes it possible to maintain the quantity of jaw bone tissue at the area of the removed teeth. Amount of the inflammatory complications in the post-operative period reduces. Method has minimized quantity of operations and their traumatism. It reduces period of rehabilitation by 4–6 months when using dentures with support for dental implants.

The aim of the work is to analyze the long-term results of immediate dental implantation.

Objects and methods. 65 patients aged 25–68 years were treated. Patients were included in the study according to the following criteria: 1) one or two implants within a single segment (by using method of immediate dental implantation on the lower or upper jaw). Radiation methods of investigation were carried out in dynamics: 1-st study before surgery – dental implantation; 2-nd through 6 months; 3-rd – 12 months after the operation.

Results. All implants were osseointegrated. Jaw bone tissue uniformly adhered to the entire surface of the implants, pathological bone resorption was absent.

The conclusion. Immediate dental implantation is used in clinical situations when the gingival volume is saved, there is no atrophy of the alveolar bone, oral mucosa isn't thinned. There are no clinical signs of the pathological process in the periapical zone of the removed tooth.

Key words: immediate dental implantation, osseointegration, ray methods.

Introduction

Mostly success of the implantation is determined by the correct choice of the implant design, indications and technique of the operative intervention, the period of rehabilitation and the system of preventing complications [1, 3, 10]. Against the backdrop of fast and active development of dental implant prosthetics method, one of the significant shortcomings is a need for repeated visits, repeated manipulations (for example, anesthesia), and long duration of the whole treatment. The existing ways to reduce the number of visits and reduce the overall duration of treatment are covered in the modern literature, supported by the scientific justification for indications for the choice of methods of exposure [5, 6, 8]. One of the methods is to install the implant immediately after the extraction of the tooth. In such situations, both basal single-stage and classic two-stage intraosseous implants can be used. The implantation of the intraosseous element into the socket of the removed tooth eliminates the need for a long wait for its healing, as well as the repeated administration of an anesthetic and additional visits [2, 7, 9].

Usage of the method of one-stage implantation makes it possible to maintain 60–90 % of the alveolar bone quantity at the area of the removed teeth. At the same time, without implantation, after tooth extraction, due to resorption and atrophy of bone tissue, after 6–12 months quantity of jaw bone preserved only at 40–50 %, and the height of the alveolar bone is reduced by 3–7 mm (Figure 1). Immediately dental implantation reduces amount of inflammatory complications at the post-operative period, minimizes quantity of surgical interventions and their traumatism. It allows to shorten the time of rehabilitation with the use of orthopedic structures with support for dental implants for 4–6 months [3, 5].

A significant factor in successful treatment, including prosthetic implants, is the state of oral hygiene of the patient [1, 3, 9]. In that regard, oral hygiene is an important part of the sanitation of the oral cavity. In the aspect of dental implantation, they become even more important, helping to reduce the risk of complications during the surgical stage and positively affecting the long-term results of treatment [1, 5, 7].

In this regard, before the installation of the implant recommended professional hygiene measures that provide optimal conditions for the operation [5, 10]. However, in determining the indications for dental implantation, some dentists underestimate the patients' performance of the recommended individual hygiene measures.

Many practicing dentists with extensive clinical experience at the same time pay insufficient attention to the oral hygiene of their patients, ignoring this important factor in the complex treatment of partial or complete adentia with non-removable dentures on implants [2, 4].

The aim of the work is to analyze the long-term results of immediate dental implantation method in circumstances of implementation of hygienic measures.



Fig. 1. Atrophy of the alveolar process in the region of the removed tooth. The displacement of the molar toward the defect.

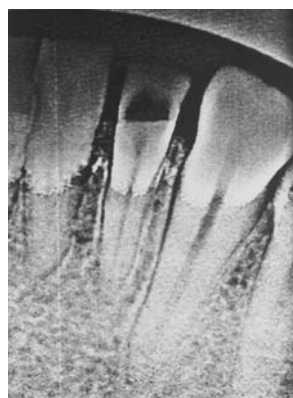


Fig. 2. Intact periodontitis serves as an indication for immediate implantation.



Fig. 3. On the roentgenogram the expansion of the periodontal gap is determined.



Fig. 4. Hole of the removed tooth before hemostasis.



Fig. 5. Preparation of the implant in the bed.



Fig. 6. Formation of a guide channel on the upper jaw.



Fig. 7. Formation of the implant canal in the lower jaw hole.



Fig. 8. An implant is installed in the area of the removed tooth.



Fig. 9. A monolithic implant is inserted into the hole of the tool.



Fig. 10. Immediate and delayed methods are used in combination.



Fig. 11. An artificial crown is mounted on the implant. The signs of inflammation are absent.

Objects and methods

65 patients aged 25–68 years were treated. Patients were included in the study according to the following criteria: 1) secondary adentia or indications for the removal of the tooth (teeth); 2) one or two implants within a single segment (by using method of immediate dental implantation on the lower or upper jaw). The exclusion criteria were: 1) pathological process at the periodontium (Figures 2, 3); 2) comorbidity diseases; 3) injuries; 4) operations requiring medical rehabilitation; 5) generalized periodontal diseases.

Therapeutic sanitation was performed before surgery. Patients were trained to individually care of the oral cavity, including the selection of flosses, toothbrush, toothpaste and mouthwash. In the morning, evening after meals all patients have used floss, also they have brushed their teeth with toothpaste, mouthwash, irrigator.

Patients were divided into two groups. First group – 33 patients – included persons on who used the method of immediate two-stage dental implantation. The operation was carried out immediately after tooth extraction under local and regional anesthesia with an injection of «Ultra-caine-DC Forte» in a volume of 3,4 ml (Figure 4). Given the

anatomical and topographic features of the jaws, the following structures were used: a helical two-stage cylindrical implant, 10, 11,5 mm long, 3,7 and 4,5 in diameter with a plug (Figure 5).

Immediate one-stage dental implantation (32 people) was carried out with strict adherence to the protocol of this type of rehabilitation of patients with partial secondary adentia. The removal of the destroyed tooth was carried out. The well was minimally prepared, forming a guide channel (Figure 6, 7). An implant was placed (Figures 8, 9, 10). A temporary artificial crown was made (Fig. 11).

Before the surgery, the characteristics and structure of the bone tissue, the proximity of the maxillary sinus (on the upper jaw), the localization of the mandibular canal were evaluated on the basis of the results of radial methods (cone-beam computed tomography (CBCT) of the jaws or orthopantomograms (OPTG)) (Fig. 12). In the following, with the aim of dynamic evaluation of the implant's osseointegration, the radiation methods of the study were carried out at the following times: after 6 months; 12 months after the operation.

As a criterion for assessing the condition of the implant, the performance indicator (PFI) was used, which was examined after 6 and



Fig. 12. Cone-ray computer tomography of the maxillofacial region.

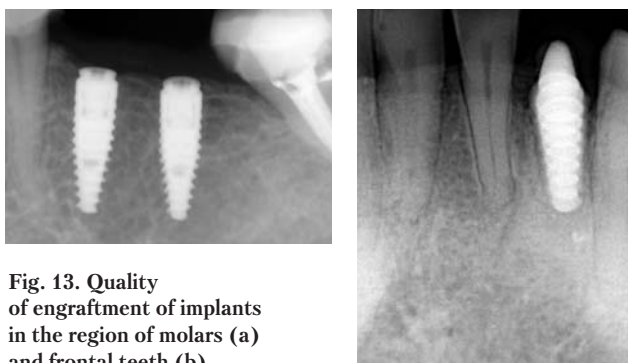


Fig. 13. Quality of engraftment of implants in the region of molars (a) and frontal teeth (b).

12 months after the intervention. At the same time, the quality of implant placement in bone, the level of adherence of bone tissue to the surface of the implant, the presence of horizontal or vertical resorption were noted. Controlled the functional state, distribution of load on the implant, occlusive load during chewing.

After the manufacture of the permanent metal-ceramic crown, the esthetic state of the artificial crown, its color and shape, the degree of erosion, discoloration, and the chipped crown were evaluated. Then the patients were measured the depth of the gingival groove or gingival pocket. The probing was performed at several points in the region of each implant and the arithmetic mean value was calculated.

An important role was given to the state of hygiene, the presence of plaque in the area of the implant, which increases the risk of local inflammation in the form of mucositis and peri-implantitis.

Evaluation of dental status was carried out using: a simplified Green-Vermillion index (OHI-S, Green, Vermillion, 1964); gingival index (GI, Loe, Silness, 1963); papillary-marginal-alveolar index (PMA, in the modification of Parma, 1960); the periodontal index (CPITN, WHO, 1960); the intensity of caries index (Klein, Palmer, 1937).

Results and discussion

Before the operation, oral hygiene in both groups was good or satisfactory (OHI-S = 0,6). The intensity of gum inflammation, according to the interpretation of GI index, corresponded to a light gingivitis (1,0). The average number of sextants with gingival hemorrhage (CPITN «1») ranged from 0,3 to 0,4.

The results of the postoperative examination (7–14 days) showed that in 55 % of cases, patients experienced mild soreness, in 45 % – localized pain. The presence of soft tissue edema in the implant placement area was observed in 75 % of cases, in 25 % – edema in the area of implant and alveolar process mucosa.

In 75 % cases, regional mucous hyperemia of the dental papilla was recorded, in 25 % – marginal hyperemia with bleeding during probing. An objective examination established that in 100 % of cases the mobility of the implants was not noted.

X-ray was taken to determine the state of bone structures, and their relationship to the implant (Figure 13).

The main criteria for assessing the state of the dental implant in the long term were the following parameters: the degree of mobility of the implant; presence of bone tissue damage; degree and rate of bone atrophy; the condition of the mucosa adjacent to the implant; the depth of the pocket between the implant and the mucosa; quality of implant application to adjacent teeth; functional load efficiency; the ratio of the implant and the anatomical formations.

When examining patients 3 months after surgery, a subjective assessment of pain was made; clinically determined presence of soft tissue edema, inflammatory phenomena in the implant placement area, bleeding of the gingival mucosa during probing, the mobility of the implant was controlled, the presence of dental plaque was determined (Figures 14, 15).

When conducting radial methods of investigation, the degree of engraftment of the implant in the bone tissue was determined (orthopantomography, dental program or cone-ray computer tomography). Criteria for ray diagnosis were the following indicators: bone tissue densely attached to the surface of the implant; absence of bone tissue in the area of the implant for two turns of thread; horizontal resorption of bone tissue by 1/2 the length of the implant; vertical unilateral resorption of bone tissue (Figure 16).

In the control period 3–4 months after the operation, the patients had no pain, no inflammatory phenomena were observed, the implants were immovable, the bone tissue fit tightly over the entire surface of the implant, oral hygiene was satisfactory on average in the OHI-S index, signs of mucositis and peri-implantitis was not revealed.

In one case of two-stage implantation, osseointegration did not occur, on the X-ray the vertical and horizontal resorption of bone tissue was recorded, the pronounced mobility of the implant, edema and hyperemia of the tissues of the gum and mucous membrane was clinically determined (Fig. 17). The implant was removed.

Evaluation of the quality criteria for the installation of dental implants through 6 months showed that in a two-stage operation in the long-term, the patients had no pain, no inflammatory phenomena were observed, the implants were immobile, the bone tissue fit tightly over the entire surface of the implant.

In a one-step operation, pain sensations and inflammatory phenomena were also not observed, the implants were immovable, bone tissue adhered tightly over the entire surface of the implant (Figure 18, 19).

Oral hygiene in patients with a two-stage and one-stage implantation after the placement of the metal-ceramic crowns for intraosseous implants remained good (OHI-S = 0,6) or satisfactory (OHI-S = 1,6). The intensity of gum inflammation, according to the interpretation of GI index indicators, corresponded to a light gingivitis (1,0). The average number of sextants with gingival hemorrhage (CPITN «1») was 0,6.

Estimation of the aesthetic state of the prostheses testified that the color and shape of the artificial crowns were not violated, the orthopedic supraconstructions were retained, fixed, the occlusion optimal.

Thus, the analysis of the condition of the prosthesis during the observation period from 3 months to 1 year after the operation showed that the frequency of complaints about the removal of the implant as a result of the absence of osseointegration was 1,5 % of the cases.

The results of clinical studies showed that the installation of implants directly into the dental holes immediately after their removal is a minimally invasive method of surgical treatment, allowing to significantly reduce the duration of the operating period.

The conclusion

Modern methods of dental implant prosthetics have a wide range of technical means (tools, devices, materials) that make it possible to expand the indications for their use. Worthy of attention are methods that reduce the invasiveness of ongoing surgical interventions. These include the surgical implant placement directly into the socket of the removed teeth in one visit, without repeated operations on the alveolar process and the gum. Prosthetics on the implant allow us to use high-quality materials for the lining of prostheses, first of all, high-grade ceramic masses.

High efficiency of complex treatment is ensured by well-coordinated work of highly qualified specialists: surgeon, prosthodontist, therapist and dental mechanist.

After the prosthodontics treatment, there is dynamical monitoring of the patients.

Conclusions

Immediate dental implantation is used in clinical situations when the gingival volume is saved, there is no atrophy of the alveolar bone, oral mucosa isn't thinned. There are no clinical signs of the pathological process in the periapical zone of the removed tooth.

Method of a single-stage implantation is used under the same conditions, if the patient wishes to conduct all the manipulations per one visit.

Usage of individually selected hygiene products by patients with intraosseous implants is an indispensable clause to keep in a good hygienic status oral cavity and preventing possible complications of the treatment.



Fig. 14. The implant has an individual abutment.



Fig. 15. Temporary artificial crown. Localized gingivitis (light).



Fig. 16. Radiographic picture of bone with two-stage method.



Fig. 17. Resorption of the alveolar bone around the implant.



Fig. 18. Inflammation in the tissues of the gum is absent.



Fig. 19. Radiological picture of the bony structures of the lower jaw.

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