An Efficient Technique of Bonding Orthodontic Attachments to Surgically Exposed Impacted Teeth

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ABSTRACT

Bonding orthodontic attachments to surgically exposed impacted teeth have always been a challenge in terms of predictability of the bonded attachment, mainly due to the blood contamination at the surgical site. The present article describes a simple technique of achieving hemostasis at the surgical site and ensuring an uncontaminated and dry field, favorable for acid etching, sealant application and bonding with light curable composite.

Keywords: Impactions, Hemostasis, Bonding to impacted teeth.

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INTRODUCTION

Surgical exposure of an impacted tooth is necessary to allow the orthodontist access to the unerupted tooth, in order to bring it into the dental arch and into alignment. However, blood contamination during bonding can lead to premature failure of the bond. Even momentary saliva or blood contamination adversely affects the bond. This is because saliva and blood deposit an organic adhesive coating within the first few seconds of exposure which is resistant to washing.

The placement of an orthodontic attachment on the tooth may be performed at the time of surgery or at a later date. Delaying the bonding procedure until healing has occurred results in little risk of contamination with blood or moisture. However, the soft tissues that cover the exposed tooth have to be excised or repositioned to expose the crown of the tooth. This can result in a poor gingival margin and is not desirable, particularly in situations in which nonkeratinized, unattached gingiva or mucosa would have to be removed to achieve the exposure.

Enamel surface contamination can occur at two critical times of the bonding procedure: After the tooth surface has been etched and after the primer has been applied. Bonding could be compromised at both of these times. In a blood contaminated environment, self etching primers and moisture insensitive primers are not very efficient and studies have shown that blood contamination significantly reduced the shear bond strength of brackets bonded with conventional primers and self etching primers. It has also been proved that blood contamination on acid-etched surfaces affects bond strength more than saliva contamination. Thus, it would be advantageous to be able to bond to enamel in a hemostatic environment, particularly on surgically exposed impacted teeth, for immediate bonding of orthodontic attachments.

Expasyl® is a paste used for gingival retraction that opens the sulcus, physically displacing the tissue and leaving the field dry, ready for impression taking or cementation (Figs 1A and B). It contains 15% aluminium chloride, kaolin and water. The aluminium chloride present in the paste provides excellent hemostasis and seepage control which can be taken advantage of, while bonding orthodontic attachments to surgically exposed impacted teeth. The mechanism of action of aluminium chloride is mainly due to its ability to precipitate tissue and blood proteins, causing a mechanical obstruction to hemorrhage from injured blood vessels. It also has the capability to extract fluid from the tissues. Aluminum chloride is highly soluble in water, freely soluble in alcohol and soluble in glycerin. Aluminum chloride has no contraindications and minimal side effects.

PROCEDURES

A 15-year-old female patient had a buccally impacted maxillary canine, which was in a favorable position to be brought into the arch and alignment. The retained deciduous canine was extracted to create space for the impacted canine (Fig. 2A) and

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*Expasyl™, Kerr Expasyl—gingival retraction paste, Kerr corporation, Produits Dentaires Pierre Rolland, Merignac Cedex, France

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Figs 1A and B: (A) Expasyl with gun and capsule (cartridge) assembly, (B) Expasyl gingival retraction paste in capsule

Figs 2A to I: Site after extraction of retained deciduous canine, (B) Bleeding seen immediately on raising a buccal flap, (C) Expasyl paste placed in the surgical site for hemostasis, (D) Bleeding controlled with better visibility of the surgically exposed tooth, (E) Attachment bonded and subjected to light curing, (F) Ligature wire engaged to the attachment, (G) Ligature wire attached to the main archwire, (H) Flap sutured back into place, (I) Three months after surgical exposure

A flap was raised buccally to gain access to the impacted canine (Fig. 2B). Immediately after surgical exposure of impacted teeth, the Expasyl paste is placed over the surgical site for 2 minutes and is then flushed away with water spray and suction (Fig. 2C). The surgical site is then air-dried. This ensures a dry and bloodless field, conducive to bonding orthodontic attachments to the surgically exposed teeth (Fig. 2D). The attachment is bonded with Transbond XT composite after acid etching with 37% phosphoric acid gel for 30 seconds, followed by thorough washing and drying. A thin layer of Transbond XT primer is applied on the etched enamel and the attachments are bonded to the surgically exposed tooth, following the regular protocols and subjected to light curing for 40 seconds (Fig. 2E). A self-ligating bracket was bonded to the impacted canine and a
ligature wire was threaded through the bracket slot (Fig. 2F). The ligature wire was then tied and attached to the main archwire, in order to give mild eruptive force and guide the impacted tooth into the arch (Fig. 2G). The flap was then sutured back into place (Fig. 2H). The patient did not report any discomfort after the surgical procedure and there was no incidence of bond failure during the next 3 months (Fig. 2I), until the bracket was debonded by the operator to reposition it at the ideal crown level.

**DISCUSSION**

Hemostatic agents ensure an uncontaminated and dry field; favorable for acid etching, sealant application and bonding with light curable composite, thus reducing the risk of bond failure.

A variety of local hemostats, including absorbable gelatin sponge, collagen hemostat and oxidized cellulose, are commercially available. However, these are not ideal for orthodontic purpose. Calcium sulphate hemihydrates (Plaster of Paris), has been recently used for hemostasis to attach orthodontic attachments to surgically exposed impacted teeth with good results. However, it must be acknowledged that manipulation of plaster of Paris is a messy work, particularly considering the sterile environment of the surgical office and the time taken for the plaster to set and the effort required to remove it completely from the surgical site after achieving hemostasis.

The gingival retraction cord is currently being used for gingival retraction while taking impressions for crowns and bridges. In addition, they also serve as effective hemostatic agents, controlling gingival bleeding and providing efficient seepage control. Gingival retraction cords containing epinephrine effectively control bleeding; however, 24 to 92% of epinephrine may be absorbed systemically. Astringents impregnated in retraction cords include aluminum chloride, ferric sulfate, alum (potassium aluminum sulfate) and zinc chloride. Alum and ferric sulfate may be irritating and even corrosive at high concentrations, while increased concentrations of zinc chloride may damage bone and tissue permanently.

The least irritating cords contain buffered aluminum chloride, which may be left in contact with the gingival tissue for up to 15 minutes without permanent damage. Histological studies have proved that it does not cause any adverse effects on the gingival and periodontal tissues and exhibits excellent biocompatibility. Hemostatic agents ensure an easy and efficient way of bonding orthodontic attachments to impacted teeth immediately after surgical exposure and will go a long way in helping orthodontists bond better in a bloody field, minimizing the risk of bond failure. The bonded attachments can be immediately subjected to orthodontic forces without any risk of premature failure of the bond.

**REFERENCES**


**Transbond™ XT-3M Unitek Monrovia, CA.**

*Note: The authors do not have any financial interest in the product mentioned in the above article.*