Whilst it is advantageous to adhesively cement all-ceramic restorations, zirconia-based ceramics present some difficulties when it comes to adhesive cementation. Zirconia has a dense crystalline structure with no glassy phase and thus is not able to be acid etched. It contains no silica and so a silane coupling agent (ceramic primer) cannot be used for chemical bonding to the luting cement. Instead, adhesive cementation requires that the zirconia be micro-abraded (for macroscopic retention) and preferably with the Rocatec or CoJet systems (3M ESPE) to not only roughen the fitting surface, but also impregnate it with silica which will allow the use of a silane coupling agent.

Fortunately, zirconia-based crowns have strength values which are comparable to and can exceed those of metal-ceramics. Zirconia-based restorations are thus self-supporting restorations and provide the clinician with the option of placing them with conventional luting cements in situations where adhesive cementation may be difficult to achieve.

The following series of photographs demonstrates the use of a new resin modified glass ionomer luting cement, RelyX Luting 2 (3M ESPE) for the conventional cementation of a zirconia all-ceramic crown on a lower first molar.

**Figure 1:** A radiograph of the patient’s lower left first molar (#36) showing completed obturation of the pulp chamber and root canals.

**Figure 2:** Clinical view of #36 when patient presented 6 months following completion of endo treatment. The placement of glass ionomer restorative cement over Cavit (3M ESPE, St. Paul) in the access cavity has helped to maintain a hermetic seal post-endo.

**Figure 3:** The interim restoration has been removed from #36 and the exposed GP has been covered with Vitrebond (3M ESPE, St. Paul) glass ionomer lining cement to create a further layer of seal prior to placement of the core build-up.

**Figure 4:** A direct amalgam core has been placed in the tooth in preference to an indirect cast core as the tooth still had a significant pulp chamber with enough tooth structure to retain the core. The occlusion is checked and the appointment is completed.

**Figure 5:** At the second appointment, the #36 is prepared for an all-ceramic restoration. 1.5mm rounded shoulders are prepared circumferentially, and 2mm reduction is performed on the occlusal surface.
Dr Michael Mandikos received his Bachelor of Dental Science Degree with honours from the University of Queensland. From 1995 to 1998 he studied at the State University of New York at Buffalo, USA where he graduated with a Certificate in Prosthodontics and Masters Degree in Biomaterials. He has researched direct and indirect composite resins and he has published several papers in Australian and international journals on clinical and dental materials topics. Dr Mandikos has presented continuing education programs at dental meetings throughout Australia and Southeast Asia and he is a Fellow of the Royal Australasian College of Dental Surgeons and a recipient of the College Medal. He is a Visiting Specialist Prosthodontist to the University of Queensland Dental School, the Royal Australian Air Force and was a Visiting Prosthodontist to the Australian Army. He is a reviewer for the Australian Dental Journal, Quintessence International and Clinical (International Journal of Brazilian Dentistry). Dr Mandikos is a product evaluator for several dental companies and he maintains a private practice limited to Restorative Dentistry in Brisbane city.

Figure 6: A polyvinylsiloxane impression was made of the tooth and working dies fabricated. Note the continuous, 1.5mm, rounded internal shoulder preparation.

Figures 7 & 8: At the third appointment, the completed crown is inspected and tried-in and adjusted as necessary.

Figure 9: RelyX Luting 2, resin modified glass ionomer luting cement is dispensed, mixed and loaded into the crown. As the cement is not light activated, there is no concern that it might prematurely polymerise if this step is carried out under the operating light.

Figure 10: The prepared tooth is cleaned of any remaining temporary cement and lightly air dried. The loaded crown is seated on the prepared tooth and loaded under finger pressure using an intermittent “tapping” action to affect complete seating.

Figure 11: Dental floss is introduced into the interproximal areas to remove excess luting cement before the gel state of setting. An explorer can easily cleave away excess cement in the gel state while a curette or scaler is useful once the cement is set.

Figures 12 and 13: The completed restoration is shown from the buccal and occlusal views. All-ceramic restorations exhibit remarkable aesthetic properties and also satisfy some patient’s requests for non-metal restorative materials. Zirconia based crowns have the added benefit of being able to be cemented with conventional luting cements (as demonstrated in this case) making cementation a clean and simple process.