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A Key to Enhance Dentin Bonding with Indirect Restorations

Immediate Dentin Sealing (IDS)



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A top priority of restorative dentistry is conservation of tooth structure, this led to introduction of indirect bonded restorations as inlays, onlays and veneers, which aim to reduce the the amount of tooth substance removed (1). An inevitable consequence for this is exposure of dentine, which represents a challenging situation to obtain proper bonding, as well as that dentine is exposed to bacterial microleakage as well as chemical and mechanical stimuli during the restorative procedures like temporization and impression taking phases (2).

Conventionally the sealing of dentine was done at the final stage of restoration, this step is referred to as "Delayed Dentine Sealing or DDS). This approach leaves dentin exposed to bacterial contamination and other physical stimuli. Another approach was introduced, which is referred to as "Immediate Dentine Sealing (IDS)" or also known as prehybridization or double bonding technique (3). This approach involves applying Dentine bonding agent (DBA) on freshly cut Dentine at the session of tooth preparation prior to any other restorative procedure.

Basic Principles of IDS

IDS depends on four main principles.

1: Freshly cut, contaminant free dentine is the optimum substrate for IDS technique, this also emphasizes the importance of isolation during tooth preparation to prevent bacterial contamination of dentine prior to DBA application (Figure 1 & 2) (4).

2: Unfavourable consequences may result from curing of DBA and composite if they are cured together, this consequence leads to collapse of the hybrid layer, thus separate step of precuring DBA results in enhancing bond strength as it keeps the integrity of hybrid layer (4).

3: Precuring of DBA on freshly cut Dentine allows for achieving proper bonding with Dentine in an environment free of occlusal forces or other forces that result from composite resin shrinkage (5).

4: IDS technique helps to reduce bacterial and fluid penetration (4).



Figure (1): preparation of tooth structure under isolation before DBA application for IDS technique.



Figure (2): Application of DBA on freshly cut dentine

Advantages of IDS technique.

IDS offers multiple clinical advantages including:

- 1- Patient comfort due to lower need for anesthesia during impression and temporization procedures in addition to reduced post-cementation hypersensitivity (5).
- 2- Increased bond strength especially in cases with compromised retention for indirect restorations including cases of short clinical crowns, excessive taper and cases with conservative tooth preparation as inlays and onlays (6).
- 3- Independent management and conditioning for enamel and dentine, which helps to enhance the bonding performance of hard dental tissues (5).

Considerations For IDS Protocol.

Type of adhesive system used for IDS.

The conventional total-etch three-step system was claimed to provide the most durable and reliable long-term option (7). Another study also emphasized that both total-etch and self-etch for IDS technique provide similar enhancement for bond strength (8). Also, the use of a filled resin adhesive system was considered a better option when compared to unfilled resin DBA (7).

Effects on Impression material

Application of DBA can result in formation of superficial oxygen inhibition layer (OIL), that can result in inhibition of polymerization of elastomeric impression material, this can lead to defective inaccurate impression recording (9), especially in cases of using vinyl polysiloxane impression material and polyether (9). Attempts to reduce or eliminate OIL were introduced by additional polymerization of DBA with application of glycerin and pumicing with rubber prophyl cup (9).

Conditioning of the IDS substrate

Achieving proper bonding for the IDS substrate is important for long term successful bonding. For this purpose, multiple solutions were proposed to prepare this layer for bonding. Either by air borne particle abrasion (APA), additional etching with phosphoric acid or using fluoride free pumice (11).

Interaction with provisional restorations

Resin - based provisional restorations or cements might bond to the resin -coated dentin



Figure (3): Removal of excess flowable composite or resin with a probe.



surface which complicates the removal of the Provisionals. For this reason, a technique was proposed to use petroleum jelly as

a separating medium during the fabrication of temporary restoration (12). Another technique was suggested as “reverse spot bonding technique” for provisional cementation. This technique relies on bonding the provisional material in only a small area of the IDS-prepared tooth, away from the margins. This serves for efficient cleaning of the surface at the cementation appointment. A small portion of fast-setting condensation silicone is placed in the middle of the preparation, covering 2–3 mm of the sealed surface. Then, a separating medium is applied on the entire surface of the preparation (13).

Thickness of DBA layer

Another concern is the thickness of DBA layer, especially in the case of using filled resin for IDS technique, the thickness of this layer that may vary from 60–80 microns. Removal of excess resin is mandatory, in order not to interfere with seating, this can be done with probe or micro brush (Figure 3).

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