G2   A Case of Great East Japan Earthquake Human Remains for Which Digital Imaging Analysis of Dentures Helped in Identification

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Learning Overview: After attending this presentation, attendees will have acquired a new dental identification technique.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by informing attendees that judgment of a case report of comparison was based on very little evidence utilizing artificial teeth from dentures.

Human remains were discovered immediately after the Great East Japan Earthquake and were cremated, although the person was not identified. The full set of dentures in the mouth at the time of discovery of the remains were kept as possessions of the victim in the municipality. Possible identification of the remains emerged through collation with a DNA database, but an additional personal identification method was desired for a more reliable identification. Eight years later, the dental clinic that the candidate attended during his lifetime was identified, and it was revealed that the dental clinic prepared the upper and lower full dentures. Moreover, it was revealed that the dentures the candidate wore had rare artificial teeth in the molar regions.

Demonstration of wearing the dentures prepared with the rare artificial teeth by the unidentified remains may be a big help in judging the comparison. Thus, this study tried to increase the possibility that the remains were the patient (candidate) who attended the dental clinic by analyzing whether the artificial teeth of the dentures worn by the remains were the rare artificial teeth.

Images of the dentures belonging to the unidentified body were acquired using cone beam Computed Tomography (CT) and Stereolithography (STL). Then, the artificial teeth used in the dentures worn by the candidate, Livedent FB20 Plastic 108, and hard resin teeth used about 40% of the time in Japan (frequently used in general dentures prepared within the coverage by national health insurance and used in the anterior tooth region of the dentures prepared by the dental clinic), and ENDURA S28 A3, used as a control material, were imaged using a desktop scanner for dental technicians and STL was constructed. These were superimposed on STL of the bilateral upper and lower first molars of the artificial teeth in each of aforementioned images. The software used for superimposing the images was spGauge. As a result, it was determined that the artificial teeth of the dentures worn by the unidentified body were very likely to be identical to those used by the candidate.

Component analysis was also a measure for this case, but items left behind by an as-yet unidentified individual cannot be destroyed, so non-destructive analysis was required. In the analytical results, large differences were noted in the functional palatal- and lingual-side cusp between the artificial teeth of the dentures worn by the remains (candidate) because the morphology of these is likely to have changed due to being ground for occlusal adjustment by a dentist when new dentures are attached and attrition by mastication, but almost no difference was noted on the non-functional buccal surface or fissure of the occlusal surface of the cusp; these useful results helped in obtaining a judgment of the comparison.

Disaster Victim Identification, Forensic Odontology, Stereolithography