

COMPARISON OF METHODS FOR SECURING FIXED ORTHOPEDIC CONSTRUCTIONS USING IMPLANTS.

Safarov Murod Tashpulatovich

Tashpulatova Kamilla Maratovna

Ruzimbetov Khayot Bazorboevich

Tashkent State Dental Institute

Department of Hospital Orthopedic Dentistry

Abstract

The introduction of implants into dentistry with the aim of improving the functionality of the dentofacial system, as well as increasing the aesthetic qualities of patients, can be considered a significant breakthrough since the method of casting models was developed in the early 19th century.

With the development of implantology and orthopedic dentistry in general, many different orthopedic structures have appeared to solve various clinical problems and methods of their fixation.

Keywords: orthopedic dentistry, implantation, prosthetics, fixation

Target works : To study the advantages and disadvantages of various methods of attaching fixed orthopedic structures to implants.

Tasks work

- 1) Characterize various methods of fixation of fixed prostheses supported by implants.
- 2) Study the advantages and disadvantages of each method in various clinical situations.
- 3) Analyze the patient's examination.

Material And methods

The analysis included 32 patients undergoing a preventive examination, in whom implant-supported dentures were installed in the oral cavity from 1 to 10 years ago.

Implant-supported dentures can be classified into implant-supported dentures, implant-supported dentures, and implant-supported dentures depending on the type of connection between the superstructure and the implant.

They can be divided into:

- cement prostheses
- Screw-retained dentures
- Prostheses with screw and cement fixation - SCRP (Screw & Cement Retained Prostheses-SCRP). Each of these types of fixation has its own advantages and disadvantages.

Biomechanical criteria

From a biomechanical point of view, cemented and CE prostheses are relatively better. When installing screw-retained prostheses, it is usually very difficult to achieve passive fit and fixation, especially with long prostheses. This is due to the additional clinical and experimental processes associated with the manufacture of these constructs, which may introduce errors. The presence of small technical gaps is the main criterion that complicates the passive fitting of structures, and this is almost impossible to achieve even with the help of laser welding, spark discharge and soft soldering.

During the day, the bone tissue of the jaw and lower jaw undergoes reversible cyclic deformations during chewing movements; a study by Hobkirk and Schwab showed that osseointegrated implants in completely edentulous patients were relatively displaced during mandibular movements. The displacement can be up to 420 μm , and the pressure at which the connected implants are pressed against each other can be up to -16 N. These values depend on the distance between the implants and the thickness of the bone.

The disadvantage of all screw designs is that the screws can become loose or break under occlusal loading. And even implants. In addition, when prostheses are screw-fixed, excessive loads can be transferred to the bone tissue around the implant.

When using cement or cement-retained screw prostheses, a perfect fit can be achieved with a gap between the cement of 25-30 microns. Once the abutment and implant are passively bonded, the gap between the indirect restoration and the abutment can be filled with cement to reduce or completely compensate for

inaccuracies, eliminate preload, and more evenly distribute the load on the implant and ultimately the bone tissue.

Retention And occlusal relationships

Holding force is the main criterion affecting the long-term performance of the structure. The holding forces depend on several factors:

- Approximation of axial surfaces;
- Height and area of the contact surface.
- Surface microrelief.

Jorgensen has proven that 6 degrees of convergence is ideal for natural teeth, and the same is true for implant restorations. Most implant systems have this taper in the standard abutment. Even if custom abutments are used in CE cemented constructions, the 6° taper is reproduced during the milling process. The wall height of standard abutments is higher than that of the tooth, but the surface area is smaller. Custom abutments can be manufactured to a standard that replicates the morphology of natural teeth.

Several studies have confirmed that surface roughness improves retention. The surface roughness can be increased by sandblasting the abutment and the internal surface of the structure. However, if the taper is maintained and the height of the axial wall is sufficient, there is no need for greater roughness.

Occlusion is another factor influencing the choice of fixation type. The problem of insufficient interocclusal height during prosthetics can be solved using screw-fastened structures. The advantage of screw prostheses is that the clinical height of the crown can be reduced without loss of fixation.

However, screw and cement-screw fixation presupposes the presence of a hole in the occlusal surface of the implant, which serves as an exit for the screw rod, which can occupy from 1/3 to 1/2 of the entire occlusal surface of the crown. This opening must be aesthetically closed in a variety of ways, making it difficult to adapt to the concept of correct interocclusal contact achieved by the dental technician in the occlusal block. The area of the occlusal surface occupied by the hole for the screw shaft is very important for the formation of correct occlusion, especially in the molar area. Composite materials are often used to correct esthetic defects and close the screw shaft hole, but according to Ekfeldt and Oilo, the resulting occlusal contact is not stable, especially in the case of ceramic restorations, since the composite material



is worn by edentulous teeth. With true cementation, ideal occlusal contact with long-term stability can be achieved.

Correction of implant angulation

The problem with correcting missing teeth with implants is parallel displacement of the teeth. For some reason, dentists are not always able to install implants in parallel, which complicates prosthetics. In screw and screw prosthetics, the angle of inclination of the implant axis can be adjusted using standard or custom angled abutments. With screw-retained prosthetics, this possibility is limited.

Aesthetic criteria

The aesthetic appearance of the structure is an integral part of competent and complete orthopedic treatment and often prevails over the functional aspects.

With screw and cement-screw prosthetics, it is necessary to solve the problem of correcting the aesthetic component, especially when the exit of the screw rod is located on the vestibular surface of the crown. This aesthetic defect can be corrected in several ways.

Closing the defect with filling material is the simplest and cheapest method. This method can achieve a satisfactory aesthetic result without cost or complications, but the composite material is not long-term stable and is difficult to match the color of the existing prosthesis unless special composite dyes are used.

The best choice in terms of aesthetics and functionality are inlays specially manufactured using e.max press technology. These inlays or onlays are made directly by the dental technician and are not only aesthetically superior, but also contribute to the formation of precise occlusal contacts.

Installation and maintenance of the structure

Many modern implant systems have an internal conical connection between the implant and abutment, which provides excellent functional and hygienic results. However, such connections require precise fitting of all components of the prosthesis and therefore require x-ray inspection after installation of the prosthesis, whether screw, cemented screw or cemented fixation.

The wide and long contact surface between implant and abutment, which defines the “path of insertion,” is another characteristic of SCRP prostheses for internal fixation of implants.

Screw retainers and cemented screw retainers can be easily removed if necessary. This need arises in the following cases: replacement of orthopedic components of the structure, breakage of a screw or abutment, various modifications or repairs of the prosthesis, periodontal diseases requiring regular treatment. The ability to remove the structure significantly increases the safety of treatment, which is an advantage of this type of fixation compared to cement fixation.

Presence of residual retained material

For the long-term prognosis of screw-retained prostheses, radiographic images are sufficient to confirm the correct fit of the superstructure to the implant.

In the case of cemented prostheses, in addition to x-ray examination, it is necessary to carefully remove excess cement after installation. Excess cement can affect the tissue surrounding the implant and cause iatrogenic inflammation. In addition, removing excess cement using various instruments, especially probes, can scratch the ceramic surface of the prosthesis. Scratches can also lead to plaque formation on the surface of the denture crown and destruction of soft tissue. For this reason, the edges of cemented restorations must be at least 1 mm close to the gingival margin.

Table 1. Benefits And flaws various types fixation

Constructions With screw fixation	Cementable designs	Cement-screw designs
- Easy to remove the structure. - Maintenance and repair of the prosthesis is simple. - No problems associated with cement residues for maintenance. - Difficulty in installing passive abutments. - Differences in the aesthetics of prostheses. • - Occlusal disorders.	- Easy to install passive abutments - Allows you to adjust the angles of implant placement - Precise occlusion and axial load - Improved aesthetics - Less labor-intensive and expensive - Difficulty maintaining the structure - Problems due to residual luting cement	- Passive landing is easily achieved. - By using angled or customized abutments, implant angulation problems can be solved. - Precise occlusion and axial load - Ease of maintenance and repair of structures - Structures can be cemented “on the model”, so there are no problems with cement residues for fixation. - Aesthetic variations

The advantage of screw-retained cemented prostheses is that the abutment can be cemented directly onto the plaster cast, excess cementation material removed, polished, transferred into the mouth, and secured to the implant.

Analysis of patient trials

Of the 32 patients with implant-supported prostheses, 12 had cemented fixation, 10 had screw fixation, and 11 had cement-screw fixation.

During periodic examinations of patients with cement fixation, two patients observed remains of the fixing material and inflammation of the soft tissues of the periodontium. Excess cement was removed and anti-inflammatory therapy was prescribed; In seven patients with screw and cement-screw fixation methods, restored more than five years ago, destruction of the filling material that closed the hole in the abutment screw shaft was revealed. Discoloration, wear, and clumping of the edges of the filling material have been observed. The filling material was replaced with new one.

One screw-retained patient complained of crown mobility when chewing, and upon examination it was discovered that the screw connection had become loose. The patient underwent the following treatment: 1) the composite resin covering the hole in the screw shaft was removed; 2) the screw was replaced with a new one; 3) the screw was tightened to 30 Ncm in accordance with the manufacturer's recommendations; 3) the hole was closed with a composite resin filling material.

In the remaining patients, the examination did not reveal any deviations from the norm, the orthopedic structures were healthy, and there were no changes in the periodontal tissues.

Conclusion

There is no single “best” way to place an implant-supported prosthesis, and each individual clinical case requires careful planning and selection of the optimal method to solve the specific clinical problem.

BIBLIOGRAPHICAL LIST

1. Tashpulatova K. et al. Technique for eliminating traumatic occlusion in patients using Implant-supported bridges //European Journal of Molecular & Clinical Medicine. – 2020. – T. 7. – No. 2. – pp. 6189-6193.
2. Safarov MT, Ro'zimbetov XB, Tashpulatova KM, Safarova NT (2023). Tish Implantatlarida To'liq Yoyli Protezlarning Biomexanikasi. Conferences , 35–36. extracted from <https://journals.scinnovations.uz/index.php/aposo/article/view/1030>

3. Safarov, M., Akhmadjonov, M., & Ruzimbetov, A. (2022). Study of microbiological status in patients with perimplantitis in the area of bridges. *Conferences*, 138. retrieved from <https://journals.scinnovations.uz/index.php/aposo/article/view/111>
4. Tashpulatova K. M., Safarov M. T., & Ruzimbetov H. B. (2023). Hemodynamic Changes In The Mucous Membrane Of The Alveolar Ridge Of The Lower Jaw With Partial Defects Of The Dentition. *EDUCATION, SCIENCE AND INNOVATION IDEAS IN THE WORLD*, 34(4), 42–48. Retrieved from <https://www.newjournal.org/index.php/01/article/view/9797>
5. Safarov M.T., Tashpulatova K.M., & Ruzimbetov Kh.B. (2023). Analysis Of The Effectiveness Of Methods For Fixing Artificial Crowns And Bridges On Dental Implants. *EDUCATION, SCIENCE AND INNOVATION IDEAS IN THE WORLD*, 34(4), 36–38. Retrieved from <https://newjournal.org/index.php/01/article/view/9795>
6. Tashpulatova K.M., Safarov M.T., Sharipov S.S., Ruzimbetov H.B. (2023). Medium-term Forecast of the Efficiency of Fixed Dentures on Dental Implants. *Conferences*, 101–103. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/1117>
7. Safarov M.T., Shirinova Sh., Tashpulatova K.M., Ruzimbetov H.B. (2023). Adaptation of the Chewing Muscles in Patients with Prosthetic Bridges Fixed on Dental Implants. *Conferences*, 93–95. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/1113>
8. Ruzimbetov Kh.B., Safarov M.T., Tashpulatova K.M. (2023). Microbiological Studies for Inflammatory Complications in the Peri-Implant Areas. *Conferences*, 79–82. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/1107>
9. Safarov M.T., Tashpulatova K.M., Ruzimbetov H.B., Shakirova D. (2023). Clinical and X-ray Study of Changes in Hard Tissues Around the Implant in Patients with Partial Edentia. *Conferences*, 89–90. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/1111>
10. Safarov MT et al. Evaluation of the Compensatory-Adaptive Mechanisms of Bridge Prosthetics at the Terminal Dentition Defects with the Use of Intraosseous Implants by the Method of Electromyography //American Journal of Medicine and Medical Sciences. – 2020. – T. 10. – No. 9. – pp. 657-659.

11. Safarov M. T. et al. Microbiological status of patients using artificial crowns supported by dental implants for peri-implantitis // Conferences. – 2023. – P. 376-379.
12. Safarov M.T., Ruzimbetov Kh.B., Safarova N.T., Kholboev H. (2023). Study of the Functional Efficiency of Bridges Fixed on Dental Implants. Conferences , 372–374. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/902>
13. Safarov, M., & Tashpulatova, K. (2022). Study Of The Microflora Of The Oral Cavity In Patients Using Dental Bridges With Dental Implants For Peri-Implantitis. Conferences , 172–173. retrieved from <http://journals.scinnovations.uz/index.php/aposo/article/view/78>
14. Safarov MT et al. Permanent prosthetics on dental implants //Eurasian Journal of Otorhinolaryngology-Head and Neck Surgery. – 2023. – T. 2. – S. 70-74. <https://doi.org/10.57231/j.ejohns.2023.2.3.012>
15. Safarov M.T., Akhmadzhonov M., Ruzimbetov A. Study of microbiological status in patients with perimplantitis in the area of bridges. – Conferences, 2022.
16. Safarov MT, Tashpulatova KM, Ruzimbetov HB To Question About Osteointegration Dental Implants And Ways Her Stimulations //TADQIQOTLAR. – 2023. – T. 27. – No. 3. – pp. 82-89.
17. Safarov MT, Tashpulatova KM, Ruzimbetov HB Modern Representation About Osteointegration Of Dental Implants //TADQIQOTLAR. – 2023. – T. 27. – No. 3. – pp. 98-106.
18. Safarov MT, Tashpulatova KM, Ruzimbetov HB The Problem Of Inflammation In Peri-Implant Tissue And Factors Affecting Its Course //TADQIQOTLAR. – 2023. – T. 27. – No. 3. – pp. 90-97.
19. Musaeva K. A. et al. Biomechanics of fixed full-arch prostheses supported by implants // Conferences . – 2023. – P. 370-372.
20. Musaeva , K. (2023). Prosthodontic treatment of patients with osteoporosis. Current problems of dentistry and maxillofacial surgery 4, 1(02), 103. retrieved from <https://inlibrary.uz/index.php/problems-dentistry/article/view/16170>
21. Musaeva K. A. On the Issue of Orthopedic Rehabilitation for Osteoporosis //Conferences. – 2022. – P. 90-91.
22. Musaeva, K., Asom, B., & Saliev, S. (2018). Improving the fixation of complete removable plate dentures in conditions of severe atrophy in the area of the

maxillary tuberosities. Stomatologiya, 1(2(71), 27–28. retrieved from <https://inlibrary.uz/index.php/stomatologiya/article/view/1714>

23. Musaeva, K. (2017). Features of the dental status of patients with chronic kidney disease. Stomatologiya 1 (1 (66) , 62–64 . retrieved from <https://inlibrary.uz/index.php/stomatologiya/article/view/2364>

24. EXPERIENCE IN THE USE OF MATHEMATICAL MODELING TO PREDICT THE LONG-TERM DURABILITY OF PROSTHETICS ON DENTAL IMPLANTS. (APPLICATION OF MATHEMATICAL MODELING IN PROSTHETICS ON IMPLANTS.). (2024). Western European Journal of Modern Experiments and Scientific Methods, 2(3), 14-23.

<https://westerneuropianstudies.com/index.php/1/article/view/453>

