A NEW CLASSIFICATION OF DIRECT ESTHETIC RESTORATIVE MATERIALS , TECHNIQUES & RESTORATIONS

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ABSTRACT

Various materials, methods and concepts are used in contemporary esthetic dentistry practice. For the purpose of better and easy understanding and also for disseminating the proper information in an effective way the classification of these materials / methods and concepts have been made in various ways. The classifications are modified or changed as per clinical and academic requirements and new classifications are developed to meet the new demands. This articles describes about the new approach of classification of direct esthetic restorations, materials and its placement techniques. The proposed classifications are based basically on esthetic nature of the tooth to be restored, the optical properties of the materials and necessary technique required to achieve the desired esthetic result. It is believed that the proposed new classifications will benefit the clinicians to select the proper materials and technique in different clinical situations, where esthetic is a prime factor.

Key Words: Opaque, Dentin, Enamel, Translucent, Layering Technique, Classification.

INTRODUCTION

The use of the direct esthetic resin based restorative materials have increased tremendously in recent years because of their excellent esthetic potential, acceptable longevity, and relatively low cost in comparison with ceramic restorative material and procedures. In addition these materials allow for minimally invasive preparation and are popular for various restoring esthetic defects of tooth like form, dimension, texture and color. The natural esthetic condition of the tooth to be restored, restorative materials to be used and its application technique are the three major factors required in direct esthetic restorations to create polychromatic, life-like, invisible restorations which match ideally with the restored tooth and the adjacent dentition.

CLASSIFICATIONS

There are various classification systems available in dentistry which describe the above three major factors. Each classification provide certain basic information to the clinician. To complete the direct restorative cases with high esthetic demand clinician requires more information about esthetic nature of the defects to be restored and the optical properties of the materials and the techniques to be used. So in this article the author has proposed three classification systems separately for Direct Esthetic Restorative Materials, Techniques and Restorations.

a. Classification of the direct esthetic restorative materials.

Resin based direct esthetic materials are the most commonly used direct esthetic restorative materials in contemporary esthetic dentistry. The aesthetic and physical properties of glassinomer materials are not up to the mark to meet the high esthetic demand of restorative procedures and hence it is not discussed in this article.

Various classification systems for resin based restorative materials have been developed through the years based on particle size, size distributions and percentage of filler loading of the resin. In 1983 Lutz and Phillips described the following categories.

Traditional /Macrofillers – 1 to 15 microns (70-80 % by weight)
Fine Particles - 0.4 to 3 microns (70 -90 % by weight)
Microfine / Microfiller – 0.04 to 0.2 microns (50 -60% by weight)
Hybrid / Blends - (Macro filler plus Microfiller) (77-84% by weight)

In 1992 Willems proposed a system based on volume fractions. Bayne and other proposed a classification in 1994 based again on filler particle sizes in six categories

Megafill – 0.5 to 2 millimeters
Macrofill – 10 to 100 microns
Midifill – 1 to 10 microns
Mini Fill – 0.1 to 1.0 micron
Microfill – 0.01 to 0.1 micron
Nanofill – 0.005 to 0.01 micron

There are other classifications as well

a. *Based on Setting Mechanism of the materials,*
   Auto Cure (Chemically cure)
   Light Cure
   Dual Cure
b. *Based on Viscosity of the materials and their clinical uses.*
   Low viscosity or Flowables
   Medium viscosity or Universal
   High viscosity or Packable

The above classifications provide information about compressive strength / tensile strength, fracture resistance, surface finish, color stability, polymerization shrinkage, handling properties of the materials and their clinical applications. But these information are not sufficient in clinical practice while undergoing a highly esthetic demanding restoration where optical properties of the materials play a vital role. So the new clinical classification of the direct esthetic restorative materials is proposed here, based on basic optical properties and clinical application of the materials and categories in four groups.

1. *Opaque Group of materials*

A direct esthetic restorative materials use to reduce the translucency (Blocking Light) or to mask the undesired color of the tooth being restored
Eg. Various Opaque, Opaque dentin (A3O / A2O, B2O etc), Some of the GIC can also be used as opaque materials in base.

2. *Dentin Group of materials*

A direct esthetic restorative materials use to substitute and mimic the dentin layer of the natural tooth.
Eg. Various Dentin Shade / Body Materials (A1 / A2 / B2 etc)

3. *Enamel Group of materials*

A direct esthetic restorative materials use to substitute and mimic the enamel layer of the natural tooth.
Eg . Enamel / Insical / Transparent restorative materials etc

4. *Effect Group of materials*

A direct esthetic restorative materials use to mimic or to create special effect present in the natural tooth. These materials are mostly used in between dentin (Natural / Restorative) and enamel layer of the restorations.
Eg. Various Tint / Stain / Color modifier etc.

There are various composites systems with different groups of the materials avaliable in the market. The restorative technique or the material placement protocol may be different as per the group of the materials avaliable in the kit or system. If we do not understand the basic concept of the group of the materials we are using, it may create us confusion in clinical practice for their proper use and hence difficult to achieve perfect result. It is believed that the proposed classification would help the clinicians to have better understanding about the fundamental group of direct esthetic restorative materials presently being used in their daily practice and also guide them to purchase the correct restorative system as per their restorative demand. Lack of any of the above groups of the materials in direct esthetic restorative materials system may affect in the achievement of the desired level of clinical esthetic output.

b. Classification of Direct Esthetic Restorative Technique

The proper selection or adaption of clinical technique is very important in esthetic dentistry. There are various techniques in direct esthetic restorations procedures. Most popular and widely used modern techniques are based upon the natural layering concept. They focus mainly on optical and anatomic characteristic of the natural teeth and emphasizes the importance of using materials specifically designed to emulate the dentin and enamel layer of the natural teeth.

So far layering concepts have been classified as
Basic Layering Concept
Classic Layering Concept
Modern Layering Concept and
Trendy Layering Concept.

Each of these concepts is based on the specific arrangement of the two or three layers usually needed for large Class III and Class IV restorations or incisal buildups. None of the above category mention about single layering technique which is frequently used in esthetic dentistry and also do not mention about the clinical use of special opaque materials. To avoid these shortcomings the following types of layering technique classification which include all the layers required for achieving excellent natural esthetic restorations have been proposed.

1. Mono Layering Technique

This is a very simple and common layering technique where either dentin or enamel group of the material is used to restore the defect of natural tooth.

Eg. – All Type 1 Direct Esthetic Restorations. (See the proposed classification)

2. Bi- Layering Technique

This technique demands a higher level of clinical skill than in mono layering as it uses both the dentin and enamel group of the materials to restore the defect of natural tooth.

Eg: Type 2 Direct Esthetic Restorations.

3. Tri – Layering Technique

This is the most advanced level of layering technique where dentin, enamel and opaque group of the materials are used together. The proper selection of thickness and to create harmony between various shade and opacities of each layer of the material requires a perfect skill in this layering technique.

Eg : Type 3 Direct Esthetic Restorations

4. Complex -Layering Technique

Any one of the above direct esthetic restorative technique which requires special Effect Materials during restorative process is classified as Complex Layering Technique of that particular technique. In this layering technique the effect group of the materials are normally used between dentin and enamel layers of the natural or restorative layers of the restorations.

So we also have

- Complex - Mono Layering Technique
- Complex - Bi- Layering Technique
- Complex - Tri -Layering Technique

The proposed classification is very simple to understand and easy to remember as its classified name itself suggest the number of the layers and various groups of restorative materials required to restore the tooth defects.

3. Classification of Direct Esthetic Restorations

There are various types of tooth defects which needs various types of restorations to fulfill the functional and esthetic demand.

Developmental defects (Enamel / Stain / Shape)
Bacterial – Tooth decay
Chemical – Erosion
Physical – Abrasion / Trauma

Various tooth defect classifications have been proposed earlier based upon site, extent and the layer of the tooth materials involved. Dr. GV Black's classification is very popular as it is still taught all over the world at dental graduation level. However the recent advancement in physical and esthetic properties of the various adhesive direct restorative materials have brought a significant

changed in the concept of the cavity design and restoration principle proposed by GV Black. It is well known that GV Black's classification do not describe the extent of the tooth lesion, but is still popular and in wide use to describe the site of the tooth defects or a restoration. We normally add the words Small, Large, Extended, Deep, Superficial, One surface or Two surfaces as an adjective to describe the complexity of the restorations or the defects. Another classification of the carious lesion proposed by Dr. Gram Mount describes both the site and extent of the carious lesions but not the other tooth defects.

According to his classification the site of the carious lesion are classified as
Site 1 – Pit & Fissures and smooth surfaces
Site 2 – Contact area, of all teeth
Site 3 – Cervical third.

Size (Extent) of the carious lesion are classified as
O = No Cavity
1 = Minimal
2 = Moderate
3 = Enlarged
4 = Extensive

In the above classification the site and size of the lesion do not give sufficient restorative clues or the esthetic complexicity of the lesion and also do not include all the causative factors of the tooth defects. More over this classification uses totally different terminology to describe the anatomical site of the lesion than of GV Black's popular terminology which is still very popular and widely used in contemporary dentistry.

The author feels that the cavity / tooth lesion or restorations classifications avaliable today are not sufficient to deal with direct esthetic restorative procedure which requires various new restorative materials and latest techniques and concepts. Therefore, to fulfill the present esthetic demand of various esthetic restorations a new classification of the Direct Esthetic Restorations has been proposed. The proposed classification is based on the group of the restorative materials and basic esthetic restorative technique require to restore the tooth defect to achieve a desirable esthetic result. To denote the anatomical site of the restorations the author has used the popular GV Black Classification as Sufix in his classification.

All the Direct Esthetic Restorations can be classified in 3 major types as per their esthetic demands of materials and techniques to restore the defects.

a. Type 1 - Direct Esthetic Restoration

In this type of restorations the defects of the tooth is restored by using only *dentin* or *enamel* substitutes material. The restorative process does not require opaque or any effects group of materials. Hence the restoration is completed by Mono- layering restorative technique - (Fig 1)

Type I
Direct Esthetic Restoration (Fig. 1)

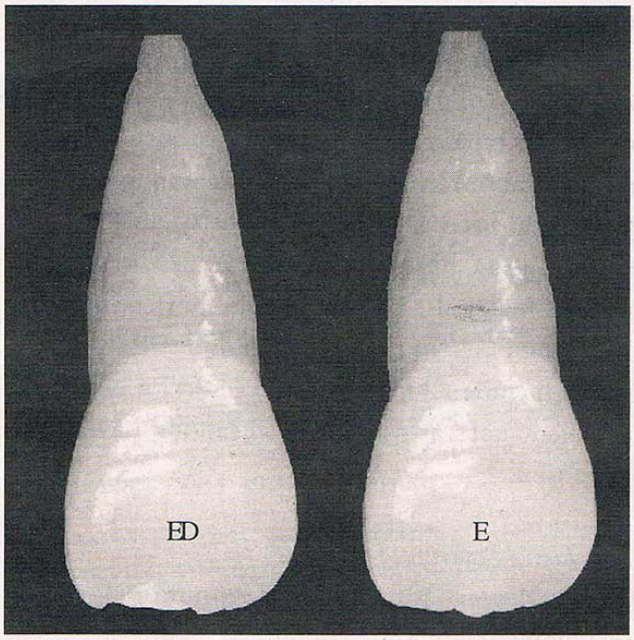

Fig 1- Type 1 Direct Esthetic Restoration, restored with Mono Layering Technique: Exposed Dentin (ED), Enamel Group of Materials (E)

b. Type 2- Direct Esthetic Restoration

In this type of restorations the defects of the tooth is restored by using both *dentin* and *enamel* substitutes material. The restorative process does not require opaque or any effects group of materials. Hence the restoration is completed by Bi-layering restorative technique. - (Fig 2)

Type 2
Direct Esthetic Restoration (Fig. 2)

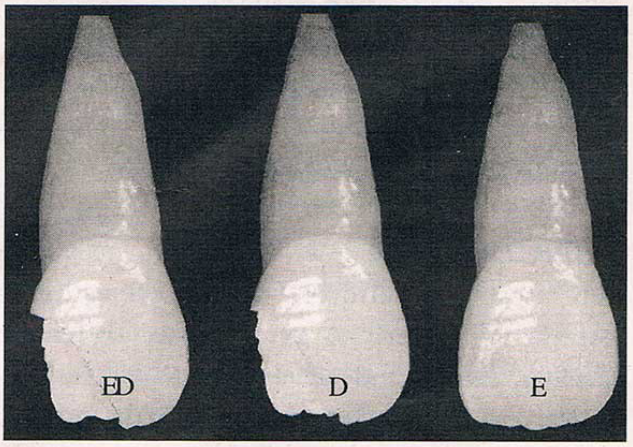

Fig-2 Type 2 Direct Esthetic Restoration, restored with Bi-Layering Technique Exposed Dentin (ED), Dentin Group of Materials (D), Enamel Group of Materials (E)

c. Type 3- Direct Esthetic Restoration

In this type of restorations the defects of the tooth is restored by using both *dentin* and *enamel* substitutes material. The restorative process also require opaque materials but does not require any effects group of materials. Hence the restoration is completed by Tri-layering Restorative technique. (Fig 3)

Type 3
Direct Esthetic Restoration (Fig. 3)

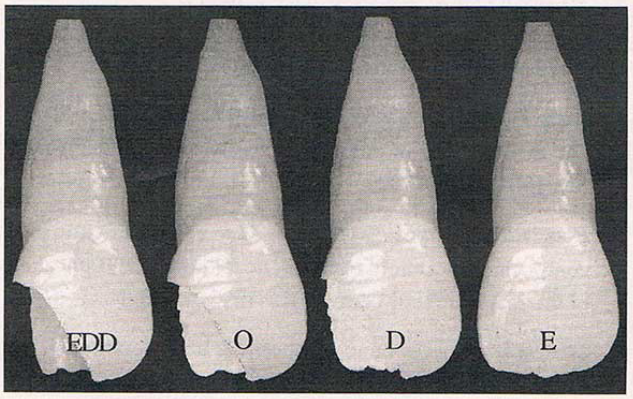

Fig 3 -Type 3 Direct Esthetic Restoration, restored with Tri - Layering Technique Exposed Discolored Dentin (EDD), Opaque group of Materials (O), Dentin Group of Materials (D), Enamel Group of Materials (E)

d. Complex Direct Esthetic Restoration

Any one of the above type of restoration which requires *effect group of materials* (Tint / Stain / Color etc) to mimic special effect of the tooth to achieve the best esthetic result, is classified as Complex Direct Esthetic Restoration of that particular types.

So we also have

Type 1
Complex Direct Esthetic Restoration (Fig 4)

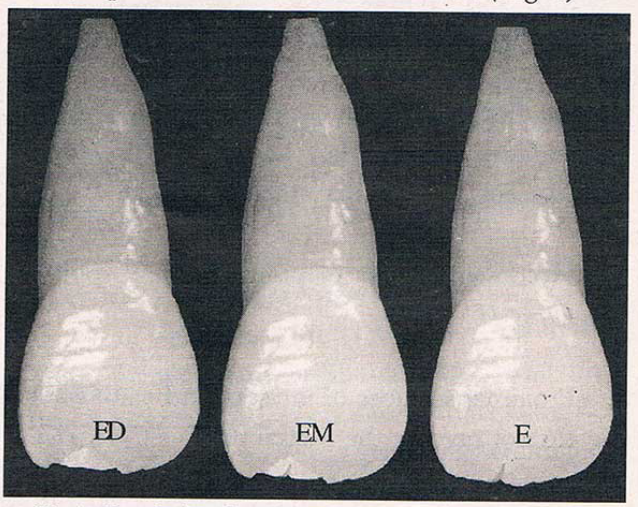

Fig 4 - Type 1 Complex Direct Esthetic Restoration, restored with Complex Mono Layering Technique

Type 2
Complex Bi Layering Technique (Fig 5)

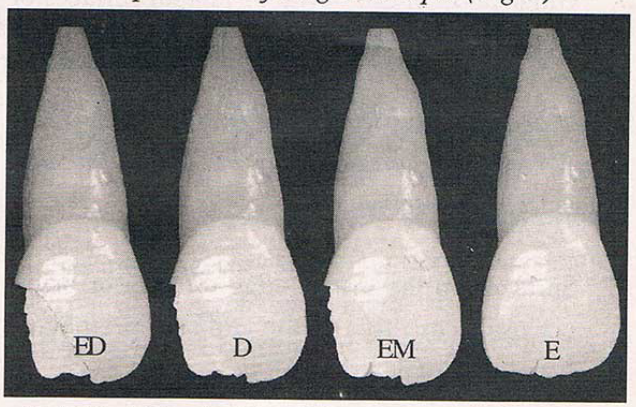

Fig 5-Type 2 Complex Direct Esthetic Restoration restored with Complex Bi-Layering Technique Exposed Dentin (ED), Dentin Group of Materials (D), Effect Group of Materials (EM), Enamel Group of Materials (E)

Type 3
Complex Direct Esthetic Restoration (Fig 6)

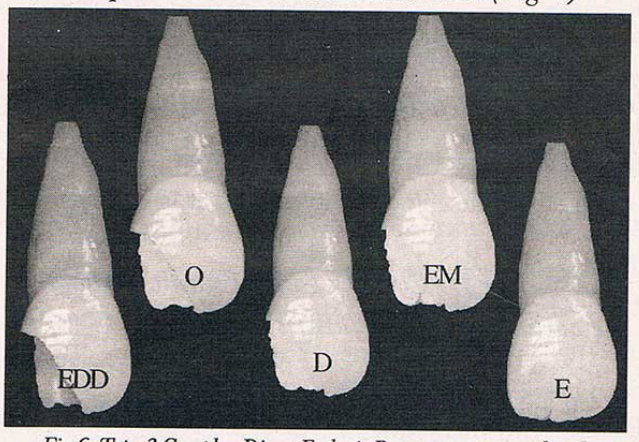

Fig 6 -Type 3 Complex Direct Esthetic Restoration, restored with Complex Tri -Layering Technique Exposed Discolored Dentin (EDD), Opaque group of Materials (O), Dentin Group of Materials (D), Effect Group of Material (EM) Enamel Group of Materials (E)

Since the above classification provide information about optical complexity of the restorations we now use popular GV Black's Classification to denote the site of the restoration.

1. All Pit & fissure, on occlusal, buccal, & lingual surfaces of premolars and molars & Lingual surfaces of Maxillary incisors - *Class I*

2. Proximal surfaces of premolars and molars - *Class II*

3. Proximal surfaces of incisors and canines that do not involve the incisal angle - *Class III*

4. Proximal surfaces of incisors and canines that do involve the incisal edge - *Class IV*

5. Gingival 3rd of the facial or lingual surfaces of all teeth (Not pit and fissure) - *Class V*

In addition to the classification of Dr. GV Black (Class I to V) another category may be added for easy anatomical site location.

6. Surfaces on the inscial edge of anterior or on occlusal cusp tips of the molars, premolars, & cuspids – Class VI

So we have a new classification that include all 4 causative factors including Developmental to Trauma with optical and esthetic complexities with the site of the direct esthetic restorations.

The proposed classification is read as –

Class I Type 1- Direct Esthetic Restoration

and if the effect material is required we add the word Complex in same type and it is read as

Class I . Type I – Complex Direct Esthetic Restoration
The advantages of the classifications are.

1. It provides esthetic and optical complexities of the restoration.

2. Helps to apply required layering technique

3. Helps to choose restorative materials

4. Includes all lesions of the exposed tooth surfaces (Developmental to Trauma)

5. Easy to remember and teach.

CONCLUSION

The latest generation of the direct esthetic restorative materials, avaliable in different opacities, shades and effects permits for various esthetic restorative techniques similar to the indirect fabrication techniques used by dental ceramist. It is now possible to achieve a very high level of aesthetic replacement of the tooth structure with direct esthetic restorative materials if operator uses suitable materials and techniques with sufficient level of restorative skill. Author believes that the proposed classifications of direct esthetic restorative materials, techniques and restorations would help the operator to select proper restorative materials with correct restorative layering techniques as per the esthetic demand of the restorations.

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