Translucent Zirconia Generations and Indications

As all contemporary restorations, zirconia monolithic partial or full crowns target the optimum shape, function, and color of natural teeth. Translucent monolithic zirconia is the most recently introduced generation of zirconia ceramic for anterior and posterior restorations. As previously established traditional zirconia combines both high strength low translucency (Stawarczyk B et al., J Mech Behav Biomed Mater, 2016) translucent zirconia has the advantage of being much more esthetic due to its high translucency but with a reduction of mechanical properties.

The introduction of translucent zirconia blocks, which are directly milled into monolithic restorations, has been one of the most challenging innovations of the last decade in dentistry (Manziuc MM et al., The EuroBiotec Journal, 2019). There are several types of translucent zirconia discs developed to provide high range of colors aiming to reduce the need for surface stains. In addition, pre-shaded, multilayer and high-translucent zirconia discs are developed. They were introduced to mimic the gradient in color and translucency along the dental crown from the incisal to the cervical portion, as well as between the dentin and the enamel layers. In addition, customized staining and extrinsic characterization can be used, Mazda J (Inside Dentistry, 2017).

There were several approaches achieved by ceramic companies to improve zirconia translucency. Two of the most effective approaches to improve zirconia translucency are removal of alumina and controlling grain size by sintering

temperatures. They also have great impact on strength properties and aging (low temperature degradation) of zirconia. Definitely, olycrystalline zirconia is more translucent when grains are small and uniform with minimal porosity (Harianawala HH et al., J Adv Prosthodont, 2014). Recent approaches producing more stabilized cubic/tetragonal zirconia materials resulted in highly translucent zirconia. Recent results proved that Ceramill Zolid FX had the highest translucency and flexural strength among tested translucent zirconia types. Furthermore, this type of more stabilized cubic/tetragonal zirconia can be used in cases of less occlusal thickness and need less tooth preparation, (Zadeh PN et al., JPD, 2018). However, it is well known that increasing the cubic phase up to 50 % in recent generations of translucent zirconia has decreased its flexural strength and fracture toughness due to affecting the unique zirconia's transformation toughening mechanism. Therefore, the objective of this presentation is to briefly discuss the generations and approaches to increase zirconia translucency among different dental ceramic manufacturers and the impact of their usage as restorations in different situations intra-orally.