F21 Contribution of New Technologies to the Bitemarks Study

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After attending this presentation, attendees will understand how new technologies especially laser scanner using 3D modeling of dental casts can enhance the study of bitemarks. The sectioning performed allows the approach to optimisticaly further development in the bitemarks study to help investigators and magistrates to identify the perpetrator of these acts to find the truth.

The technique mixing data processing and forensic science is an original tool in the fight crime and is currently being tested within Forensic Science Institute of the French Gendarmerie (IRCGN). This presentation will impact the forensic science community by presenting practical applications which can represent guidelines available to a wide population of specialists.

Bitemarks are caused by the mechanical action of the teeth accompanied or not by the pressure of tongue or lips. Thus bitemarks induce a physical deterioration of soft tissues characterized by a print whose contours vary mainly according to the strength of the pressure exerted on the tissue, the mandibular movements of the perpetrator, and the movement of the victim. Naru and Dykes (1996) showed that the manual sketching copying dental arches of a suspect vary perceptibly if they are not performed by the same technician. The imprecision of the copying depends of the dexterity, sensitivity, and the tiredness of the operator. There is a consensus among experts in bitemark studies who consider that data processing is an ideal tool to copy objectively the contours of teeth of the suspect. But according to the strength of indentation, the marks of incisal edges or occlusal surfaces don't show all the morphological characters used to identify the aggressor. Charles Georget (2003) developed a method based upon sections made from plaster dental casts. This method provides a more accurate representation of the dentition. Nevertheless, it requires a specific material made for the experimental process. The data is produced by the assessment of the dental arches of the aggressor in situ and the molding of the cast in white plaster. Around the white plaster cast, a form work is made and filled with black plaster. The sections and the pictures of the dental casts are entered into a database. The tool used to produce the sections is commonly found in prosthodontic laboratories. It guarantees the orthogonality of this assemblage and the equidistance between two sections. The tool is made to create a controlled removal of plaster every millimeter. After a section is ground the cast is dismantled from its support. It is photographed or photocopied next to an ABFO N°2 scale. However, this method is limited because it is destructive and the number of sections is limited. It is also a time consuming process. The contribution of new technologies and especially the use of laser scanners assist in the production of fast and easy 3D models of the dental cast. This none destructive method enables to production of sections according to the needs of the odontologist. The digitized dental cast is available for further examination due to the non-destructive nature of the methodology.

Bitemark, 3D Modeling, Plaster Section

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