The Role of Forensic Anthropology in Mass Disaster Resolution

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On Dec. 12, 1985, a military charter DC-8 crashed shortly after takeoff at Gander, Nfld., Canada. All 256 aboard were killed, making this the deadliest U.S. military aircraft accident in history. The investigation team (consisting of forensic pathologists, odontologists, radiologists, anthropologists, graves registration personnel, and systems engineers) succeeded in identifying the remains of all 248 manifested passengers and 8 crewmembers. The unique contribution of anthropology necessitates that a forensic anthropologist be included in all phases of casualty resolution from recovery and initial processing to final evaluation, rather than being summoned as a last resort. This approach would yield immediate information on "unknowns" and would eliminate subsequent duplication of effort.

AS THE NUMBER and variety of mass disasters increase, the need for effective methods of establishing identification becomes critical. Since these disasters result in human remains that are incinerated, mutilated, fragmentary, partially skeletonized, or rapidly decomposing, it can be extremely difficult to establish visual identity. Dental records and fingerprints are used to make most of the positive identifications. But the problematical cases linger: remains without dentition or prints, those too badly damaged or too incomplete to yield much information. In an attempt to circumvent these problems, physical anthropologists are increasingly being asked to lend their expertise with bones to establish physical identity.

This has resulted in a new area of specialization for anthropologists, "forensic anthropology," defined as "the application of the physical anthropologist's specialized knowledge of human sexual, racial, age, and individual variation to problems of medical jurisprudence" (14). Since 1971, there has been a Physical Anthropology Section of the American Academy of Forensic Sciences; although it ranks among the smallest of the 10 sections, it grows each year.

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The techniques of forensic anthropology rely on familiarity with bony landmarks and surrounding anatomy and on knowledge of trait frequencies in populations. Since physical characteristics are general and exclusionary, an anthropologic evaluation is usually insufficient to establish positive identity, but it does eliminate many possible identities. The presence of bone injuries or disease processes can further individualize the remains. Antemortem radiographs can be matched with the remains (11), though this task more often falls to an odontologist or radiologist.

There are many excellent overviews of the range of forensic anthropology (4,13,14,16,18,19). This report is an application of anthropologic techniques to a particular set of circumstances: the crash of an Arrow Air DC-8 in Gander, Nfld., on Dec. 12, 1985.

EXAMINATION OF REMAINS

The investigation had been proceeding for over 3 weeks before the services of an anthropologist were requested to help with particularly difficult cases. These included 50 incinerated and dismembered remains for which no positive identity could be established due to insufficiency of individual remains and/or lack of antemortem records (the military medical/dental records were also on the plane and many were totally destroyed). As a physical anthropologist employed by the Army and experienced in current death cases, I was sent on Jan. 8 to the port mortuary at Dover Air Force Base, DE, where analysis of the remains was ongoing.

After an initial briefing, my first task was to evaluate 70 sets of pubic symphyses which had been excised, tagged with the processing number assigned to the remains, and cleaned. The pubic symphysis is a critical bony area for determining sex and age in adults. Males are characterized by short pubic rami, a small subpubic angle, lack of ventral arc and subpubic concavity, and a broad medial aspect to the ischiopubic ramus. Females show long pubic rami, a greater subpubic angle, ventral arc, subpubic concavity, and a narrow medial aspect (6,12). Two of the 70 subjects proved to be female.

After the late teens, the symphyseal face of the pubic