



F19 The Forensic Dental Articulator in the Identification of Human Bite Marks

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After attending this presentation, attendees will be made aware that when a bite mark is inflicted, the maxillary or upper jaw, is related anatomically to the lower jaw or mandible. Due to different sizes and shapes of individual temporal-mandibular joints and jaw structure, this affects the gross dimensions of the bite mark pattern.

This presentation will impact the forensic science community by adding techniques in the identification or exclusion of suspects in bite mark cases where DNA is absent or a few teeth are present in each jaw.

A forensic dental articulator is capable of detecting that anatomical relationship. This new technique adds one more dimension in the bite mark analysis. At present in bite mark analysis only the teeth in one or both jaws are related to life size photos of the bite mark, in order to either identify or exclude a subject.

Dental articulators have been used in dentistry to relate the maxillary and mandibular jaws for the examination, diagnosis and treatment of various dental disorders. A wax bite is taken on the patient in what is called centric relation, which gives the anatomical relation of the teeth when the mandibular condyles are allowed to move in the maxillary fossa in the most distal and superior position, until the teeth make first contact. A clinician will then mount the dental casts on an articulator using the wax bite to relate the casts to each other. Centric occlusion occurs when after the teeth make contact and then slide into a position where the teeth make the most contact. During the movement from centric relation to centric occlusion, the condyles change position. It must be noted that this is an important clinical and forensic distinction. As the jaws open the lower anterior teeth define an arc which is not a circle because there is rotation and translation. So a fixed axis of rotation articulator does not give the arc of closure and the change in position of the condyles and subsequently the teeth. There can also be protrusion of the lower jaw in opening and biting. Can a bite mark examiner determine the amount of protrusion, if any, on a bite mark?

Dental articulators at present are not capable of recording the rotation and translation in real time during the opening process because of the mechanical limitations. The technique involved in getting an articulator to perform in real time will be shown. Presently, dental casts of the maxilla and mandible are mounted in centric occlusion in the jaws of pliers to simulate the masticatory apparatus of the suspect. The examiner's hands are used to supply the force in making a bite into a human, animal, or other material. As presented in the 2008 AAFS meeting in Washington, DC, centric occlusion is not the relation to use because the teeth during a bite never completely touch, if at all, so centric relation is the proper mounting, with the proper vertical dimension.

Additionally since machines have been developed that measure human bite forces, the forensic dental articulator can now generate a bite mark that is physiologically and anatomically correct.

The ability to capture the relationship between the jaws allows an identifiable bite mark pattern of anterior teeth, when only a few are present. Drag marks can be demonstrated and produced.

Forensic Dental Articulator, Bite Mark, Arc of Closure