IJCNP, Volume 3, Issue 2, 2025 ISSN: 2995-536X
https://medicaljournals.eu/index.php/IJCNP

INTERNATIONAL JOURNAL OF COGNITIVE NEUROSCIENCE AND PSYCHOLOGY

APPLICATION OF A NEW METHOD FOR THE TREATMENT OF PERI-IMPLANTITIS

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Relevance. Today, almost every clinic (private and public) offers dental care such as implantation, which is an alternative to traditional treatment in many clinical situations. However, despite the widespread introduction of dental implantation into dental practice, the expansion of indications for it and the avalanche-like increase in the number of implants installed by dentists, the number of complications does not decrease. The results observed in patients immediately after implantation indicate a high level of dental care, however, more and more information about the risk of long-term complications is appearing in the scientific literature. One of the main problems of implantology is the inflammation of the tissues surrounding the osteointegrated implant. At the meeting of the European Federation of Periodontologists, based on the modern scientific evidence base, a consensus was reached on infectious and inflammatory diseases in the field of dental implants. It is proposed to distinguish peri–implantation mucositis and peri-implantitis (1). Mucositis in the implant area is an inflammation of the surrounding soft tissues without disruption of osseointegration. Dental peri-implantitis is an inflammatory reaction of the tissues surrounding an osteointegrated implant, accompanied by loss of the supporting bone. The diagnosis of peri-implantitis is established on the basis of radiologically revealed bone changes in the form of a crater-shaped destruction in the neck circumference and even the upper third of the implant [2]. It is believed that mucositis can occur in 80% of people with dental implants, and the development of peri-implantitis has been described in 28-56% of those examined (Lindhe J., Meyle J., 2008). According to other data, mucositis is observed in 60-80% of people with dental implants, and the development of peri-implantitis has been described in 10-56% of patients. In our clinical practice, such phenomena are often found that correspond to the data of scientific literature.

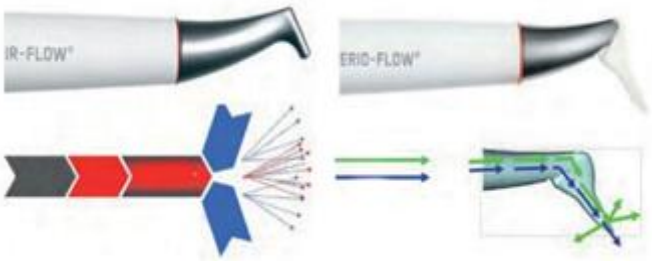
Pathological changes around implants can occur both in the near future after prosthetics, and after several months and even years. The main factors in the development of complications in the immediate postoperative period may be errors in performing surgical procedures and prosthetics, whereas the main reason for the development of the inflammatory process of periimplant tissues in the long-term postoperative period is the patient's failure to comply with the schedule of regular visits to a periodontist (hygienist) or their absence. The main risk factors for the development of peri-implantitis are the lack of rational regular hygiene of natural teeth and orthopedic structures in the oral cavity and the presence of a history of periodontitis. Numerous microbiological studies indicate that the functioning of implants is accompanied by the development of biofilms on the extraosseous surfaces of the implant and prosthesis, and the microbiota of this subgingival biofilm is similar to that in periodontal pockets in periodontitis, while biofilm in the transmucous (cervical) area of the supraconstructures of implants can cause chronic productive inflammation in peri-implant tissues and lead to peri-implantation mucositis and peri-implantation (Datdeeva M.O., 2010). The key role in the development of peri-implantitis belongs to the microflora of biofilm (3), which is a community of microorganisms grouped in microcolonies protected by the lipopolysaccharide matrix they produce.

The causal relationship between the accumulation of microbial biofilm and the development of inflammation in the tissues surrounding the implant has been confirmed in experimental and clinical studies (Heitz-Mayfield L.J., Lang M.A., 2000). The developed peri-implantitis, the clinical and microbiological picture of which is comparable to that of periodontitis, leads to a reduction in the service life of the entire implantation structure. The mechanism of action of Perio-Flow® when working on the gum and up to 5 mm under the gum is similar to that of the Air-Flow method. The air from the turbine enters the hose, then into the powder chamber, where it mixes evenly with it – the

resulting mixture goes to the nozzle of the device. The tip has two channels: water is supplied externally, and an air-powder mixture is supplied internally. At the same time, the water moves completely separately from the powder mixture to the nozzle, where they come out together without mixing. The water surrounds the powder mixture with a shell, forming (inducing) a working jet of the mixture, preventing it from spraying to the sides, bringing it to the surface of the tooth. A water-air jet with finely dispersed cleaning powder, the strength of which is adjusted depending on the individual clinical situation, removes the biofilm (4). Subgingival treatment at a depth of the periimplant pocket of more than 5 mm is performed using a Perio-Flow tip with a disposable sterile Perio spout, which provides a triple cone-shaped supply – easy access and circulation of glycine powder, air and water (5). The nozzle shape ensures low dynamic air pressure. Disposable nozzles guarantee hygiene. The gentle application of the biokinetic energy of the original Perio method eliminates the risk of gum damage and scratches on the surface of the abutment and implant, provides easy access to any area and 100% removal of biofilm without damage.

The bottom of the periimplant pocket is not damaged, but is completely cleaned of biofilm, necrotic masses and mature granulations. By spraying the powder under pressure in three planes, the biocompatibility of the biofilm-coated surfaces is successfully restored, thereby reducing the depth of the periimplant pocket[5]. According to some authors (Schwarz F., Ferrari D., Popovski K. et al., 2008), the use of the Perio Flow aquakinetic technology – air-abrasive supra- and subgingival treatment with glycine powder with a particle diameter of 25 microns (EMS, Switzerland) – makes it possible to remove 99.9% of the biofilm without damaging the implant surface (Fig. 1).

Fig. 1. The mechanism of the Perio-Flow® air-abrasive method above the gum (left) and subgingival (right).



The purpose of the study: Comparative evaluation of the clinical efficacy of the Perio-Flow aquakinetic method (EMS, Switzerland) in the complex treatment of patients with peri-implantitis and peri-implant mucositis and traditional methods. Material and methods: The results of treatment of paraimplantation inflammatory diseases in 17 patients aged 24-56 years, including 9 men and 8 women (the main group), were studied. The duration of use of the implants (24 in total), which were both in the frontal areas, as well as in the area of premolars and chewing teeth, ranged from 1 to 7 years. The majority of patients complained of bleeding, discharge from the gums, and discomfort. In 5 (29.4±0.7%) of the examined patients, peri-implantitis was asymptomatic and was diagnosed during the examination. All the patients we observed were subjected to a clinical examination, in addition, they underwent X-ray, microbiological and hygienic studies. The diagnosis of peri-implant mucositis was made in 2 patients, while the rest had peri-implantitis confirmed radiologically. The control group consisted of 5 people who underwent standard treatment: occupational hygiene with PIEZON 700 piezoelectric device (EMS), in the field of implants with PI (EMS) instrument with plastic coating (Fig. 2), plaque removal with non–abrasive pastes by mechanical method. The reusable, autoclavable PI instrument, which was used to clean dental implants from dental deposits, has a patented polyester-ketone coating that is safe for the surface of implants and ceramics, and works with a piezoelectric tip by attaching through a 1200-inch endochak. In addition to standard occupational hygiene, biofilm removal by Perio Flow subgingival aquakinetic treatment (EMS) was performed in patients of the main group on day 2 (2nd visit) and after 6 weeks (5th visit) (Fig. 3).

Fig. 2. Professional hygiene of implants by ultrasound using a special instrument.

The treatment package for patients in both groups included motivation for rational oral hygiene (GPR), hygiene training in the presence of dental implants with individual selection of basic and additional hygiene products, local and

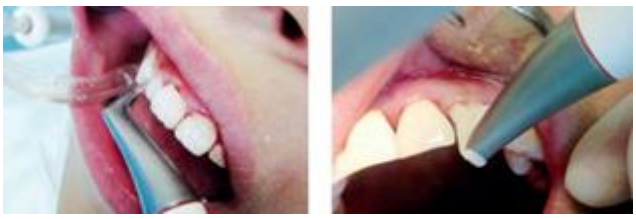


Fig. 3. Removal of biofilm in periimplant pockets up to 5 mm deep with a conventional Air-flow tip with Perio powder, at a depth of more than 5 mm with a Perio-flow tip with a special sterile plastic spout.

according to indications, general antimicrobial and anti-inflammatory therapy, vitamin therapy, local immunocorrection, physiotherapy. The treatment results were evaluated using generally recognized clinical methods: the depth of probing around the implant or peri-implant pocket (PEAK), the color of the peri-implant gum, consistency, the presence or absence of exudate from the peri-implant groove (pocket), the magnitude of peri-implant marginal bone resorption, and the simplified GPR index OHI-S (Green J.C., Vermillion J.K., 1963), an index for the quantitative determination of plaque in the gingival area of Silness – Loe (S-L) (Silness J., Loe, H., 1964), PMA (papillarmarginal-alveolar) index (Schour I., Massler M., 1947 modified by C. Parma). According to the indications, targeted radiography was performed. The analysis of clinical parameters and index evaluation were performed at each of the patient's visits (on the 1st, 2nd, 5th and 10th days, after 6 weeks, after 3 and 6 months) - a total of 7 visits. The results were processed using standard statistical methods. The results of the study: Before treatment, the examined patients in both groups had high values of the Silness – Loe index (2.35±0.2 in the main group and 2.28±0.1 in the control group) and OHI-S (2.81±0.22 and 2.65±0.51, respectively), indicating an unsatisfactory GPR. The PMA index averaged 58.5±2.8% in the main group and 57.3±2.4% in the control group. As can be seen from the data we obtained, the level of GPR (according to the values of the OHI-S index), which differed slightly before treatment in patients of the two groups, reached 0.38±0.33 on the 5th day (by the 3rd visit) in the main group, remaining at this level. In the control group, the hygiene level was worse and decreased to 0.48±0.27 by the 4th visit (after 10 days), and after 6 weeks it was 0.53±0.23 ($p<0.001$). The level of hygiene of the posterior region according to the value of the Silness – Loe index against the background of ongoing therapy increased significantly against the background of hygiene instruction and therapy in patients of both groups, slightly deteriorating by the 5th visit (after 6 weeks). In subsequent visits, the difference in the index values was already established: in the main group, after 3 months, this indicator was 0.92±0.31, in the control group – 1.96±0.38 ($p<0.001$), after 6 months – 0.87±0.11 and 2.14±0.23 ($p<0.001$), respectively, despite regular monitoring with correction hygiene. As a result of the study, it was found that during treatment, the condition of the gum tissue around the implants, which was assessed using the PMA index, improved in patients in both groups, amounting to 12.1±0.8, 11.7±0.6 and 11.9±0.9, respectively, by the time of the 5th, 6th and 7th visits. In the control group, by the 6th and 7th visits, this indicator was worse than after 6 weeks - 13.6±1.7, 16.9±1.3 and 17.8±2.1, respectively. As a result of the treatment, a decrease in PEAK depth was recorded in patients of both groups. Moreover, in the main group, there was a significant reduction in PEAK depth after 6 weeks, 3

months, and 6 months ($p<0.01$) compared with the control.

According to a clinical study, we found that already on the 5th day after the start of treatment, the values of the plaque index, the simplified hygiene index, and the periodontal index decreased significantly. At the same time, the differences between the values of the studied indices before treatment and 5 days after its start in the groups of patients who received therapy with Perio Flow and who used the traditional method were statistically significant. The decrease in plant size was confirmed clinically. In the patients of the main group, using the Perio Flow method, there was a more noticeable and rapid improvement in a number of clinical indicators. In the control group, after 3 and 6 months, some patients experienced a recurrence of inflammation and a deterioration in hygiene, which was reflected in the indices. The patients underwent plaque removal, and additional oral hygiene instructions were given. A comparative analysis of the two methods in terms of peak depth reduction revealed a statistically significantly higher efficiency of the research method compared with the control ($p<0.01$). After 3 and 6 months from the start of treatment, the research method led to a more significant decrease in PEAK depth compared to the method used in the control group, which we explain by a better restoration of the biocompatibility of periimplant pocket tissues during aquakinetic treatment due to biofilm destruction compared with the traditional method.

Conclusions.

1. Schedule of dynamic follow–up of patients with dental implants: one month after implantation, then every 3-4 months, with stable remission - 2-3 times a year. The examination evaluates the color, structure and consistency of the gums, the presence of hyperemia, edema and exudate. If necessary, light probing is performed, mobility, fixation of the prosthesis, and the presence of dental deposits are also assessed (hygiene indices, periodontal indices, if necessary: bleeding index, inflammatory process prevalence index). An X-ray is performed to check the bone level.

2. Normally, bone loss should be within 1-1.5 mm in the first year after surgery, and then slow down to 0.2 mm each subsequent year.

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