



G46 3D Dental Digital Study Models in Bitemark Comparison

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Learning Overview: After attending this presentation, attendees will have acquired information regarding the role that 3D dental digital study models have in bitemark comparisons.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that 3D dental digital study models are as accurate as original dental stone casts and have the distinct advantage of being unbreakable, cost-effective substitutes for the original dental stone casts and can easily be securely transferred to forensic dental experts and other interested parties by the internet.

A male adult defendant was sent to trial on charges of first-degree murder, aggravated sexual assault, and sexual interference in connection with the death of a three-year-old female. There were 13 human bitemarks on the torso and limbs, in addition to three scarred/healing human bitemarks to the buttocks and right forearm.

The case went to preliminary inquiry in 2010 and to trial in 2012. A Board-certified forensic dentist testified for the prosecution in both events. The trial court judge acquitted the accused, and the Court of Appeal ordered a new trial on the basis of judicial error. There was no dental expert witness for the defense, neither at the preliminary inquiry nor at trial. For both the preliminary inquiry and for the trial, the case was considered a “closed population” event. However, for the retrial, further investigation discovered that more persons had been in contact with the child than had originally been thought, thus it became an “open population” case. A forensic dental expert witness for the defense was appointed for the scheduled retrial in 2014.

For the retrial, a judge ordered the duplication of original dental stone casts of six suspect dentitions to be constructed in another jurisdiction and ordered that the duplicate dental stone casts be sent to all experts in the case. The pairs of duplicate dental stone casts received by the forensic dental expert witness for the defense were defective in one form or another. One dental stone cast contained three broken anterior teeth on the stone models, which the suspect dentition did not have. Others had air bubbles on the incisal edges of anterior teeth.¹ In the absence of the original dental stone models, it was not possible to determine if the defects were artifact on the original or the duplicate models. Either way, air bubbles do not exist on human teeth, and the models cannot be used for comparison.

The use of digital files representing 3D objects is currently accepted for diagnostic and comparison purposes and are recognized for judicial purposes. Had 3D dental digital study models been made from defect-free dental stone casts and transferred to the interested parties, this dilemma would not have occurred.

This presentation will include the use of different views of 3D dental digital study models, 3D measurement tools, cross section properties, and cast “highlights” of the ORTHOpix™ 3D dental digital study models for comparison purposes.

In conclusion, 3D dental digital study models can play an important role in bitemark comparison and can substitute for the original dental stone casts of suspect dentitions.

Reference(s):

- ¹ Robert Dorion. The Anatomy of an Aborted Retrial Involving Bitemark Evidence. *Proceedings of the American Academy of Forensic Sciences*, 68th Annual Scientific Meeting, Las Vegas, NV. 2016.

Forensic Odontology, 3D Digital Dental Study Models, Bitemark Comparison