Different Techniques to Establish Occlusal Anatomy of Posterior Teeth with Composite. A Review

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Abstract

Composite resin restoration on posterior teeth through the incremental technique is, generally, a time-consuming procedure with the risk of contamination between the layers. Therefore, there is a need to facilitate the work of dental professionals and achieve aesthetic and functional results such as the occlusal stamp technique. "Stamp technique" is a technique used for restoring class I and class II restorations with accurate occlusal topography. It was introduced mainly to restore Class I cavities and erosively damaged teeth. A stamping technique is an easy-to-follow procedure to recreate accurate occlusal topography for a direct composite resin restoration effectively and efficiently with less time needed for finishing and polishing of the restoration. This technique consists of fabricating an occlusal matrix that mimics the natural occlusal anatomy of posterior teeth,before cavity preparation takes place. This matrix is then pressed against the final composite increment before curing takes place and is suitable in cases where caries is evident during the clinical examination or radiographically within tact marginal ridges and ideal occlusal anatomy. For overcoming the main disadvantage of polymerization shrinkage seen in composite restorations, it has [to be done using incremental layer technique. Stamp is used in the final layer to replicate the natural anatomy of the occlusal surface. A precise tooth-like restoration having an accurate functional occlusion is obtained when the stamp technique is performed. This technique also can be utilized for class II cavity restorations where the marginal ridge is intact. This case report describes simple class I composite restoration using stamp technique. The main objective is to replicate occlusal anatomy by making a copy of the original unprepared tooth structure to get a perfect anatomy in a few minutes. This review walks through many techniques utilized for simulating posterior occlusal anatomy.

Keywords: *Composite, Incremental Technique, Occlusal Topography, Polymerization Shrinkage.*

Introduction

Dental caries is a disease of calcified tissues, with demineralization and destruction of their inorganic and organic components. Occlusal surfaces are considered the most susceptible to caries lesions because of their morphology. One of the primary goals of restorative material is to reestablish the original occlusal anatomy of the tooth. Cusp anatomy, contours, and colour all play into the harmony of a smile. Advancement in the direct composite resin and because of the minimally invasive technique, it is considered to be one of the choicest material for restoring posterior teeth. Composite resins are available in many shades and a variety of consistency depending on the clinical need. Probably their versatility in one of the reasons that they are in constant demand by the clinicians. The increase in demand has lead to a lot of research and development with Composites. Besides, they are simpler to deal with and facilitate the

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reproduction of occlusal structures. Confronting these upgrades, intercessions with composite restorations have made conceivable the change of explicit and individual subtleties existing in the natural dentition, in a sufficiently tasteful way and undefined to human vision.[1]

Cusps need to be placed appropriately in the inter-arch space. They must be adequately graded in heights and sizes to be in harmony with the movements of the mandible.[2] Optimal occlusion is that which is comfortably adopted by the patient. Therefore, a restoration is designed in a manner that it does not produce any disturbance in the typical condylar path. Its occlusal anatomy influences the magnitude and direction of load borne by the tooth. However, the ability to produce a restoration which conforms with the original anatomy of the posterior teeth must be perceived as one of the complicated and time-consuming technique.

The present review describes different techniques that aid in the reproduction of occlusal anatomy and minimizes the overextension of restorative material, thereby maintaining the health of the stomatognathic system (Figure 1).

Traditional technique: For Grossly decayed tooth or moderate to extensive loss of occlusal anatomy, traditional Increment layering technique is preferred. In this technique, the posterior Composite is placed in small increments, and each increment is individually light cured. The increments can be either placed horizontally, obliquely or vertically. Successive cusp build technique is another modified form of the incremental method. Here, singular cusps are reestablished each in turn up to the level of the occlusal enamel. Little inclining augmentations are applied to each corner of the cavity. This technique allows the handling of material to a minimum and averts voids into the material. [3]

It is indicated in large class I and Class II cavity and in the grossly decayed tooth where occlusal anatomy has been lost. This technique can significantly reduce finishing time by precise attention to the progressive reconstruction of natural morphology. The incremental method showed lower microleakage. One of the significant disadvantages of this case is that it is time-consuming and occlusal anatomy may not correspond to the original anatomy of the tooth. The clinician needs to develop this skill and should have a thorough knowledge of anatomy and characterization of posterior teeth.

Occlusal former technique: Many carious lesions have intact occlusal anatomy. Such caries are occult as they have a macroscopically whole unimpaired occlusal surface however with undermining rot that can be viewed as a territory of somewhat blue/dark discolouration under the enamel surface, or radiographically. There are many techniques that grant registration of intact anatomic details before cavity preparation and for this reason,indicated for small enamel defects and occlusal fissure lesions or Class II preparations with no occlusal involvement. Stamp technique has various advantages.[5] Firstly, it helps in reducing the overall time required for the restoration as instantly desired cusp –fossa relationship is attained. This is suitable in a busy practice scenario as it ensures predictability with accuracy (Table 1).These techniques are broadly classified into prefabricated method, and custom made techniques. Both ways can be used either as a direct or indirect technique.

Table 1. Advantage and disadvantages of occlusal formers.

	Occlusal formers technique
Advantage	1 The anatomy and occlusion with which the patient was comfortable is restored in the new composite restoration 2. The surface of the composite restoration is as smooth as the original surface of the tooth being restored, and therefore minimal, if any polishing is needed 3. There is no air-inhibited layer to be removed, since oxygen is excluded frorn the surface by the matrix during curing 4. The Composite is cured under slight pressure, and is thought to reduce voids in the rcstoration 5. With practice, there is minimal flash to be removed
Diadvantage	1. There is additional time and expense to create the occlusal matrix 2. There is additional time necessary to cure the last layer of Composite

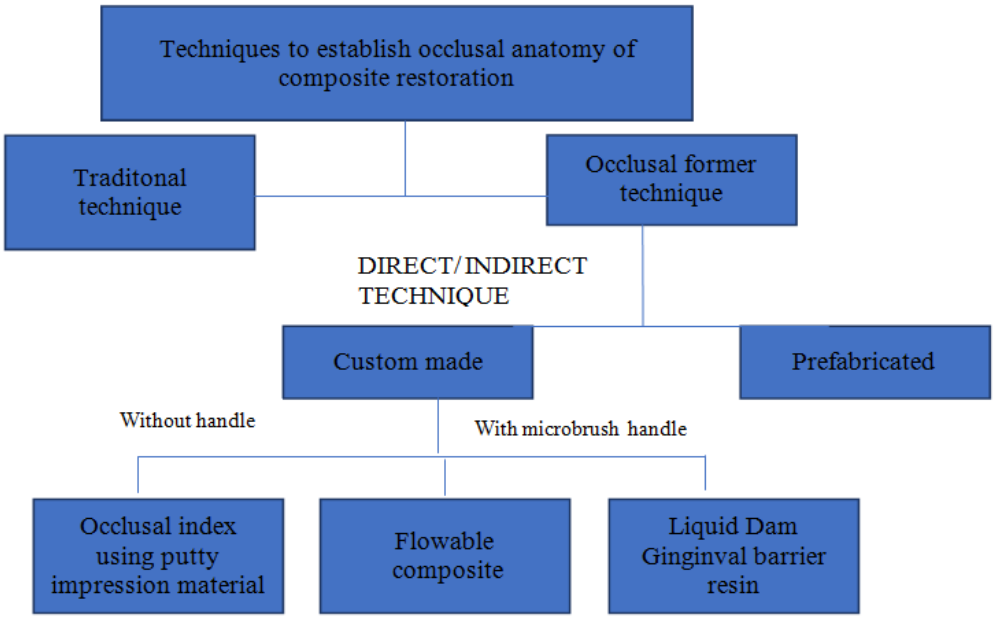

Figure 1. Classification of different techniques to establish occlusal anatomy of posterior tooth.

Direct Technique: In custom made techniques, varied materials can be employed to make the occlusal replica, including light-curable material, chemically activated acrylic resin, polyvinylsiloxane bite registration material, transparent silicone moulds, occlusal matrix technique (Figure 2).[5] In this technique, before penetrating the enamel and before cavity preparation a putty impression material or a flowable material with a micro brush is used to make an impression of tooth occlusal anatomy. After cavity preparation, increment layering of composite is placed, and each increment is light-cured till it reaches the occlusal surface. After the placement of the lastunpolymerized occlusal increment, Teflon tape is placed and on top of that putty occlusal index or stamp is positioned back on the teeth to simulate the previous recorded anatomy. Subsequently, the index is removed and the excess composite istaken out and cured.[4]

Indirect Technique: In the presence of a rather considerable defect, it is challenging to build up cusps precisely enough to occlude with the antagonists. Here, a silicone impression and models of the teeth is made. After which wax is utilized to reconstruct the desired anatomy. On the wax carving, an occlusal stamp is formed which is consequently placed on the last increment of restored natural dentition to mimic the anatomy.[4]

Occlusal matrix material using Biteperf: The Biteperf gadget is made in transparent polycarbonate and comprises of a plastic handle (50 mm long) and clear round head (13 mm in the distance across and 4 mm thick). The base head has a circular shape with one thermoplastic impression material (polyethylene) mounted on it. The occlusal transfer matrix was plasticized by heating for 15–20 seconds or until the surface acquired a shiny appearance. It is then positioned under gentle pressure on the occlusal surface of the tooth. The occlusal matrix is kept immobile for 10 seconds and then cooled with air jets [Figure 3]. A mark is made on the outside of the mould to allow for exact positioning during the restoration.[6] Eventually, the internal detail of the occlusal replica is scrutinized. Post caries removal and cavity preparation light-cure composite resin are added in the cavity using the incremental technique, leaving space for a final increment on which the occlusal matrix device is to be placed.[5] Leaving this final occlusal increment unpolymerized, the occlusal replica was stabilized in the original anatomic position and pressed down firmly. The next step is polymerization of the last resin increment across the occlusal surface, applying light through the matrix while it is held under pressure to ensure perfect positioning. After polymerization, the occlusal matrix device is removed, and the occlusal anatomy is evaluated.[6] Mostly in this technique, occlusal reproduction is accurate, however small adjustment if required, can be done with abrasive silicon carbide instruments or rubber polishers.

Prefabricated Fissure formers for composite filling (Occlu-Print): These prefabricated stamps have an excellent and rapid occlusal modulation of lateral composite fillings. It is manufactured using translucent plastic (Figure 3). It is less time consuming compared to the manual modulation technique of stamp fabrication.[7,8] With Occulu-Print, polymerization is made by placing the curing onto the stamp. Molar and premolar disposable stamps are available 16 different sizes and shapes, separated into upper/lower jaw and right/left jaw with each stamp having a related FDI-reference.

Prefabricated composite occlusal shells for posterior teeth: Edelweiss occlusal composite shells are prefabricated nanocomposite table top restoration which is usually used to increase the vertical dimension of posterior teeth. Depending on the size of the tooth the preformed composite shells are selected. These can be adjusted with stone burs to fit the individual tooth. The tooth and the shells are treated with an etchant and specific bonding agent. The shell is then luted on the tooth with a dual-cure luting agent. Post cementation occlusion is adjusted and minor finishing and polishing procedure is done.[9,10]

Figure 2.Pit and fissure caries with intact occlusal surface

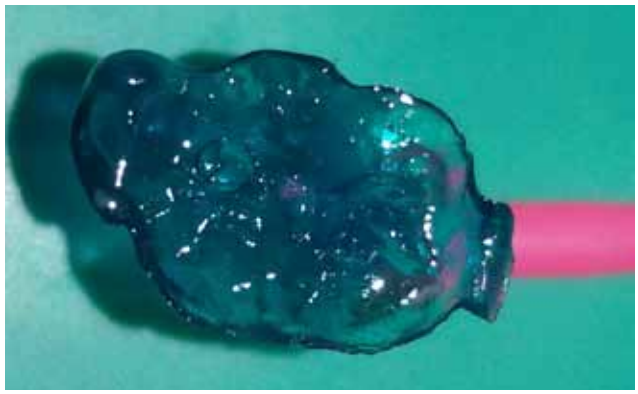

Figure 3. Customized occlusal former with liquid rubber dam

Figure 4. Preformed Occlusal former

Figure 5. Composite restoration with characterization.

Conclusion

Finishing with appropriate anatomy has been difficult and time-consuming in the traditional increment layer technique. An alternative to overfilling and then grinding in the anatomy is proposed. The occlusal replica technique can be carried out with several materials, all of which have their advantages and disadvantages. The anatomy shapes up almost naturally. With only minor adjustments and polishing with a polishing paste, time spent finishing is shortened. Natural-looking, functional, and beautiful occlusal anatomy are now achievable with this uncomplicated technique (Figure 4).

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