Bondodontics update for indirect restorations

Professor Brian Millar, London/United Kingdom, March 2021 | Pictures & Case: Dr. Stephen Denny

There has been a sustained move from conventional cementation to adhesive luting as clinicians move away from cast restorations to aesthetic materials (Fig. 1). In line with this there has been a shift away from conventional cements (e.g. zinc phosphate) to dual-curing resin based luting materials.

Ideally these adhesive luting materials should bond to both tooth tissue and the restoration, be tooth coloured and easy to use. Ease of use would include: syringeable, dual-cure, suitable viscosity and no need for separate etch and bond stages.

One of the first was ParaCore (COLTENE) and although this was designed as a core build-up material it's flow properties, dual-cure and colour also made it suitable as an adhesive cement. Even if most of the requirements mentioned above were met, ParaCore, like many earlier resin-based luting materials (e.g. Nexus, Calibra, Panavia), required an additional bonding agent. Therefore, further development resulted in built-in adhesives bringing us to the popular current materials in this range, so-called self-adhesive cements, such as RelyX Unicem (3M) or SoloCem (COLTENE). These are designed to be used directly onto the tooth without the need for neither acid-etching nor the application of a separate bonding agent. However, the bond strengths resulting from self-adhesive cements were lower than the ones from adhesive luting materials which have been used with additional bond. Whereas in some situations the bond strengths resulting from a self-adhesive protocol would be sufficient, in other situations they are not.

This is why the newest evolution in adhesive cementation are the universal luting materials (e.g. RelyX Universal, 3M). Companies recognized that in some situations additional bond strength may be required and made their self-adhesive luting materials compatible with bond. Solocem (originally a self-adhesive material) can now be used with a layer of the universal bond ONE COAT 7 UNIVERSAL (COLTENE) if the clinician chooses to improve bond strength on enamel and dentin. Even if ONE COAT 7 UNIVERSAL is light-curing, it is designed so that its acidity does not affect the curing properties of the luting material SoloCem. This means that there is no

Fig. 1: Traditional gold crowns (left) and metal-ceramic crowns can be conventionally cemented (e.g. zinc phosphate) and have exceptional survival rates in practice of close to 50 years[1]. They can also be adhesively luted. Aesthetic indirect restorations (right) require more complex adhesive luting techniques.

Fig. 2: Initial situation in the patient's mouth

Fig. 3: Scan

Fig. 4: Scan

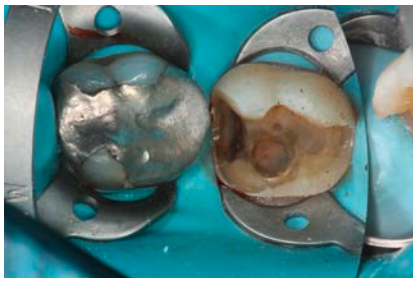

Fig. 5: Removed amalgam filling and preparation

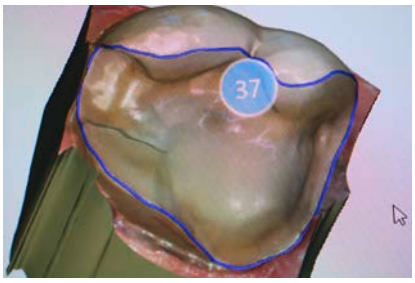

Fig. 6: Scan after preparation, checking the preparation margin

need of using an additional activator for ONE COAT 7 UNIVERSAL. In order to improve bond strengths on enamel even more, I recommend to additionally use the selective etch technique. I would consider this essential when bonding a metal framed resin bonded bridge to enamel. So, etch the enamel (not dentine) with standard 35 % phosphoric acid gel (e.g. Etchant Gel S, COLTENE) for 25 seconds, wash and gently dry. Be careful not to get the acid on adjacent teeth, otherwise clean-up becomes more difficult. Ideally, protect the adjacent teeth with a barrier and proceed with the adhesive luting protocol (Fig. 12 to 18). Please note that as the bonding agent needs to be light-cured this has to be carried out before placing the restoration. Therefore the bond layer must be very thin otherwise can prevent seating of the restoration.

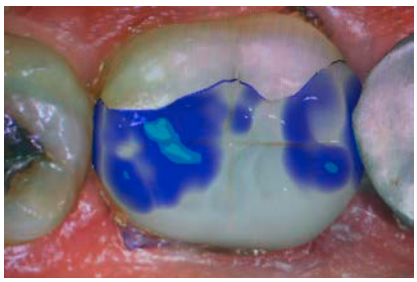

Fig. 7: Design of the onlay and checking the occlusion

Fig. 8: Indirect restoration material: BRILLIANT Crios Block

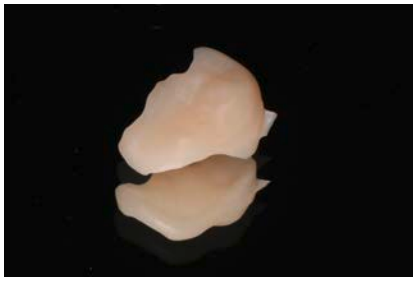

Fig. 9: Onlay before polishing

Fig. 10: Onlay after polishing

Fig. 11: Products used for the restoration: ONE COAT 7 UNIVERSAL, Etchant Gel S and SoloCem

Fig. 12: PTFE-Tape for protection of adjacent teeth

Fig. 13: Selective etch with Etchant Gel S

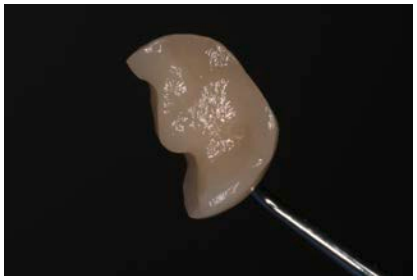

Fig. 14: Onlay after pre-treatment of the restoration surface, application and light-curing of ONE COAT 7 UNIVERSAL

Fig. 15: Preparation after application and light-curing of ONE COAT 7 UNIVERSAL

Fig. 16: Application of SoloCem onto the onlay

Fig. 17: Placement of the onlay

Fig. 18: Post-op

Conclusion

There is a good reason to simplify luting restorations. The new universal self-adhesive luting composites are a help to clinicians. Reduced bond strengths when using them self-adhesively can be enhanced by adding the options of:
- Use with acid-etching enamel where necessary, and
- Use with an additional bond layer to improve bond strengths

References

[1] Olley RC, Andiappan M, Frost PM. An up to 50-year follow-up of crown and veneer survival in a dental practice. J Prosthet Dent 2018 Jun;119(6):935-941.

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