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Review

Immediate dentin sealing for indirect bonded restorations

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ABSTRACT

Purpose: The aim of this article is to review available literature on the clinical procedure of immediate dentine sealing for indirect bonded restorations.

Study selection: More than 40 articles reporting the technique, studies, outcomes, etc. were reviewed after PUBMED/MEDLINE search, most of them addressing the specific situation of dentin bonding for indirect restorations.

Results: It is known that tooth preparation for indirect bonded restorations can result in significant dentin exposures. Immediate application and polymerization of the dentin bonding agent to the freshly cut dentin, prior to impression making is therefore recommended by some authors. Literature indicates that this procedure, *immediate dentine sealing (IDS)*, appears to achieve improved bond strength, fewer gap formations, decreased bacterial leakage, and reduces post-cementation sensitivity. This rational approach to adhesion is also reported to have a positive influence on tooth structure preservation, patient comfort, and long term survival of indirect bonded restorations.

Conclusion: In the extensive literature regarding advantages of using IDS technique significant differences have been shown when compared to Delayed Dentine Sealing. Although more research is required in this field, presently there are NO scientific reasons not to recommend IDS in routine practice.

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1. Introduction

Management of the dental tissues between the preparation and provisionalization phase of restorative treatment plays a pivotal role in the success of indirect bonded restorations. In the development of these restorations, the exposed vital dentin immediately after tooth preparation is susceptible to insult from bacterial infiltration and micro-leakage during the provisionalization phase. Bacterial and fluid penetration through the exposed dentinal tubules can result in colonization of microorganisms, post-operative sensitivity, and the potential for subsequent irritation of the pulp. To avoid these possible sequelae, whenever a substantial accessible area of dentin has been exposed during tooth preparation for indirect bonded restorations, local application of a dentin bonding agent (DBA) is recommended [1]. This immediate application of a DBA prior to provisionalization phase for indirect bonded restorations has been proposed since the early 1990s [1–5]. The so-called *immediate dentin sealing (IDS)* [1] has been extensively studied and significantly improved over the years with positive results with respect to bond strength, gap formations, bacterial leakage, and post-cementation hypersensitivity.

The principle of dentin bonding is to create an interphase, also called the *hybrid layer* [6,7] by the interpenetration of monomers into the hard tissues. Once the infiltrating resin is polymerized, it can generate a “*structural*” bond somewhat similar to the interphase formed at the dentinoenamel junction (DEJ) [8]. Some basic principles need to be followed during the clinical procedure of dentin–resin hybridization, the most important ones being related to the problems of (1) dentin contamination and (2) susceptibility of the hybrid layer to collapse until it is polymerized. These factors when viewed within the frame of indirect bonded restorations lead to the conclusion that dentin should be sealed immediately after tooth preparation.

The rationale behind IDS could be enumerated as [2]:

A. *Freshly cut dentin is the ideal substrate for dentin bonding.*

Dentin contamination owing to provisionalization can reduce the potential for dentin bonding. Various studies by

Paul and colleagues [2,3,9] demonstrated significant reductions in bond strength owing to dentin contamination with various provisional cements. In practice, freshly cut dentin is present only at the time of tooth preparation (before impression making).

B. *Pre-polymerization of the DBA leads to improved bond strength [10,11]*

The unpolymerized dentin–resin hybrid layer collapses due to pressure during composite placement or seating of the restoration [12–14]. Pre-polymerization of DBA is absolutely compatible with direct composite restorations; however, it raises concerns when applied during the luting of indirect bonded restorations. Polymerized DBA thicknesses can vary significantly depending on both the type of DBA and the topography of the tooth preparation. Stavridakis et al. [15] recorded film thicknesses of DBA that ranged from 0 to 500 μm . Various other authors [13,16] have also demonstrated polymerized DBA thicknesses to range from 60 to 80 μm on a smooth convex surface and up to 200–300 μm on concave structures such as marginal chamfers, hence, interfering with the complete seating of the restoration. It is therefore recommended that the DBA be kept unpolymerized before the restoration is fully seated. This, in turn, generates two problems: (a) while the restoration is being inserted, the outwardly directed flow of dentinal fluid dilutes the bonding agent and blocks microporosities into which resin otherwise would have penetrated [17,18] and (b) the pressure of the luting resin during the seating of the restoration can create a collapse of demineralised dentin and subsequently affect adhesion. All these problems can be resolved with IDS after completion of tooth preparation, before final impression itself.

C. *Immediate dentin sealing allows stress-free dentin bond development*

Dentin bond develops progressively over time owing to the completion of the co-polymerization process. In directly placed adhesive restorations, the weaker early dentin bonding is challenged by the overlaying composite shrinkage and occlusal forces. On the other hand, when using IDS and

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