

Expressive Aspects of Restorative Dentistry

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Abstract

The subject that will be reviewed is carrying a type of revolutionary character in operative, prosthetic and aesthetic dentistry in general, and its represents the field of restorative dentistry. As in all disciplines of dental medicine, evolution of this direction has already started from the day of its development, and as a rule in any type of evolutionary processes, there were certain key points during this path. In our case it's the stage, which took place in history about a century ago. That was a period, during which were actively existences of such problems as: provision of ideal aesthetics, matching of opacity & translucency, provision of good biologic response compatible with soft tissues in subgingival margins, and not less important issue, alterations by corrosion.

Key Words: *Indirect restorations. Direct restorations. All ceramic crowns. Shade selection. Aesthetic dentistry. Digital dentistry.*

Introduction

This article presents consideration and research of several modern aspects of restorative dentistry, including present restorative techniques and materials, diagnostic tools and its influence on today's restorative practice. Since the clinical practice requires consideration of time management, providence of patient's comfort, complex treatment planning and insurance of final result, modern techniques and tools are acting as a 'right hand' for the operator, being representative of aesthetic, prosthetic or operative field of dental medicine.

Purpose of Article

Making the explanation easier of implementation of above mentioned points for young/experienced practitioners; Importance of complementary research methods; Avoidance from incorrect or unnecessary planning or treatment interventions; Refreshed knowledge as a logical way of evolution.

Preface

The use of ceramics in dentistry dates as far back as 1889 when Charles H. Land patented the all-porcelain "jacket" crown. This new type of ceramic crown was introduced in 1900s. The procedure consisted of rebuilding the missing tooth with porcelain covering, or "jacket" as Land called it. The restoration was extensively used after improvements were made by E.B. Spaulding and publicized by W.A. Capon. While not known for its strength due to internal micro cracking, the porcelain "jacket" crown (PJC) was used extensively until the 1950s. To reduce the risk of internal micro cracking during the cooling phase of fabrication, the porcelain-fused-to-metal (PFM) crown was developed in the late 1950s by Abraham Weinstein. The bond between the metal and porcelain prevented stress cracks from forming. Lost-wax fabricated metal copings also addressed the

problem of the marginal fit experienced with traditionally constructed porcelain jacket crowns. While PFM crowns have a decrease in porcelain failures, the addition of a metal block-out opaque layer diminished the esthetics of these restorations. A resurgence of an all-ceramic restoration came in 1965 with the addition of industrial aluminous porcelain (more than 50%) to feldspathic porcelain manufacturing. W. McLean and T.H. Hughes developed this new version of the porcelain jacket crown that had an inner core of aluminous porcelain containing 40% to 50% alumina crystals. Although it had twice the strength of the traditional PJC, it still could be used in the anterior region only (due to its lower strength). Its higher opacity was also major drawback. However after that period the construction has undergone for numerous changes and modifications, but until today it continues to act as an integral weapon of modern prosthetic dentist.

All ceramic crown today is a - lucid press able porcelain, zirconia or lithium disilicate construction which may vary in implemented materials, technique and price, but ensures all aspect of aesthetic requirements, and longevity in oral cavity of the patient. As the rest of existing prosthetic materials, they have its own indications, which may be in face of.

Indications of All-Ceramic Crown

Implant Abutment

One of the best representatives is Straumann® CARES® Abutment, which is highly-designed, flexible and relatively time saving construction due to digital technologies of CAD/CAM. Now, it's available in both screw-retained and cement-retained restorations.

Inlay retained FDPs

Inlay-retained FDPs may especially be indicated when adjacent teeth have been previously restored and when implant placement is not possible or not indicated. In such cases, both metal-ceramic and fiber-reinforced composite FDPs have certain disadvantages, which makes inlay retained FDPs as the best solution.

Maryland bridges

A Maryland bonded bridge is a minimally invasive alternative to a traditional dental bridge, as it does not require extensive modification to neighboring healthy teeth. (Single Crown, Splinted Crown, 3/4/5/6-Unit Bridges, Cantilever Bridges, Primary Telescopes).

Types of All Ceramic Products

Leucite Reinforced Press Able Porcelain Crowns

Originally introduced 15 years ago, IPS Empress press able crowns have a flexural strength of 160MPa and have proven to be durable and to provide excellent aesthetics. It's a highly-esthetic single tooth restoration, and in addition to the excellent strength values, the leucite glass-ceramic ingots are distinguished for their exceptional esthetics. The homogeneous material scatters light naturally and provides a balanced chameleon effect.

Lithium Disilicate Porcelain Crowns

Made from biocompatible lithium disilicate ceramic glass ingots, IPS e.max crowns are resilient to fracturing with a flexural strength of 400MPa, which is three times stronger than Empress. Crowns can be pressed or milled to offer good fit and function. With e.max, it is possible to create full-contour restorations, or to layer enamel porcelain using IPS e.max Ceram, a comprehensive layering ceramic capable of achieving highly aesthetic results.

Solid or Monolithic Zirconia

Solid or monolithic full-contour zirconia crowns are ideal for posterior restorations and are extremely strong with a flexural strength of 1200MPa. CAD/CAM-fabricated crowns offer a very precise marginal fit and are virtually unbreakable. The early monolithic zirconia crowns were often too high in value, but progressively the shades have improved considerably and can now closely match adjacent dentition. Effect shades can help to characterize the occlusal surface of the crown, and the very latest monolithic zirconia crowns offer natural translucency and opalescence.

High Translucent Zirconia

High translucent zirconia is particularly suitable for anterior crowns but can also be used for posterior crowns. It offers lifelike translucency and has a flexural strength between 590 and 720 MPa. High-translucent zirconia can be used in monolithic restorations or it may be layered. Its translucency is due to the way the material is processed, minimizing the effects of impurities and structural defects, which could otherwise affect its ability to allow light through.

However, regardless of that updated features, indirect restorations offered by prosthetic dentists had always its undeniable place, but the topic that we are going to discuss next, is still suffering from inappropriate approach.

Direct Restorations

It should be underlined, not to confuse it with a filling of the tooth, since the field of direct restorations nowadays has its own exceptional concept, and is acting way more than traditional construction of the shape. To be more precise, we are talking about definite imitation of optical parameters for anterior, and well-defined occlusal references for posterior teeth, including primary, secondary and even tertiary anatomy of the surface. All of these outcomes are possible to achieve due to developed sequential or stratification techniques, and to implement them properly, we need a suitable weapon in our storage:

Required tools for effective direct restoration

Set of Composite Resin.

Except the filler particle size and mechanical properties of your composite, attention is paid on the shades of the material. During extended amount of time, the choice was limited to a maximum 3-4 shades, with outcome of monochromatic or acceptable results, while to achieve for a true color of the natural tooth, modern market is offering from 10-25 different shades, including body shades, enamel mass and a separate bleaching scale.

Composite Heater

Is a machine for gentle heating of the syringe, prior to procedure, which makes it easy to adapt the layers and reduces the risk of incorporating air bubbles in the material.

Modeling Resin

It is a flow able agent, which was designed to avoid from sticking of composite with your instrument, and to provide wetting and sculpting properties.

Stains

Are important not only posterior restorations (pits and fissures), but also for anterior, to recreate the opacity and translucency of the tooth.

Handtools

Are one of the most important parts, since majority of traditional instruments are too thick, blunt, or too regular, while the use of thin and modified working tips will allow not only accurate condensation, but also will help to maintain thickness of your layers up to 0.5 mm.

Silicone Index

It is a reference key, taken from natural teeth before preparation, or from the wax-up of the cast. It allows recreating correct midline, proximal walls and palatal anatomy during your anterior restorations. The topic, following this chapter is related with both direct and indirect restorations.

Shade Selection

Large numbers of doctors are losing their interest to this question after several years of restorative practice, and that's the crucial moment, which is leading to insufficient color matching of the restoration. It's already not a secret that traditional scale of VITA shade cannot ensure needed color of the restoration, since the same code of various manufacturers, differs from each other by saturation or value. Some of them may offer an electronic matching device, but since we usually combine different brands, shade selection remains an individual task. However, there are several solutions that we can perform, and in case of direct restoration, it is:

Individual Shade Pattern

Is a method, by which you can create not only individual shades, but also combine your favorite materials in one unit, and use it for the rest of your restorations. Some manufacturers include necessary tools for shade patterns, in other case it's possible to purchase from commercial companies, or make them by yourself.

Non-Adhesive Pattern

Quite simple, but effective technique, determined by placement of several composite portions on the tooth surface, followed by non-adhesive polymerization.

Cross-Polarization

Is implemented during dental photography, by a polar filter that makes it easy to eliminate unwanted reflections on the teeth, caused by the flash or artificial light. These specular highlights can obscure details in the teeth and cause problems when communicating with the lab.

Tailpiece

Performance of multidisciplinary approach for even simple cases, together with renewed techniques, digital workflow and continuing education, will establish your clinical discipline for cases that you never had before, and will add a bit shine, behind the white lab coat.

References

1. J. Manauta, A. Salat “Layers : An Atlas of Composite Resin Stratification”2012,ISBN,Chapter: Individual Shade Pattern
2. Gregg Helvey, DDS. [A History of Dental Ceramics] Received 2010 May ; Compendium, Volume 31, Issue 4 <https://www.aegisdentalnetwork.com/cced/2010/05/a-history-of-dental-ceramics>
3. Flavia Pardo Salata NAHSAN,1 Rafael Francisco Lia MONDELLI,2 Eduardo Batista FRANCO,3 Fabiana Scarparo NAUFEL,4 Julio Katuhide UEDA,5 Vera Lucia SCHMITT,5 and Wagner BASEGGIO6 [Clinical strategies for esthetic excellence in anterior tooth restorations: understanding color and composite resin selection] Received 2010 Mar 23; Revised 2010 Apr 30; Accepted 2010 Oct 26. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3894755/>
4. **Stacey Simmons, DDS.** [Cross-polarized reflective light dental photography: The silver bullet of tooth shade selection] Feb 28th, 2017 <https://www.dentistryiq.com/clinical/article/16365677/crosspolarized-reflective-light-dental-photography-the-silver-bullet-of-tooth-shade-selection>