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Single-Shaded UniversalComposites:A review article

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ABSTRACT :
In today's era of minimally invasive dentistry, composite resin restorations have emerged as an ever-evolving restorative material with groundbreaking developments year by year. Esthetics being the major concern of patients, correct shade matching is a very important factor. TOKUYAMA DENTALhas come up with it's latest breakthrough in restorative dentistry, OMNICHROMA, as a unique direct restorative material that matches every tooth with a single composite shade, also offering exceptional handling and high glosspolishability.It is formulated on a "Wide Color Matching" concept, creating shades that can cover a wide range of natural teeth colors to reduce the time investment of shade selection and reduce the amount of composite shades needed in inventory.By combining spherical fillers with Smart Chromatic Technology, it uses structural color to match any shade from A1 to D4 in just one application saving tremendous amount of chair time. Another single-shaded composite material is CHARISMA manufactured by Kulzer which works on the same principle.

KEYWORDS : Omnichroma, Wide color matching, smart chromatic technology, charisma

I. INTRODUCTION :

Composite resin is considered as one of the best direct restorative materials because it mimics the aesthetics of natural tooth tissue[1-4]. The material's colour stability is one of the fundamental physical characteristics of composites. One of the primary causes of replacement of the restorations is believed to be the colour stability of resin composites, which can significantly impair their clinical life and effectiveness within the oral cavity[5,6] Creatingesthetic direct composite restorations that matchexisting tooth color can be a difficult clinical challenge for most clinicians. There are many composites which do not precisely match standard shade guides. This can be extremely frustrating for clinicians, especially with a patient who is particular about esthetic matching. Having a "universal," single-shaded composite system takes the guesswork and frustration out of shade selection.Omnichroma (Tokuyama Dental America) was launched in 2019. This was the first composite resin-based material that could be used on any patient's tooth, regardless of colour. This single-shaded composite resin has a special quality that enables dentists to not be troubled by the numerous shades in situations where multiple

shading of composite restoration is followed as the standard for repairing the tooth's anatomy. This offers a quick, simple method for producing restorations that are both pleasing and functionally aesthetic.[7]

COMPOSITION OF OMNICHROMA COMPOSITE MATERIAL :

1) 79% by weight (68% by volume) of spherical silica-zirconia filler (mean particle size: 0.3 μm, particle size range: 0.2 to 0.6 μm) and composite filler.

2) 1,6-bis(methacryl-ethyloxycarbonylamino) trimethyl hexane (UDMA), Triethylene glycol dimethacrylate (TEGDMA), Mequinol, Dibutyl hydroxyl toluene and UV absorber.

3) It is available in either SYRINGE or Pre Loaded Tip (PLT).

COMPOSITION OF CHARISMA :

1) Charisma Classic is based on a BIS-GMA matrix and contains approximately 61% filler by volume, with 60% inorganic fi ller by volume and a particle size of 0.005–10 μm
2) Barium Aluminium Fluoride glass
3) Pre-polymerized filler

CONCEPTS AND FEATURES :

With just one shade of composite, the 16 VITA classical shades may be aesthetically matched, thanks to single-shaded composites' extensive colour matching capabilities. As a result, there is no need for shade matching, which enables dentists to cut back on chair time, composite inventory, the waste of unwanted composite shades, and their reliance on shade-matching techniques.

CHARACTERISTICS :

- Excellent esthetic properties
- Unprecedented color matching
- High polishability
- Excellent physical-mechanical properties
- Highest wear resistance
- High compressive strength
- Exceptional handling

INDICATIONS :

• Direct anterior and posterior restorations
• Direct bonded composite veneers
• Diastema closures
• Repair of porcelain/composite restorations

CONTRA-INDICATIONS :

Patients allergic to or hypersensitive to methacrylic and related monomers, UV absorbers or any of the other ingredients.

MANUFACTURING PROCESS[8] :

Using a unique method called the Sol-Gel Method, TOKUYAMA DENTAL has synthesised the consistently sized fillers (260nm spherical filler). The Sol-Gel Method creates fillers from filler cores in organic solvent and allows the fillers to expand gradually from the cores, in contrast to typical filler production methods, which entail crushing glass components until they are about the desired size. This process enables the production of uniformly spherical fillers.

Polymerization Shrinkage[8]

Using the method illustrated in the figure 1. below, TOKUYAMA measured the polymerization shrinkage of OMNICHROMA and other composites. This method can measure shrinkage in the cavity floor when the composite resin is placed into a cavity and exposed to light in a clinical procedure. This method permits evaluation of shrinkage under conditions closer to those encountered in real clinical settings. Fig 2. shows the linear polymerization shrinkage of OMNICHROMA and other commercially available resin composites after 3 minutes of curing light exposure.

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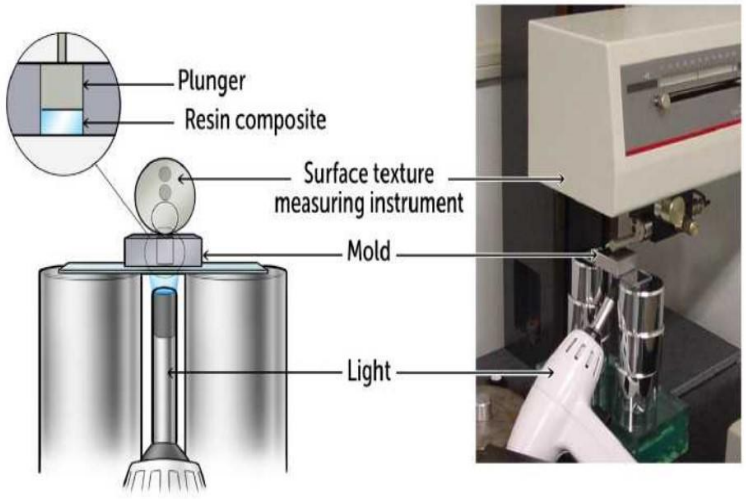

Fig 1.

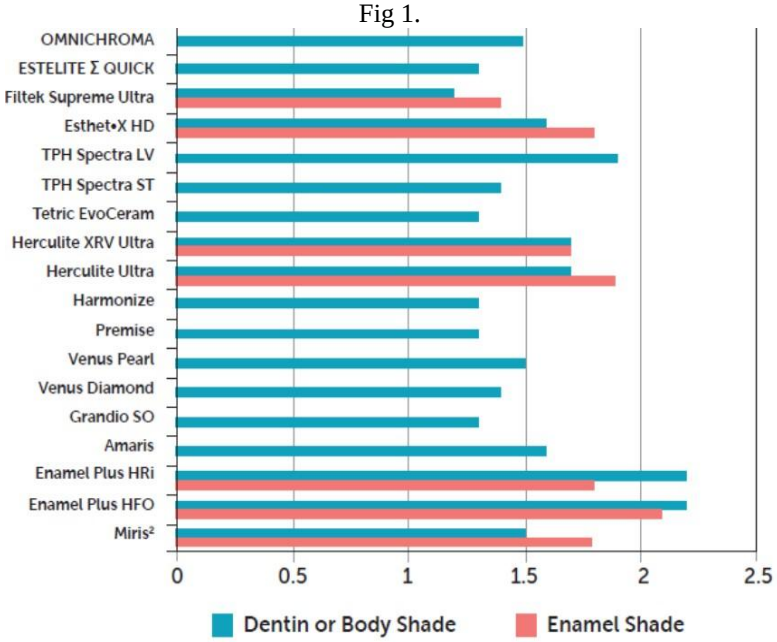

Fig 2.

Potential Advantages:

- Management of inventory is simplified considerably.
- Unused composite wastage is reduced.
- Being short stocked on shades will never be a potential occurrence.
- There will never be a shortage of a single composite shade.

Simplifying Shade matching provides unique benefits:[26]

- Doctors no longer have to hold up a shade guide next to a patient's tooth to match a shade.
- Since they use surrounding tooth colour in its structural colour process, it streamlines the shade matching process by reducing the chair-side time and eliminating the need for artistic finesse that shade-matching other composites require.
- When you have one composite on the shelf that matches all teeth, you don't need all the incidental shades in inventory. As a result, the practice throws out less composite that would typically expire because of being rarely used.

How do single-shaded composites improve practice efficiencies ?[26]

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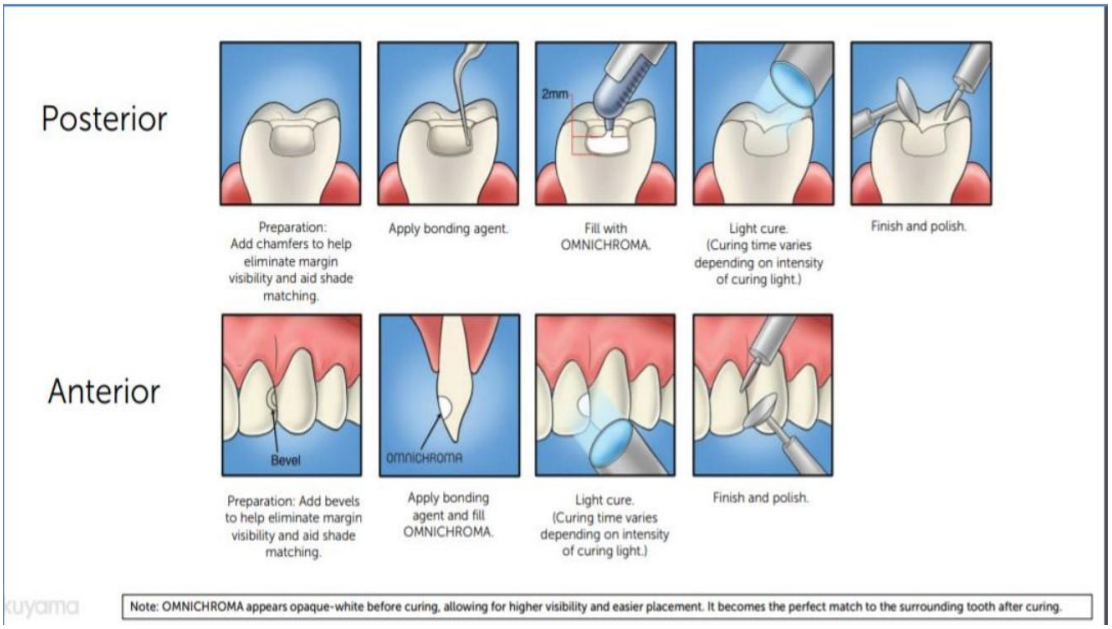
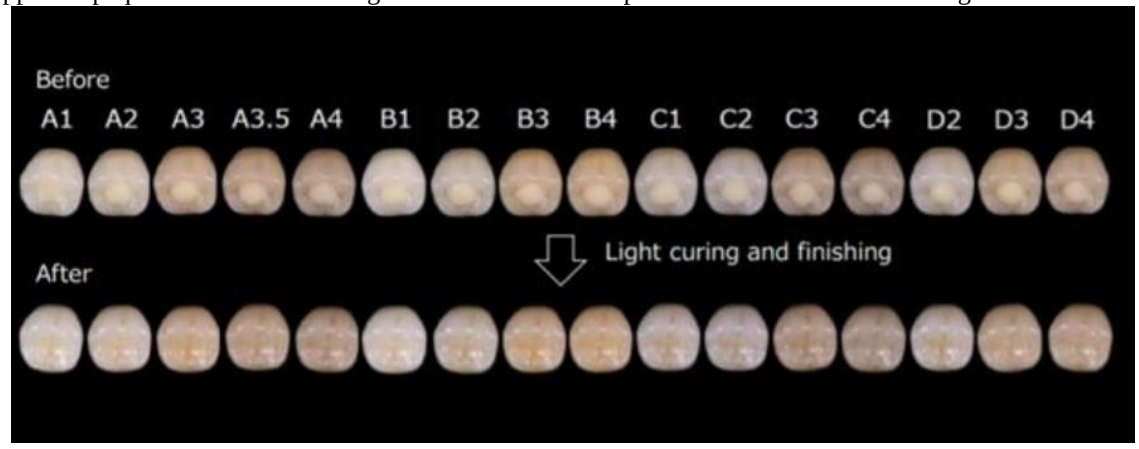
- In dental practice, time is money. Finding ways to work smarter is a significant factor in boosting revenue. Simplifying the shade matching process is an example of innovations that can improve practice efficiencies.
- Doctors and staff could have fewer clinical hours per week to gain back a work-life balance or reduce day-to-day pace in the office.
- Some dental professionals might use it to spend more time with patient education, helping patients understand how oral health can affect a person's overall health.
- Also, from a business perspective,the time saved could result in more revenue-generating activities for the practice.

Clinical Procedure



Before and After

It appears opaque -white before curing and then becomes the perfect match to the surrounding tooth after curing.



BLOCKER

Due to the lack of surrounding dentition, shade matching interferences may happen in cases involving large Class III and IV cavities. OMNICHROMA blockers get over this restriction by acting as a supporting component to lessen shade matching interference. When there is little or no surrounding dentition around large Class III or Class IV restorations, it is employed as a lingual layer. The single shaded composite is applied as a second layer following the application and curing of the blocker.

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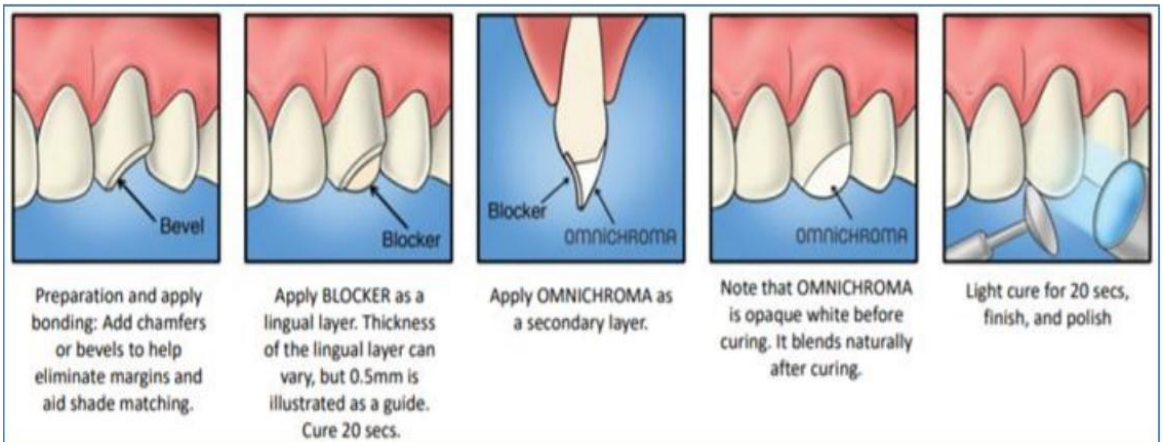

II. DISCUSSION

Smart Chromatic technology, a distinctive technique based on fillers that provide red-to-yellow structural colour, is used with single-shaded composite resins. As a consequence, practically every patient's cured composite blends in with their natural tooth structure. The key traits of these composite materials are superior polishability, great handling, and resistance to ambient light influence. Wear and abrasion characteristics, wear of the composite, and wear of the opposing tooth structure are all extremely minimal. They comein a paste, which is more of an opaque-white before curing, thereby allowing the material to be more visible for clinicians while manipulating and placement. The material is homogeneously blended with the surrounding tooth structure when application of light source during curing is carried out. In order to facilitate marginal borders to disappear, a chamfered margin is preferred.[7]According to a recent survey, about 52% of doctors spend 30-60 seconds in shade-matching for restorative procedures.Considering 1 minute as an average, the amount of time a clinician saves in a year is significant.The use of single-shaded composites can, in essence, streamline the restorative process.[20]

III. CONCLUSION

The most recent developments in dental imaging and colour matching are most likely the result of the emphasis on an "aesthetic standard." The optical qualities of translucency, light scattering, surface texture, and gloss as well as the fundamentals of aesthetics, such as tooth size and proportion, symmetry, outline form, and overall harmony, are just as important, if not more so, to a successful restorative match because, despite our tendency to focus on colour matching, this is what we are after.[9-12]

Single-shaded composite resins are one of the most note-worthy and exciting innovations in the field of restorative and aesthetic dentistry. So, in future more studies and follow-up of cases needs to be done in order to arrive at the final conclusion whether they will live up to promising expectations[13].

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