Doctoral Thesis

Lava- a ZrO_2 integrally ceramics system, in CAD/CAM tehnology

SUMMARY

Beauty has always been a main concern for mankind!

But the concept of beauty differs from people to people, from an epoch to another, from a culture to another. If the concept of beauty is considered from different points of view, the concept of esthetics refers to the most faithful imitation of form, colour, of the aspect of the natural dental tissues. Among the artificial physiognomic materials created by man, the introduction of ceramic in dental prosthetics had a major impact.

Although ceramic has been produced in China from the beginning of our era, it reached Europe much later, in the XIVth century.

In dental prosthetic the use of ceramic is proposed by Pierre Fauchard in 1723, after the creation of white porcelain, in Meissen, in 1710. A long trial period followed, which trials, in 1958, led to the creation of low temperature synthesis ceramic, by Weinstein. This discovery allowed metal ceramic prosthetic restorations on noble metals. It was for the first time that strength and esthetics came together. The high price of metal made research go on and, in 1970, the execution of metal ceramic prosthetic restorations on non noble alloys was possible.

There are a number of disadvantages of such dental products (esthetic, high thermal conductibility and low bio compatibility of metal component) which make researchers invent ceramic systems without a metal component.

Execution of dental prostheses is a minute human manufacture activity. This activity has developed together with the discovery of new materials and technology. The idea of a new computer assisted technology belongs to Francois Duret (27).

In 1987 the system CAD/CAM CERC appears, which fact made the dentists' dream of computer assisted prosthetic restoration come true.

In 1990 the company IVOCLAR grants the patent IPS-Empress, a system that consists in the execution of a ceramic nucleus through high temperature injection, a nucleus which is to be classical ceramic plated.

So, conditions for wholly ceramic restorations, exclusively ceramic prosthetic restorations without metal infrastructure were created.

SIC includes all the techniques and clinical and laboratory procedures used in the execution of wholly ceramic restorations.

With SIC special ceramic materials, different of those in the metal ceramic techniques, with improved mechanical and esthetic characteristics are used.

Ceramic systems with higher strength allow a smaller thickness of material and, implicitly, a lower sacrifice of dental rough tissues, without affecting the esthetics and duration of dental restorations. Thus, an optimal combination between strength and esthetics, by a proper proportion of the opaque core and plating ceramic quantity is obtained.

The special effect, the natural aspect and bio compatibility represented by wholly ceramic restorations made of them some of the most appreciated new prosthetic alternatives for sole and pluri dental prostheses, as well as for a number of components of implanting pillars.

As a result of SIC and wholly polymeric systems fast development, different execution technologies for restorations have developed as well and, at present, there are several procedures in the field of wholly ceramic restorations.

Oxide ceramic bases are closely connected with CAD/CAM technologies. The company 3M-ESPE developed SIC Lava which presents the advantage that all hardware, software components and materials come from a single source, so they are all compatible.

The whole system is grounded on the concept of computerized milling. The dentist makes the preparations, takes the empress and in the milling core a structure of lava zircon oxide to be plated is made.

Different ZrO_2 materials, although chemically similar, are not identical. ZrO_2 3M™ESPE™Lava™ have a higher degree of transparency, as compared to the other materials of the same thickness.

Moreover, as Lava works require a thickness of only 0,3 mm on the anterior side, the transparency is consistently increased when the wall thickness is reduced from 0,5 to 0,3 mm. Lava zircon thick of 3,3 and 0,5 mm is considered an optimal material for anterior teeth restoration as related to their esthetics.

As a conclusion, as it comes out from the studies of braking tenacity and curving strength, as well as from the clinical studies, we can notice that mechanical characteristics, high breaking strength, curving strength of Lava 3M ESPE is comparable with the metal ceramic restorations.

Esthetics is much superior as compared to metal ceramic restorations, the colour being much closer to natural teeth. SIC bio compatibility is demonstrated by the absence of allergic symptoms.