



F22 Detection of Flowable Composites Using UV LED Light

Gerald Guzy, DDS*, 259 Kinderkamack Road, Westwood, NJ 07675

After attending this presentation, attendees will gain knowledge of the value of UV LED lights in detecting the presence of flowable composites during forensic dental examination.

This presentation will impact the forensic science community by demonstrating that small battery operated UV LED lights can make the presence of flowable composites more easily detected by the examining forensic dentist.

One of the primary goals in the restoration of carious lesions is the preservation of tooth structure. The philosophy of minimally invasive dentistry is to conserve as much tooth structure as possible by using small cavity preparations. This is possible because adhesive dental materials do not require mechanical retention.

The use of air abrasion, laser technology, and magnification has furthered the philosophy of minimally invasive dentistry. The development and introduction of flowable composite resin in the mid 1990's gave dentists a new class of aesthetic restorative materials that complimented minimally invasive dentistry techniques. The primary advantages of flowable composites have been described as their ease of placement and the precision with which they can be applied.

Flowable composites have been used for a variety of dental restorative procedures including small CII, II, III, IV, V restorations, porcelain crown margin repairs, enamel defect repairs, preventative resin restorations, repair of bis-acryl composite provisional crowns, and repair of polycarbonate crowns.

Pit and fissure sealant materials have been evaluated by the author using battery operated UV LED lights. Recently, a battery operated UV LED light was used to detect the presence of resin based composites during the forensic dental examination of a severely decomposed body. These studies have shown that small battery operated UV LED lights can be important tools in the detection of conventional resin based composites and pit and fissure sealants during forensic dental examinations of unknown human remains.

The purpose of this preliminary study was to evaluate the use of small battery operated UV LED lights at 365 nm and 395 nm for the detection of flowable composite resins.

Twenty-two extracted noncarious, nonrestored human permanent molars were used in this study. The occlusal surfaces were cleaned with a slurry of oil-free pumice and distilled water, and the teeth were stored in distilled water until used. Twenty different flowable composites from twelve different manufacturers were applied to the occlusal surfaces of twenty different teeth. Two teeth had no flowable composite applied, and served as controls. The flowable composites were polymerized with a Morita Jetlite 5000 LED curing light. The light intensity was measured using the radiometer built into the charging base of the curing light. The light output was measured each time a flowable composite was polymerized and was consistently greater than 800 mW/cm². Polymerization times were based on the manufacturers' recommendations.

The teeth were examined using standard overhead fluorescent lighting, then re-examined in a darkened room using a Nichia 365 nm 5 LED UV light and an Inova X5MT 395 nm 5 LED UV light. These lights were chosen because they are small, inexpensive, easily obtained, and battery operated.

In general, flowable composites appear brighter than the surrounding tooth structure when illuminated with UV LED light due to their fluorescent properties. UV LED lights at 365 nm and 395 nm both enhance the appearance of flowable composites by contrasting the flowable composite with the surrounding tooth structure. The presence of flowable composite is easier to detect using the 395 nm light as compared to the 365 nm light. The flowable composite fluoresce significantly brighter and whiter with the 395 nm light as compared to the light blue fluorescence with the 365 nm light.

The results of this study suggest that the use of small battery operated UV LED lights can be valuable in the detection of flowable composites during forensic dental examinations. However, their use does not preclude a thorough visual and radiographic examination.

UV LED Lights, Flowable Composite, Forensic Odontology