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The “Era of Monolithic Ceramics”

With the advent of injected “leucite-reinforced” ceramics in the last century’s early 90’s¹, something changed in how an indirect restoration was made; however, more than that, there was a change of behavior in a generation.

A decade earlier, in the early 80’s, after the classic publications^{2,3} showing how the etching of porcelains favored the creation of a structural unit and adhered to the dental enamel, a movement was already beginning. The possibility of bonding a metal-free ceramic to the enamel created “laminates” as we know them, because although this technique was described more than 80 years ago, there was no possibility of an efficient adhesive fixation, reducing its longevity even in the short term.

Then, the internal etching of ceramics, silane application, composite resins with the ideal viscosity for cementation, manufacturing techniques on platinum foil and refractory die arouse. At that time, Europe and Japan were home to the great ceramists of this first “metal-free” generation of Esthetic Dentistry. On the other side of the world, in the United States, with a generation of successful professionals born in a time of great economic power (*baby boomer generation*), Esthetic Dentistry found in great centers, like California, the ideal place to develop. Great ceramists moved to America, and thousands more were pilgrims to Europe and Japan in search of the great masters of stratified ceramics. The technique became “popular

and elitist.” Popular because it was the dream of many to have perfect teeth, aligned and white; but elitist, since only a small group of ceramists could perform the technique efficiently. Moreover, because it was practically an artistic technique, production was costly and at low volumes. This created an elite of “artist ceramists,” true masters who perfectly copied the entire anatomy and optical characteristics of a tooth. These masters are today, admittedly, the ones who are responsible for the respect and appreciation of Esthetic Dentistry. Time showed that the technique was “perfect”; the initial longevity studies were encouraging and more and more professionals and patients sought this treatment modality. However, a problem had arisen! Not with the technique itself, but with the demand! With the worldwide boom of esthetics - and as the technique was artistic and each tooth carved as a work of art - production appeared to be limited and large companies in the area began to move to meet this growing demand for metal-free ceramic restorations. Among the many techniques that have emerged, the ceramic by injection (*pressure technique*)¹ was the one that definitively changed the entire set of procedures within laboratories and clinics.

Okay, now the “perfect” technique was popular, and no longer elitist! The price of the elements fell drastically, the making of a laminate entered an assembly line and, through the technique of makeup, more laboratories became able to realize the much-desired “ceramic laminates”. But not everything is perfect!! The first generation of leucite-injected ceramics (e.g., System Empress, Ivoclar Vivadent) required more invasive preparations in relation to “porcelains” made on refractory dies or platinum foils. Simultaneously to this, all over the world, adhesives that allowed union to dentine emerged, “making up for” such wear! Of course, this compensation is no longer justified in current dentistry, since the importance of maintaining as much dental structure as possible, either

enamel or dentin, is known and documented. However, finally, it was like this: we left the thin stratified porcelain on enamel for the leucite-injected ceramics on dentin. Esthetics was important, but not so conservative! Evolution often has a price.

Nevertheless, in science, there are comings and goings, until a certain consensus appears!

Thus, lithium disilicate-based ceramics (Empress 2, Ivoclar Vivadent) appeared, which had very high resistance, but were too opaque to be used in small thicknesses, despite being a structure passive of etching and silanization. This limitation led to another evolution, and years later the e.max Press system (Ivoclar Vivadent) emerged, with the same formulation, but with translucency variation, which allows to work with extremely reduced thicknesses and with optical characteristics obtained through a wide variety of ingots with makeup or partial stratification. Several commercial brands with the same formulation and variables based on the same manufacturing proposal are available today. With this development, the technique with ceramic laminates became more popular, and less and less elitist!

Slim pieces became a trend, and a new name emerged: “contact lenses”,⁴ which helped to further popularize the technique.

Then, there came another “revolution”: CAD-CAM systems, which today are able to design with the help of computer programs and mill virtually any material.

Dentistry has become esthetic and less invasive, either for injected ceramics, milled or stratified. The variety of techniques has increased possibilities, and the benefit of a less invasive restorative dentistry has become available to more professionals and patients. In the last 35 years, Restorative Dentistry has evolved like never before!

In particular, I do not advocate any technique. As an educator and health professional, my focus

is this: no matter what technique the ceramist or clinician intends to use; but that when they use it, they do it in the best way possible.

If the ceramist has the ability and / or, by conviction or personal opinion, prefers to work with the stratified technique and has clients (dentists and patients) who can afford it ... perfect!

On the other hand, we are a country with continental dimensions and a huge number of professionals and patients who seek and need esthetic and functional rehabilitative treatments. For this, the production of monolithic ceramic restorations, with the injected and / or milled technique and finished with makeup, takes the benefit of the current Dentistry to an increasing number of people. And, importantly: with quality and relatively lower cost.

Education is the same. It is not because the ceramic is monolithic and with makeup that does not

require technique and refinement; training is also arduous for the ceramist, but makes the process less susceptible to errors. There is room for all the techniques of making ceramics, and all work and have scientific documentation - and this is imperative to be understood and shared!

In this new age, there is no need to say that one technique is better or worse than another; there is a need to understand that decision making is often personal, because the professional is more familiar with the technique!

Confirmation by science that monolithic ceramics are viable options opens up a “sea” of therapeutic possibilities, business expansion and, above all, services improvement for patients seeking health and esthetics.

Welcome to this new era ... with more possibilities and options!

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