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Dental Identification of Disaster Victims by a Dental Disaster Squad

On 7 June 1971, an Allegheny Airlines twin-engine turboprop Convair 580, flying from Groton, Connecticut, and destined for Newport News, Virginia, crashed a mile short of Tweed-New Haven Airport while attempting to make a scheduled 9:52 a.m. landing at New Haven, Connecticut. As it had emerged from a low lying fog bank 25 ft above Long Island Sound, the aircraft, carrying twenty-eight passengers and three crew members, had sheared through high tension wires and three unoccupied beach houses, exploded, and burst into flames. The blaze required the concerted effort of the fire departments of several towns to extinguish.

Twenty-eight of the thirty-one persons aboard perished in Connecticut's worst commercial airline disaster (Fig. 1). Two passengers and the copilot miraculously survived. The latter had been ejected from the plane on impact; a male and a female passenger, suffering burns, had managed to escape through an emergency exit.

When Connecticut State Police arrived on the scene, only the body of the pilot, in the forefront of the plane and accessible to firemen, had been removed. He was the only victim to be later identified by fingerprints. Before removing the remaining 27 victims, the police photographed and sketched the interior of the aircraft, noting the position of each body and assigning it a number. The bodies were then carefully removed, each was inserted into a separate plastic body recovery pouch bearing the corresponding number, along with any personal effects found on the body, and transported by ambulances and hearses to Yale-New Haven Hospital. A brief quandary over disposition of the bodies, related to the 90-deg weather, was resolved by the medical examiner at the scene in favor of Yale-New Haven Hospital, where refrigeration was available.

The 27 bodies were burned beyond recognition; fingerprint identification was impossible. However, the state of Connecticut was in the unique position of having at its disposal a Dental Disaster Squad, a group of volunteer dentists organized just two years before by the Connecticut State Dental Association with the cooperation of the Connecticut State Police and prepared to serve in just such an emergency. The director of the Dental Disaster Squad was summoned by the State Police Bureau of Identification and asked to assemble the members of the squad for the purpose of identifying the victims by means of their dentition. Permission was granted by the State Chief Medical Examiner and the pathologist of Yale-New Haven Hospital to perform the necessary procedures for dental identification.

Received for publication 1 Aug. 1971; accepted for publication 8 Sept. 1971.

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FIG. 1—(Hartford Times photo) *Burning wreckage of Allegheny propjet that crashed on approach to New Haven airport. To the left can be seen high tension wires and the inflamed beach houses.*

Preliminary Examination

Members of the Dental Disaster Squad commenced working at about 5:30 p.m. on the day of the accident. They were divided into teams consisting of three dentists each, with an officer from the State Police Bureau of Identification assigned to each team.

The bodies and personal effects, encased in zippered pouches, were removed individually from the refrigerator and placed on a table. The dentists had been asked to remove rings and other jewelry, wallets, fragments of clothing, and anything else that they discovered on the deceased. These, along with the personal effects recovered at the crash, were recorded by the police officer, in addition to the sex, weight, and general size of the body. All personal effects were then retained in a small plastic pouch bearing the same number as the larger body sack.

A file containing the description of the body, the list of personal effects, postmortem dental charts, and, as they were secured, antemortem dental charts and X-rays, as well as any other available information, was compiled for each victim by the police officers. Police worked until midnight assembling the data and deducing from them and from the passenger manifest possible clues to identity.

Since the bodies had been refrigerated promptly, there was no odor of putrefaction. All had the typical pugilistic pose commonly seen in a burned body (arms drawn up, fists clenched), which is due to the contraction of burned, taut muscles (Fig. 2). The pathologist had determined that all the passengers were alive at impact. There was no dismemberment or mutilation. They had died as a result of the fire. As the tissues of the face and tongue are good insulators, the teeth of the victims appeared to have been protected except for

the labial surfaces of the anterior teeth. On observation, the lips of the victims had the aspect of being slightly parted.

Dental Procedures

The burned facial muscles severely restricted the opening of the oral cavity which incisions in the facial tissues could not alleviate. Consequently, it was deemed necessary to resect the mandible to gain access to the mouth. A No. 20 blade scalpel was used to make an inverted V incision on both sides of the mouth. When the tissue flap was pulled back the bone of the mandible became clearly visible. A Stryker autopsy saw was then used to cut through the left and right sides of the mandible beyond the most posterior teeth. Cutting into the lingual mandibular border with a scalpel and freeing all muscle attachments enabled the mandible to be easily lowered, permitting an unobstructed view of both maxillary and mandibular dentition.

Each team of three dentists was instructed to mark on the postmortem dental chart teeth that were missing, caries, restorations and their material, bridgework and other prosthetic appliances, and any unusual conditions related to tooth shape, alignment, arch formation, etc.

A pictorial chart based on the universal system (1 to 16 and 17 to 32) of tooth designation was used for each case. As the first dentist to examine the mouth called out his observations, they were recorded on the chart by another member of the dental team (Fig. 3). A third dentist then made his examination. Finally, as the recording dentist read aloud the charting the three reexamined the mouth, resolving any discrepancies that might have occurred. The fact that the postmortem charts, when compared with antemortem X-rays and records, appeared to be error free was attributed to the triple-check system and the scrupulous attention exerted.

By 11 p.m. 25 bodies had been examined. The 25 postmortem dental charts were taken across the street to the library of Yale-New Haven Hospital, where Xerox copies were made. Later, Xerox copies were made of the antemortem charts and the X-rays were reproduced on photographic film (Fig. 4) so that the original antemortem charts and X-rays could be turned over to the U.S. Federal Bureau of Investigation in accordance with their request.

As mentioned previously, the body of the pilot was able to be identified by fingerprints. The passenger manifest listed two young children whose body size made their identification acceptable. The body of one, a six-month old baby, was recovered in proximity to its mother, and the body of the other, a two-year old (same family), was found near the body of the father.

The next evening two dentists who had carried out the examination the preceding day, accompanied by two additional volunteers from the Dental Disaster Squad (a total of 18 Connecticut dentists participated in the investigation), returned to Yale-New Haven Hospital for the purpose of comparing the antemortem and postmortem records. By 11 p.m. that night, based on the records that had been obtained, 21 of the 25 bodies had been identified. By the following evening, as the records on the remaining victims arrived, it was announced that all 28 bodies had been identified.

Antemortem Records

Antemortem records were procured by police, airline officials, the FBI, and members of the Dental Disaster Squad. They consisted of diagrammatic charts, written charts, detailed verbal descriptions, and periapical, bite-wing, and panoramic X-rays. (It was the opinion of the examiners that bite-wing and panoramic film could be more easily read,



FIG. 2—A burned victim, removed from body recovery sack, is seen in characteristic pugilistic pose. Note wrist watch on left wrist, which may be a clue to identification.

for comparison purposes, than periapical X-rays.) In a few cases it was necessary for dentists of the squad to obtain a verbal detailed description of the antemortem charts and X-rays over the telephone from the victim's dentist. This was the least satisfactory, but nevertheless an acceptable, method of establishing identity. The charts and X-rays, arriving subsequently by mail, substantiated the identification.

The dental records of the stewardess, who was unattached, were difficult to find, since Allegheny Airlines did not have dental records (charts or X-rays) of any of the flight personnel. This is not uncommon among other U.S. airlines. (In forensic odontology the practice of retaining dental information on people in hazardous occupations is referred to as "precautionary registration.") After numerous long distance telephone calls, her dental records were finally traced to a Pennsylvania dentist. He promptly transmitted over the phone a complete charting of the mouth, including a detailed description of a microbond fixed bridge that served as a significant factor in her dental identification.

Four sets of Navy antemortem dental charts, all different, were supplied for one of the victims. A dentist familiar with dental charting would realize that the discrepancies arose from incorrect designation of teeth that had migrated into spaces left from extractions. This demonstrates the hazard of having to depend on dental charts, without X-rays, for identification. Fortunately, the Navy had also supplied X-rays, and identification was predicated on the antemortem X-rays.

A soldier with perfect teeth, no caries or restorations, was congenitally lacking the upper second incisors. The distraught father was reluctant to accept the fact that the body was that of his son. An Army panoramic X-ray clearly revealed the unusual dental condition, and the identification was indisputable.

The family of one of the victims requested, for religious reasons, that the body be immediately identified and released for burial. To comply, the FBI had her antemortem dental records transmitted that same day from Washington, D.C., by telephone photocopier. This was the first body to be identified by the Connecticut Dental Disaster Squad.

Problems and Solutions

The basement of Yale-New Haven Hospital was in the midst of being rebuilt, so physical working conditions for the dentists were poor. Most of the dental work was performed in the limited space of the corridor, outside the morgue (where the autopsies were performed), under temporary lighting strung overhead on exposed wiring. State Police



FIG. 3—Members of a dental team examining and charting the dentition of a victim. State police officer recorded personal effects and other nondental information.

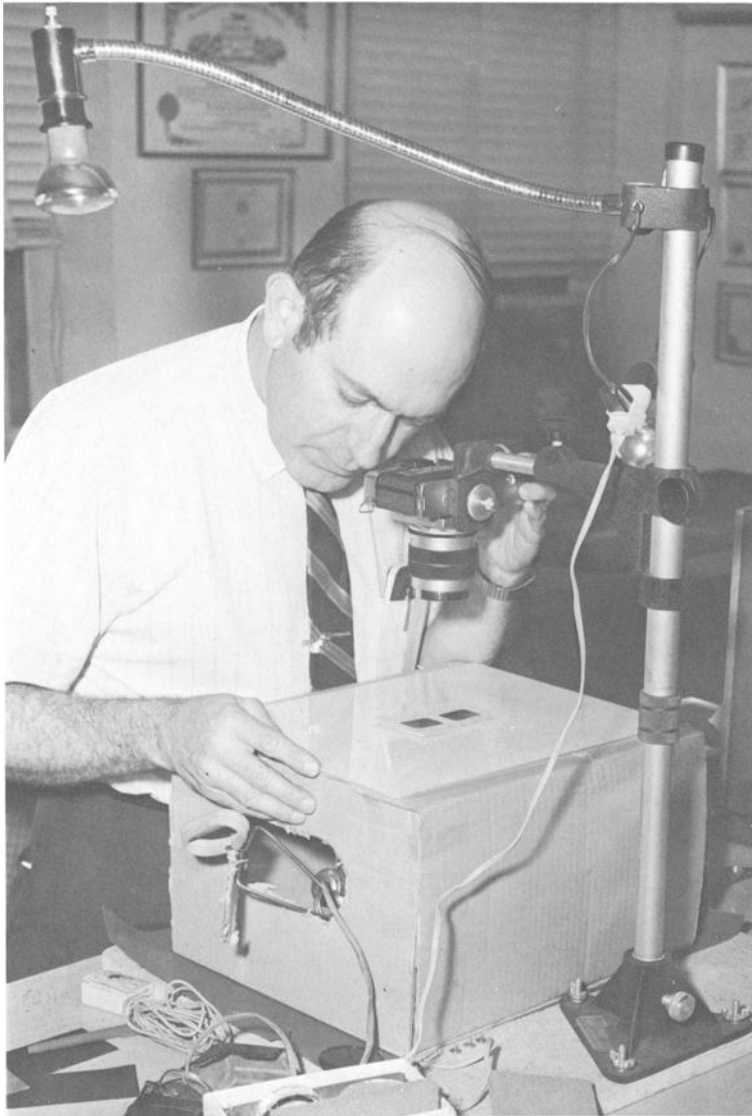


FIG. 4—With an extension tube between the lens and the body of a 35-mm Topcon camera, antemortem X-rays are photographed on black-and-white film, from which multiple prints can easily be made. Lighting source is a photofood bulb enclosed in a cardboard box and covered with opal glass.

troopers loaned dentists their 5-cell flashlights to help compensate for the inadequate lighting.

The Connecticut Dental Disaster Squad hopes to be able someday to afford surgical headlights for inclusion in its equipment kit. At least one headlight for each team of dentists would have been desirable. A 150-ft heavy-duty extension cord with multiple outlets would have been useful as an electric source for photographic equipment and additional illumination. Despite its high cost, a Stryker autopsy saw is a necessity in a dental identification kit. In this instance it was made available by the hospital.

Prior to this disaster, the first duty call for the Connecticut Dental Disaster Squad, it was not realized how much time was required to notify the individual members by telephone that their services were needed. Henceforth, the squad director will delegate responsibility for this to two squad members, thereby allowing him to depart immediately for the disaster area. His prompt arrival on the scene will enable him to survey the situation, assess the needs, and pass this judgment back to other members of the squad. Dentists arriving at the hospital during the afternoon of the accident were, initially, barred from admittance. Some type of badge or identity card would probably remedy this. Naturally, each situation will present its own set of problems. As can be seen, the problems encountered here by the Dental Disaster Squad were, in actuality, minimal.

Concluding Remarks

The Connecticut Dental Disaster Squad was formed by its present director in 1969 in response to a communiqué of the American Dental Association referred to him by Dr. Sidney Rafal, then an executive officer and now president of the Connecticut State Dental Association. In 1969 and again in 1970, the Connecticut State Dental Association, in cooperation with the Connecticut State Police, sponsored an all-day seminar in Hartford, Connecticut, on dental identification.

A week-long course in forensic odontology (the only one currently available in this country) is offered, without tuition, each October at the Armed Forces Institute of Pathology, Washington, D.C. Information on the course can be obtained by writing to Col. Robert C. Boyers, Chief of Dental and Oral Pathology Division, Armed Forces Institute of Pathology, Washington, D.C.

The Connecticut Dental Disaster Squad has a membership numbering over 60 dentists, who have volunteered to serve when needed. Much credit for the success of the initial endeavor must be attributed to the competence and cooperation of the Connecticut State Police Bureau of Identification, under Capt. George Fagan, director.

This is probably the first time that an organized group of volunteer dentists, prepared to assist in the event of a mass disaster, was summoned into service by law enforcement officials. The Dental Disaster Squad responded with alacrity and functioned smoothly and efficiently. The unqualified success of the project encourages the formation of similar forensic dental groups throughout the United States and other parts of the world.

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