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Review Article

Esthetic dentistry in prosthodontics including restorative materials-Review

Isha Rastogi[1]*

[1]*Dept. of Dental, Dr KNS Memorial Institute of Medical Sciences, Barabanki, Uttar Pradesh, India*

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ABSTRACT

All of us want and desire to look attractive. Esthetic dentistry in Prosthodontics is the branch that focuses on natural look of the teeth- to be beautiful. Esthetic is a Greek word 'estheticos' which is insightful. It is related to pleasure or good-looking. In 1950, this word was invented and esthetic revolution started in 1970s. This article deals with recent techniques and restorative materials used in Prosthodontics as in Rpd, Fpd, Maxillofacial, Implant, Smile like composites, ceramics, ormocers, cention N, zirconomers and in near future antibacterial composites. Ultimately it is the dentist's choice to mimic tooth structure and make it lifelike as much as possible.

1. Introduction

Everyone wants to be attractive. The Oxford English dictionary OED defines esthetics as ' concerned with beauty' or the appreciation of beauty. Dental esthetics is the application of the principles of esthetics to the natural or artificial teeth and restorations like smile design,face symmetry, golden ratio, gingival line, gingival angle GA and gingival zenith angle GZA.[1–4]

1.1. Esthetics in complete denture

3D printed complete denture CDs had better color stability compared to PMMA polymer, methyl methacrylate monomer cds. Also it is seen that nanofilled hybrid denture teeth had lifelike translucency, strength, high abrasion resistance, color stability, plaque resistance and biocompatibility.These teeth create a natural appearance as physical optical characteristics and had less deviation (higher precision) than conventional acrylic denture teeth.[5–8]

1.2. Esthetics in removable partial dentures

It is seen that Kennedy's class IV partially edentulous cases were more common in age group above 60 years and most common in mandibular arch.[9] Using esthetic substitutes to conventional metallic clasps as Equipoise clasp design, Twin clasp/Spring clasp, saddle lock clasp or hidden clasp and metal free clasps.

1.3. Esthetics in fixed partial denture

Implementation of CAD/CAM systems increased popularity of ceramics to a great extent.[10,11] All ceramic restorations result in ceramic chipping causing framework fracture over time. So Zirconia and reinforced ceramics have proved to be able to withstand for long time without complaints.[12] Also all ceramic specially densely sintered zirconia and reinforced glass ceramics have promising future as it satisfies both the prosthodontist and the patient.

Cosmetic Dental veneers (laminates) are common cosmetic procedure for the anterior teeth and many studies have shown that 90% survival rate has been achieved of these in 20 years.[13] It has reported that porcelain veneers

* *Corresponding author*.
E-mail address: excellent123@gmail.com (I. Rastogi).

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have excellent esthetic outcomes and predictable longevity while composite veneers can be a good conservative solution but has no durability.[14,15] Cosmetic Lumineers (prepless veneers) are made of ultra thin laminate instead of porcelain. Also in a survey it's seen that among composite build ups, bleaching, veneers and prep less veneers(Lumineers) , people favored permanent treatment modalities than temporary procedures.[16,17] Snap on smile or removable Hollywood smile is a quick to install smile, temporarily whiten teeth and compensates for missing teeth. We stil need reliable scientific studies about it. Also it is less durable, bulky and high risk of decay and plaque in this.[18,19]

1.4. Esthetics in maxillofacial prosthesis

Color matching of natural skin is essential and challenging to the maxillofacial prosthodontist.Silicones and acrylic resins and cosmetic dyes are used. Manual techniques as chairside visual trial and error method (most reliable and commonly used) throughout facial spraying prostheses is done. It is followed by some tinting ,tattooing and commercial cosmetics.[20,21]

1.5. Esthetics in implants

Patients want esthetic look from the implants. So now esthetics is now of concern to implantology researchers.[22] Example as precise implant prosthesis planning by CBCT, intraoral scanners, CAD CAM for 3D planning, tissue punch, modified palatal roll technique, atraumatic teeth removal without flap elevation, papillary generation, custom tooth form healing abutments, gingiva colored porcelain, platform switching, use of tooth colored implants as zirconia implant.

1.6. Smile design

Virtual smile designing is an essential component of the dental procedure and it is multidisciplinary.[23] Digital smile design DSD software allows patient smile enhancement by producing a visual treatment plan.

1.7. Esthetic restorative materials

Third new International Dictionary of Webster has defined esthetics as aware of, responsive or zealous about the beautiful; having a way of beauty or fine culture.[24] Face is an impression of fullness of life and mirror of soul.[25] Zirconomers are new GIC with strength and toughness of amalgam (no mercury) for posterior stress prone areas. Previously shade selection and layering was futuristic and patient expectations were diverse, so was esthetics definition for them.[26]

1.8. Indirect restorations

Ceramic came in 18th century into dentistry. It has high esthetic level but it's strength of 50 MPA makes it chip off easily. Anterior esthetics is a driving force of dentistry so it should be seen that the restoration looks accepted and maintains the tooth structure's sanctity.

1.9. Direct restorations

In 1970s ,composites started replacing acrylic resin and in 1980s, microfilm composites were created. Then smart dental materials received attention as conventional GIC cement which is biocompatible and achieves esthetic result,came up.[27] Although Bowen's formulation has been available for more than 30 years, it's chemistry is unchanged and mechanical properties have not improved substantially.[28]

1.10. Modifications in GIC's composition have been tried

Gic cement with nanoceramics, silica cement example zinc based gic, hydroxyapatite and zirconia reinforced gic. These have been tried so as to improve its mechanical properties for posterior restorations.[29]

Bioactive glass reinforced GIC has improved mechanical properties. Also hybrid GICs have antimicrobial properties.[30] Also reinforced glass ionomer cement reactive glass fiber has fracture toughness of 140% and total energy release rate of 440%.

GIC incorporating Niobium pentoxide augments the mechanical properties with biocompatibility and bioactivity.[31]

Recent advances in composites (bioactive composites with antibacterial and remineralising properties) and rechargeable composite and adhesive with long term calcium orphosphate ion release are some recent materials. They have lasting caries inhibition capacity compared previously with composites that lead to recurring caries. Numerous additional antibacterial, antimicrobial dental composites and bonding agents are introduced.[32]

1.11. Cention N is a new tooth

Colored material with isofiller that acts as shrinkage and stress reliever.[33] Unlike composites, ormocers are acronym for organically modified ceramic technology and are apt alternation for direct aesthetic restorations.[34,35]

1.12. Aesthetic posts

They help in restoration of endodontically treated teeth and their polyethylene fibres give strength to the composite. Ceramic crowns- metals are substituted by these, but there's failure because of the fracture of the bulk in these. Ceramic veneers provide conventional and biologically sound with

good dental health of the patient. CAD CAM for ceramic crowns- dentists have used it for almost 2 decades for intraoral Fpd as inlay,onlay,veneer, crown, for implant abutment, CAD CAM uses various metal alloys as Ti, Zro2 and Al2O3.[36]

1.13. Resin cements

They have superior tensile, compressive and flexural strength. Also they can be used for various dental restorations. Their bond strength is affected by pretreatment measures and curing steps with the amount of polymerization of the resin cement.[37]

1.14. Ormocers

Their surplus polymerization allows them to cure without any leftover residual monomers that makes it biocompatible with the tissues to a great extent.[38]

1.15. Compomers

They are combination of traditional composite resins with fluoride releasing properties and bond of GICs. In clinically beneficial amounts, these materials release fluorides and so they are aesthetic materials used for teeth restoration.[39]

Ceramics are classified based on moisture as SiO2 containing glass based system, fillers mainly crystalline containing glass based system, glass filler containing crystalline based systems and polycrystalline solids. Ceramics based on processing techniques are powder / liquid and glass based systems, glass based system consisting of machinable or pressure blocks, slurry or computer assisted die processed systems.

1.16. Zirconia

It provides esthetic restorations, used in Prosthodontics, for endodontics post , crown, bridge, also for orthodontic brackets, it's a popular substitute to alumina as a biomaterial.[40]

2. Discussion

Today's patient expects esthetics and so the restorative dentist has to understand the patient's desires prior to therapy. As Devan says, ' objective is not meticulous restoration of what is missing,but preservation of what remains'. So in esthetics also our goal has to be to preserve what remains. In treatment, all principles of esthetic dentistry should be applied and with all types of dental prostheses.[41]

Advances in ceramics and veneers restores function and esthetics by minimally invasive technique as they are extremely natural looking. Also Denture base characterisation in Prosthodontics is a visual treat as it mimics natural colour, shade and surface texture. Enhancement of white esthetic factors as artificial teeth and pink esthetic factors as denture base, is enhanced by characterisation of denture base. Implants, CAD CAM, electronic technology for colour matching as colorimeters, spectrophotometers, digital camera as filter colorimeter, spectroradiometers- all provide solutions for shade selection. Thus esthetics is an advancing field in Prosthodontics and dentists plus dental technicians should use it for advantages of patients.[42]

3. Conclusion

Fabrication of dental materials is designed for dental use.[43] Direct restorative materials are compomers, resin modified GIC, composite resin, amalgam. Indirect restorative materials are gold, ceramic- resin hybrid, composite resins.[44] Esthetic and perception of beauty is different for everyone and it also depends on culture experience/self imay.[45] Even though ceramics are so characteristic looking.[46] still clinicians need to assess them in patient's mouth, as masticatory forces and parafunctional habits- may cause failure of ceramics.

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5. Conflict of Interest

None.

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Author biography

Isha Rastogi, Professor https://orcid.org/0000-0003-4299-8035

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