Adhesive systems: antimicrobial agents

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Introduction

The progressive decrease in bond strength occurs due to degradation of the hybrid layer, this process involves the two substrates, adhesive and dentin, which are negatively affected by water (hydrolytic degradation) and enzymes (enzymatic degradation). The chlorhexidine is a biguanide with cationic properties. It is a stable, broad spectrum antibacterial molecule at high concentrations and bacteriostatic at low concentrations. Besides its antimicrobial properties, chlorhexidine is a potent inhibitor of MMPs. DMAE-CB is, as MDPB, a monomer composed by combining a methacrylate group, polymerizable, with a quaternary ammonium group, responsible for the antibacterial properties. Those antibacterial monomers have the same principle: before polymerizing are bactericidal and after polymerization have a bacteriostatic effect by contact.

Methods

For this work was performed a literature research for the last 10 years, in portuguese and english languages, at the research engines: "Pubmed" and "B- on" with the keywords “antimicrobial”, “antibacterial”, “dental adhesives”, ”clhorhexidine”, ”MDPB”, “DMAE-CB”.

Results

Chlorhexidine

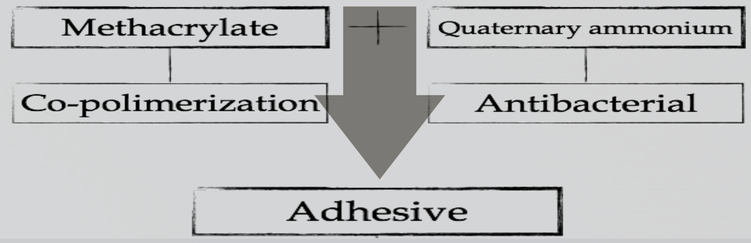
- Broad spectrum antibacterial molecule
- Stable and biocompatible
- Adhesion to dentin fosfaste
- MMPs inhibitor

2012, *Yiu, C. K. Y. et al*
”Effect of chlorhexidine incorporation into dental adhesive resin on durability of resin-dentin bond”
- More durability of resin-dentin bond on hydrophilic adhesives

2013, *Pomacóndor- Hernández, C. et al*
”Effect of replacing a component of a self-etch adhesive by chlorhexidine on bonding to dentin”
- Maintenance of the dentin bond strenght

2014, *Stanislawczuk, R. et al.*
”Evaluation of chlorhexidine digluconate on the bond strength of ectch-and- rinse adhesives”
- Maintenance of the dentin bond strenght
- Descrease of nanoinfiltration

MDPB and DMAE-CB



2008, *Fleischmann, L. et al*
”Shear bond strength of an adhesive system with antibacterial agents used in Orthodontics”
- The adhesive containing MDPB showed higher bond strength

2008, *Yildirim, S. et al*
”Microtensile and microshear bond strength of an antibacterial self-etching system to primary tooth dentin”
- Self-etching system without MDPB showed lower bond strength values compared to self-etching system with MDPB

2009, *Xiao, Y., et al*
”Antibacterial activity and bonding ability of an adhesive incorporating an antibacterial monomer DMAE-CB”
- Adhesives with strong and long-lasting bacteriostatic property could be achieved by incorporating DMAE-CB without negatively influencing bonding ability

2009, Ulker, M. et al
”Bond strengths of an antibacterial monomer-containing adhesive system applied with and without acid etching for lingual retainer bonding”
- MDPB-containing self-etch adhesive with acid etching did not significantly affect shear bond strength

2011, *Chai, Z. et al*
”The bonding property and cytotoxicity of a dental adhesive incorporating a new antibacterial monomer”
- DMAE-CB could be incorporated into the dental adhesive stably without compromising the bonding efficiency and biocompatibility of its parental adhesive

Conclusions:

Chlorhexidine is able to inhibit bacterial activity in dental treatments. With the advantage of not interfering or even improve the mechanical properties of the interface dentin/adhesive, such as higher microtensile bond strength and lower nanoleakage . The antibacterial monomers MDPB and DMAE-CB shown to have an important role in the antimicrobial ability of adhesive systems because it maintains this property even after polymerization. Apart from its proven antimicrobial activity, all incorporated agents chlorhexidine, MDPB and DMEA-CB, have shown ability to inhibit MMPs, responsable for the degradation of the collagen matrix. More studies are needed in this area in order to overtake the remaining constraints and even researches for new components that confer adhesive systems the ideal properties.

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