Results of stability determination of the dental implant «Implant.uz» using the RFA – method

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Abstract.
Resonance Frequency Analysis (RFA) is a noninvasive intraoral method designed to assess bone-implant interface and may therefore provide clinical evidence of implant stability. To achieve osseointegration of dental implants, certain biological and biomechanical requirements must be met. One of the most important requirements is the absence of micro-movements during the stage of osseous cicatrization. In classic implant products, implants receive no functional load until bone and implant surface are closely jointed together, as this assures permanent implant stability throughout the stages that follow implant placement. This article discusses the RFA -method for determining the stability of a dental implant of the "Implant.uz" system at various times after dental implantation.

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For successful surgical and prosthodontic treatment of patients with secondary adentia, dental implants are widely used, the osseointegration of which into the bone tissue is the most important factor. Direct contact between the integrated implant and the bone is an indicator of a positive reaction of the jawbone to the installation of a dental implant [4,8,9].

At the same time, to achieve excellent osseointegration of dental implants into bone tissue, it is necessary to comply with certain biological (calculation of the volume of bone tissue, its height, width, bone quality) and biomechanical requirements (material from which the implant is made, shape, size, diameter, surface quality implant). One of the most important requirements in the early stages after dental implantation surgery is the absence of micromovements of the implant in the jaw bone at the stage of bone scar formation [1].

Today, according to the generally accepted protocol, the prosthodontic stage of treatment based on dental implants is carried out after a certain period of time (2, 6 months) after the operation, so that the dental implants are not subjected to functional load until the bone and the intraosseous surface of the implant are tightly connected together. This implant-bone contact ensures further permanent stability of the implant during the next stages of treatment and functioning.

The stability of a dental implant in bone is defined as the absence of its mobility under a certain load during clinical examination, which is directly dependent on the contact of the implant surface with the bone surrounding the implant.

There are primary and secondary stability. Primary stability is determined by the pressure exerted by the implant when inserted into the bone bed immediately after surgery. The secondary one occurs during the formation of bone tissue in direct contact with the surface of the implant at various periods of observation and is determined by the process of osseointegration itself.

Therefore, assessing implant stability is the most important component for successful and predictable
integration of a dental implant to bone.

To date, several methods have been proposed to assess implant stability, such as determination of torque during implant placement, percussion sound at different times, anti-rotation torque, response to percussion (Perio-Test) and resonance frequency analysis (RFA - method).

Resonance Frequency Analysis (RFA) is a noninvasive intraoral method designed to assess bone-implant interface and may therefore provide clinical evidence of implant stability [6]. Due to its high reproducibility and soundness, this technique has progressively, in the last years, outperformed the all techniques previously proposed to monitor implant stability [3].

Since 1996, numerous works have proven the RFA analysis system useful to obtain an objective assessment of implant stability [2,5]. RFA allows implant monitoring through sequential stability measurements, as well as indirect assessment of the influence of osseous remodelling around the implant on secondary implant stability.

The purpose of our study was to study the stability of the dental implant “Implant.uz” at various times after installation.

Materials and methods. To achieve the set goal and objectives, the object of our study was 30 patients with partial secondary adentia in the lower jaw: single and multiple (limited and terminal) defects of the dentition. After clinical, radiological and laboratory examination, these patients had no contraindications to implant treatment. These patients received dental implants “Implant.uz” and RFA method, the stability of the implants was determined using the Megagen ISQ II at 1, 2, 6 months after dental implantation. Next, the patients were treated with porcelain-metal crowns supported by dental implants.

Results: Immediately after implantation, after 1, 2, 6 months, we observed the dynamics of changes in the stability of the implant. Results range from 1 to 100 arbitrary units (i.e., from the most minimal stability to complete implant integration).

The following values were obtained (Table 1):
As a result of our RFA study, it was noted that the stability coefficient of the domestic implant increases in the period from the day of surgery to 6 months. Starting with 70.1 ± 2.6 units, ending with 81.3 ± 2.1 units in the 6th month of the study. The CSI was equal to 76.37 ± 3.2 and 78.86 ± 1.5 at month 1 and month 2 of our study, respectively. This shows a positive trend in the stability indicators of the domestic dental implant, starting from a low indicator and approaching a high degree of stability. Further, after a six-month observation period, the ISI also further increased, but scientifically not significantly.

Thus, it was found that the CSI after the sixth month of implantation was equal to 81.3 ± 2.1, which corresponds to a sufficient level of stability.

**Conclusion.** The RFA research data we received is important for determining the primary stability of the implant immediately after its installation, and also provides the necessary information for deciding when subsequent prosthetic stages of prosthetics are possible, and whether immediate loading is possible.

**References:**


