USING INFORMATION TECHNOLOGIES TO DIAGNOSE AND TREAT ORAL CAVITY DISEASES WITH THE HELP OF DIGITAL DENTISTRY

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Abstract. One of the main points of our application of stomatology with the help of information technology is that it helps to solve several problems of each person. The specialist receives new treatment methods, focusing on the specific needs of the patient. One of the most convenient ways to treat diseased teeth with the help of 3D in the treatment of each tooth is to grow a tooth using 3D in the treatment of chronic or injured pulpitis.

Key words:Microscope, 3D, AR/VR, optical sensor, caries, cyst, titanium, zircon, ceramics, milling cutters, polymer material.

Introduction: In medical practice, particularly in the field of dentistry, innovative technologies are widely used in diagnostics, treatment, prosthetics, and surgery.

- New technical laboratories;

- Treatment and restoration of tooth enamel;

- Innovations in pain relief;

- Endodontics with a microscope.

Advanced dental clinics have their own laboratories capable of creating prosthetics, dental crowns, and veneers using 3D printing technology. These clinics employ high-precision mills that work with titanium, zirconium, and ceramics, as well as laser equipment for processing polymer materials. The equipment used in creating prosthetics includes digital scanners and specialized furnaces. These laboratories can create prosthetics without intermediaries, impacting cost, production time, and adherence to individual requirements. Oral diseases, such as dental issues and periodontitis, are widespread. Their treatment involves high costs for both patients and the healthcare system. Information methods offer a more cost-effective approach. Numerous data need to be collected from each patient: general and dental history, clinical data, and diagnostic images (X-rays, CT scans). Artificial Intelligence (AI) systematizes and processes this data.

Research Objective: Modern dentistry uses devices and computer programs that provide comprehensive information about clinical features, determine the extent of

tissue damage, and simplify the assessment of dental disease consequences for accurate diagnosis. It explains why dentists transition from analog to digital diagnostic methods. It creates three-dimensional models. Information technology facilitates the installation of prosthetics and the restoration of a patient's teeth. The risk of errors is reduced because the dentist can create and review the model on a computer beforehand. It aids in treatment planning. Neural networks integrate various clinical data to predict changes in teeth. Augmented and Virtual Reality (AR/VR) technologies combine different types of data and the surgeon's skills. The advantages of AR/VR are realized in a special installation-navigation system. It consists of surgical instruments, an optical sensor, and a computer. Before using it, the dentist prepares: Takes images of the patient's oral cavity. The images are obtained using an intraoral scanner or computed tomography. Creates a virtual design of the future implant. By setting the necessary parameters, the structural features of the jaw can be taken into account.

Materials and Methods: What digital dentistry does. Its application is related to the diagnosis and treatment of oral diseases: It identifies signs of disease. AI analyzes diagnostic images to determine the likelihood of pathologies such as caries, cysts, or tumors. Deep diagnostics in dentistry are based on methods such as thermal diagnostics, electroodontometry, contact radiography, panoramic radiography, sialography, color scanning, radiovisiography, stomatoscopy, photocopying, morphological studies, cytological examination, histological examination, and bacteriological studies. In some cases, tests are conducted to detect allergic reactions to various types of medications. Any diagnostic stage begins with a visual examination of the oral cavity. A dentist's examination alone is insufficient for an accurate diagnosis, so computer diagnostics assist the dentist. 3D tomography shows a three-dimensional examination of the oral cavity and skull in lateral and frontal projections. The images (CT scans) allow patients to clearly see their problems and help in creating the most complete and effective treatment plan. A 3D scanner and 3D printer for dentistry form a complete digital workflow, significantly saving materials and reducing the final product cost. The modeling process of castings is fully automated thanks to 3D printers. This accelerates the production of temporary crowns, removable dentures, dental models, surgical templates, and aligners. Digital treatment planning in dentistry starts with the creation of diagnostic and surgical templates. Today, it is hard to imagine the implantation process without using technology and equipment.

Results and Discussions: Digital diagnostic methods show the patient's jaw from all angles and projections. An SLR camera is used to capture the face. A digital arch shows the jaw's movement. All these files are integrated into a special program, allowing a 3D image of a person's face to determine the bite and accurately place implants. You can test this design in its layout, correct errors, and check the strength

of the finished model. This technology allows for the creation of both temporary and permanent crowns before implantation. Additionally, the durability of the structure can be calculated. All models are stored in a database, enabling the restoration of a crown prosthesis in just a few hours without additional visits to the clinic. Minimal visits result in high quality and quick results. Orthodontic treatment has advanced thanks to 3D technology. Digital equipment allows for predicting the movement of a patient's teeth. Today, aligners in orthodontics are the most effective and aesthetic method of correcting bites. Computer planning determines the required number of trays for a specific patient and the duration of treatment based on the condition of the teeth. The use of innovative treatment methods saves time for both doctors and patients by minimizing clinic visits and stays. Due to digital technologies, orthopedic structures are virtually planned and models provided by modern equipment are replicated with maximum accuracy. This accelerates the process and gives patients the opportunity to personally observe the creation of their new teeth.

Conclusions and Recommendations: One of the most convenient methods for treating diseased teeth using 3D technology involves growing and filling the tooth for treating pulpitis. Augmented and virtual reality (AR/VR) technologies combine different types of data and the surgeon's skills. The advantages of AR/VR are realized in a special installation-navigation system. It consists of surgical instruments, an optical sensor, and a computer. Before using it, the dentist prepares: Takes images of the patient's oral cavity. The images are obtained using an intraoral scanner or computed tomography. Creates a virtual design of the future implant. By setting the necessary parameters, the structural features of the jaw can be taken into account.

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