

CASE REPORT

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The USS *Iowa* Disaster: Success of the Forensic Dental Team*

ABSTRACT: The authors record the contributions of dentistry to the identification of the crew members who were in one of the most significant peacetime military accidents in U.S. Navy history—the April 1989 explosion in a gun turret on the battleship USS *Iowa* and the deaths of 47 U.S. Navy personnel. Dental identification was the primary means of identification for most because a very high percentage of the bodies were burned or fragmented. The dental-identification team's success was a direct result of its preparedness, its use of dental personnel with mass-disaster experience, and the overall excellent quality of the antemortem dental records. The dental-identification team's successful involvement in the USS *Iowa* tragedy was considered a model for success and therefore was instrumental in contributing to the development of the American Board of Forensic Odontology "Guidelines for the Development of a Disaster Dental Identification Team."

KEYWORDS: forensic science, forensic odontology, dental identification, mass disasters, USS *Iowa*

On April 19, 1989, the battleship USS *Iowa* BB-61 was undergoing a gunnery exercise approximately 330 miles northeast of Puerto Rico when an explosion occurred in the number 2 gun turret killing 47 crewmen (1). At the time, it was one of the worst peacetime military accidents in U.S. naval history. The massive gun turret was encased with 17 in. of steel and entombed those caught in the mishap (2). Dental comparison was the principal means of identification because deaths were by thermal injury, remains fragmentation, and/or severe decomposition of remains that were immersed in water due to flooding in the turret.

In the aftermath, a few articles have documented certain aspects of the accident investigation, including mental stress, but there have been no accounts of dentistry's participation from the dentists' perspective (1–3,5). Therefore, this paper chronicles the valuable role that dentistry played in the investigation and identification process of one of the most significant disasters in U.S. naval history and records its historical significance in forensic dentistry. In preparation for this article, the authors reviewed and tabulated data from the official Armed Forces Institute of Pathology (AFIP) forensic-dentistry after-action report and literature (1–5); relied on firsthand experience of one of the authors (WMM) who was a member of the AFIP dental-identification team; and considered only the organization, victim processing, and problems that directly affected the dental team.

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Response Team

The AFIP Department of Oral Pathology provided forensic dentistry support for this endeavor. The assembled AFIP dental-identification team consisted of 13 dental officers of the Air Force, Army, and Navy; ten were oral pathologists, two were general dentists, and one was a prosthodontist who was also a computer specialist. The dental support team consisted of seven Air Force enlisted personnel, who were rated dental technicians experienced in postmortem dental identification. Prepackaged equipment and supplies dedicated to dental identification missions were an invaluable resource and a major factor that enabled the dental team to deploy rapidly following the USS *Iowa* disaster.

Identification Data

The identification center in the mortuary at Dover AFB received 47 bodies or the remains thereof for processing and identification. Of the 47 victims received at Dover AFB, 30 died from thermal injury, 12 from blunt-force injury, and 5 from a combination of the aforementioned (1). The methods used to identify the victims were dental and fingerprint. Dental comparison alone (14 victims) or in combination with fingerprints (31 victims) was the means of positive identification for 45 or 96% (1). In addition, dental findings were classified as "consistent with" for two that were positively identified by fingerprint comparison (1). Hence, all 47 victims were positively identified.

Analysis of Investigation

All mass disasters have certain elements in common, but each has certain problems that make it unique. The nature of the explosion on the USS *Iowa* resulted in fragmentation of remains and victims with thermal (smoke and soot inhalation/burn) and/or blunt-force injury. Fortunately, these circumstances posed relatively few problems for

the dental-identification team. Although there was pressure from non-dental authorities to quickly make the identifications, the dental team did not deviate from its standard forensic dental protocol. In order to reduce errors and provide accurate documentation, a multiperson quality control system was used in all aspects of the dental-identification process; the authors have already discussed in depth details of the verification techniques that the AFIP dental-identification team used (6,7). The following briefly describes the dental methods used for the USS *Iowa* disaster and the problems the forensic dental team encountered in the various components of the investigation.

Postmortem Subsections

Initially, it was discovered that unexploded ordnance was embedded in some of the victims who had entered the identification processing chain, posing a hazard to personnel. To eliminate this danger, more thorough screening procedures were immediately instituted.

Badly burned remains required jaw resection to facilitate proper oral examinations and taking radiographs. Whenever possible, the dental-identification team took a full-mouth series of periapical radiographs to increase the chances for identification. Advantages of using periapical radiographs include the ability to observe the entire tooth, its surrounding bony trabecular pattern, and bone loss from periodontal disease. The collection of postmortem dental data on each set of remains by the examination and charting teams was essentially uneventful. Commingled jaw fragments were successfully matched with the victims from whom they were originally separated.

Antemortem Record Reconstruction Subsection

Transcribing dental information from the antemortem dental record to a standardized antemortem form may be the most difficult task facing the dental-identification team. In addition, one of the most common problems in mass-disaster dental identification is poor quality or inadequate antemortem dental records (8). However, in this disaster, most of the Navy dental records were of excellent quality. What few problems there were centered on a few instances in which unauthorized dental abbreviations were used in the treatment-rendered section of the dental record. The dental team also had to contend with a small number of panoramic radiographs without the anatomic side (right vs. left) designated.

Computer and Record Comparison and Identification Subsections

Using the Computer Assisted Postmortem Identification (CAPMI) program facilitated antemortem and postmortem comparison of dental charts and radiographs. Verification of CAPMI-recommended matches was accomplished by members of the Record Comparison and Identification Subsection. The manual comparison of antemortem and postmortem radiographs was the final word in rendering a positive dental identification. The chief or designee and two dentists who were in agreement with the final interpretation signed the official identification summary form. The

degrees of certainty were: (1) positive identification (certainty), (2) consistent with (possible), and (3) unidentified (insufficient evidence).

Conclusions

Throughout all of the investigations by the various agencies and congressional inquiries and hearings, the dental identification team's mode of operation and identification results were never in question. Commencing with advance preparations to on-site organizational plans to closure, every aspect of the dental identification team's preparedness and participation was a model for success. As a result, the dental-identification team's successful involvement in the USS *Iowa* tragedy played a significant role in contributing to the development of the American Board of Forensic Odontology "Guidelines for the Development of a Disaster Dental Identification Team" (9,10).

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