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DIRECT DIGITAL TECHNOLOGY FOR CERAMIC DENTAL BRIDGE REALIZATION

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ABSTRACT

Digital technologies-Computer Aided Design-Computer Aided Manufacruring (CAD-CAM) are constantly improving, equipment and materials becoming more and more efficient; the main goal is to perform as many of the prosthetic restorations directly in the dental office, eliminating the intervention of the dental laboratory. This article aims to present the steps of a dental ceramic bridge realization, using direct CAD-CAM technology, the subtractive method. Minimizing the treatment time and number of appointments is not only favorable for the patient but also excludes possible complications during the treatment, allowing to obtain optimal prosthetic appliances, with a simplified workflow. Patients want to benefit from a quick treatment, which does not cause discomfort, and which ensures a complete restoration of all the functions of the dento-maxilar system.

*Keywords:*digital dentistry, ceramic brigde, substractive method

Digital technologies are today widely used in dental activity, bringing more clinical information that then leads to improvements in establishing the diagnosis and in treatment options. Also, these methods reduce the working flow and allow the realization of prostheses in a shorter time.

Conventional methods an impression registration of the prosthetic area, pouring a dental cast and modeling a wax pattern of the future prosthetic device. The wax pattern is invested in order to obtain a mold, in which metal or ceramic will be inserted, depending on the prosthesis we want to obtain. Such steps require considerable human intervention and manipulation of materials, that may also exhibit inherent structural or dimensional changes [1, 2]. This means to increased processing errors and inaccuracies, as well as increased time and cost [3].

Digital technologies-Computer Aided Design-Computer Aided Manufacruring (CAD-CAM), direct or indirect methods, facilitate the production of more reliable and better adapted prostheses.

Direct computerized technologies are increasingly used in current dental practice because they allow the dentist to make a prosthesis at the chair site in a single session, which greatly improves patient comfort and reduces working time These technologies use materials that are more esthetic and can best

provide a better potential for long-term survival and stability.

Dental ceramics or dental alloys can now be machined on machines that can accept complex algorithms to provide the most accurate prosthesis[4]. CAD/CAM systems is constantly improving, equipment and materials becoming more and more efficient; the main goal is to perform as many of the prosthetic restorations directly in the dental office, eliminating the intervention of the dental laboratory[5].

This article aims to present the steps of a dental ceramic bridge realization, using direct CAD-CAM technology, the subtractive method.

Case report

The 43-year-old patient presented to the dental office with masticatory disorders, caused by a reduced partial edentation due to the absence of the molar 4.6. Following the clinical examination, corroborated with a radiographic examination, the diagnosis was established and a ceramic bridge was chosen as a therapeutic solution, with retainers on 4.5 and 4.7 and pontic on 4.6.

After the preparation of the prosthetic area and the abuttments, an optical impression of the oral cavity was registered with the Medit I500 intraoral scanner, which takes 3000 three-dimensional photos per second, allowing a faster and accurate visualization of the details. (fig.1).

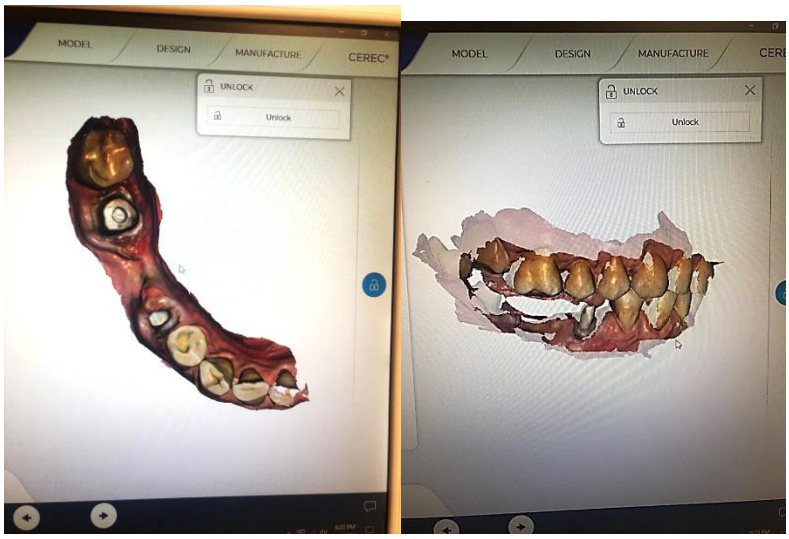

Fig 1 Optical impression of the prosthetic area

Digital impression is more easily accepted by patients, eliminates the risk of material distortion, reduces the cost of impression materials, dental trays or models, reduces the working time, eliminates the risk of microbial contamination of the dental team and of the patient and allows the digital storage of clinical information, for a practically unlimited period.

The details in the oral cavity are processed by the computer software and the design of the future prosthetic device is elaborated. (fig.2)

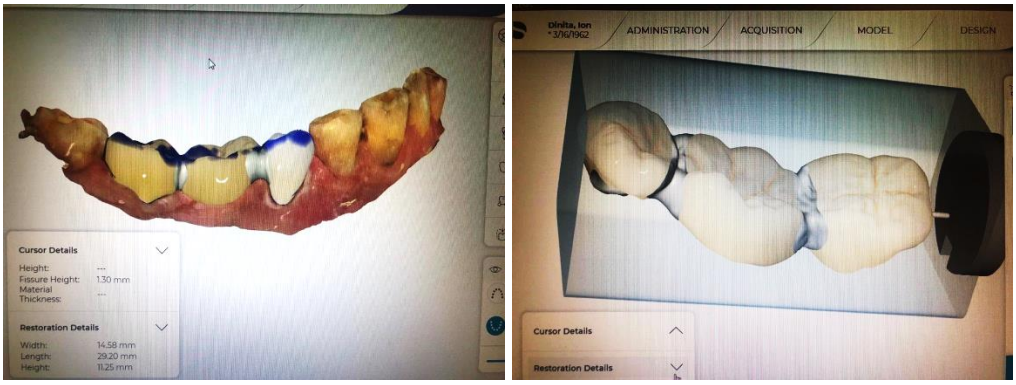

Fig.2 The design of the dental bridge

The cervical limit of each preparation was checked and individualized and the insertion axis was established too; also, the ceramic milling block was selected. Our choice for this clinical case was IPS ceramic e.max CAD (Ivoclar Vivadent), which is a lithium-disilicate glass ceramic, industrially made. This material allows to produce fully anatomical restorations with maximum stability, resilience, as well as proven clinical properties and desired aesthetic characteristics, such as shade, translucence and brightness, similar to natural teeth. After all the details regarding the design of the ceramic bridge were established, the information was transmitted to the work unit, which will mill the ceramic block, according to the received data, using special milling cutters with perfect precision. The manufacturing process is controlled by the machine, by the tools and by the process parameters. The ceramic blanks are easy to process, but strong enough to withstand cutting forces without being damaged even in areas of very low thickness, for example at the cervical areas. (fig.3).

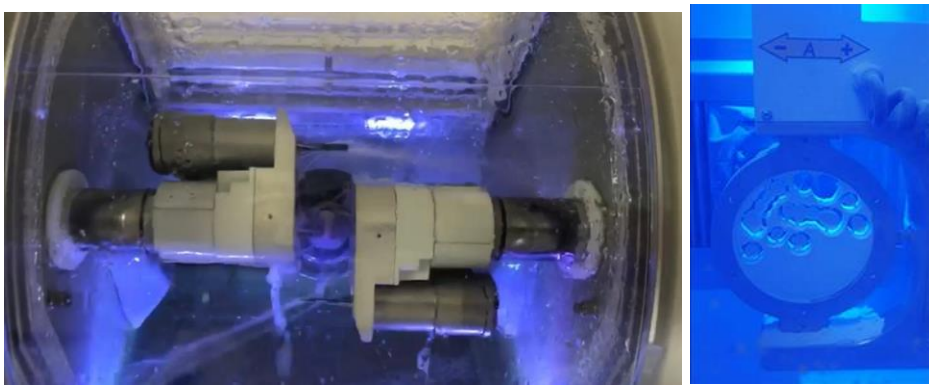

Fig.3 Milling the ceamic block

After the end of the milling process, the dental bridge is removed from the working chamber, it is disinfected and checked in the oral cavity, in order to follow its adaptation on the abutments and the relationship with the neighbor and antagonistic teeth (fig.4).

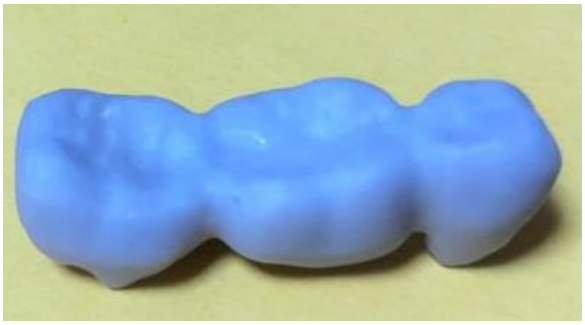

Fig.4 Ceramic bridge after removal from the milling chamber

After being verified, the work is sent to the laboratory for the application of the glaze, which has a role in waterproofing the ceramics and giving a shine similar to natural teeth. The blue pigments burn during the sintering stage, without changing the final aesthetic appearance of the bridge.

Results and discussions

Minimizing the treatment time and the number of appointments is not only favorable for the patient, but also excludes possible complications during the treatment, allowing to obtain optimal prosthetic appliances, with a simplified workflow [6,7]. Another advantage of digital direct teghnologies is represented by the leading of an excellent intraoral fit of the prosthetic device [8].

The dental bridge made in this clinical situation was made in a single treatment session, which meant a lower consumption of materials, almost no risk of errors and an immediate morphological and functional restoration of the dental arch (fig.5).

Even if the price of a bridge made by digital methods is higher compared to the same bridge made by conventional methods, patients opt for these technologies, which are much faster and give them comfort and safety [8].
Clinical trials show a higher degree of patient satisfaction during treatment if digital methods were used, compared to conventional technologies [9.10,11].

Fig.5 The final aspect of the ceramic dental bridge

Conclusions

CAD / CAM systems are considered technologies that have revolutionized dentistry, being today increasingly used and demanded by both dentists and patients, due to the advantages they offer.

Patients want to benefit from a quick treatment, which does not cause discomfort,

and which ensures a complete restoration of all the functions of the dento-maxilar system.

Digital technologies use new types of biocompatible, non-allergenic materials with superior mechanical properties.

These modern technologies reconfigured the therapeutic strategy and it is mandatory for clinicians and dental technicians to be constantly updated with the new materials ans techniques, because computerized systems will be an integrated part of current dental activity.

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