JOINT COMMITTEE ON AVIATION PATHOLOGY: IX

Laboratory Examination of Unidentified Suspected Tissue Fragments Found at Aircraft Sites

ALAN E. PETTY and ROBERT R. MCMEEKIN

Armed Forces Institute of Pathology, Washington, D.C. 20306

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The identification of victims of an aircraft accident may be very difficult because of the degree of fragmentation associated with the accident. Periodically, the Divisions of Aerospace Pathology and Toxicology have been asked to identify tissue, bone, or bloodstains of undetermined origin. Usually this request has been precipitated by situations in which a) it is questionable whether an aircraft has sustained a bird strike, b) unidentified pieces of tissue are found floating at sea, or c) fragments of bone, tissue, or blood-stained flight apparel are found near a crash site. Preliminary studies have shown that gross examination and the methods and procedures used in forensic serology may also be applied in aircraft investigation with very good results. These methods are used as an aid to confirm the identity of the victims involved.

THE PURPOSE of this paper is a) to describe some specific types of problems in determining whether materials found at the aircraft accident site are of human or nonhuman origin, and b) to describe basic techniques that may be used by local laboratories to assist in identifying unknown materials.

Although many factors must be considered during investigation of a fatal aircraft accident, two particularly difficult situations have posed unusual problems. With severely mutilated and fragmented bodies, it is necessary to verify that the material found is, in fact, of human origin and, if so, to determine the identity of the person. This is especially difficult when an aircraft is lost at sea or when the body and aircraft wreckage are so severely fragmented that no tissue is readily identifiable as being human. Another problem is presented by bird strikes (11,12), though it is not difficult to identify avian tissue when feathers or other recognizable fragments of birds are found, it is much more difficult when only a single small fragment of tissue is found, that may or may not be from a bird. These problems are amenable to study by laboratory methods, but the special techniques necessary to make these determinations are usually not readily available to the field investigator.

TECHNIQUES

A. *Gross examination.*

1. *Of appearance*: The unidentified specimen must first be examined grossly. Visual examination may reveal the organ from which it came. Skin, muscle, and fat are tissues most frequently recovered when there has been massive tissue destruction. When an aircraft is lost at sea, tissues containing large amounts of fat are the most frequently recovered because of the greater buoyancy of adipose tissues. The characteristic consistency and color of brain tissue render it relatively easy to identify, particularly when the victim sustained a severe head injury. Kidney, intestines, and lung are also relatively easily identified on the basis of characteristic appearance.

2. *Of consistency*: Consistency may be of value, but the risk of further tissue destruction must be evaluated before subjecting the material to vigorous palpation. It is generally possible to determine whether the material is fibrous (such as muscle, fascia, nerve, or skin), gelatinous (as brain), or firm (as kidney or liver).

3. *Of odor*: The odor of a specimen is useful in determining whether material found at the accident site is tissue or other artifactual material. The onset of putrefaction of fragmented tissues is sufficiently rapid that, except in the coldest geographic regions, the characteristic odor is readily identified by even the inexperienced. Even in situations where the material is saturated with the odor of aviation fuel, smelling it carefully should reveal the odor of decomposing tissue. The characteristic odor of fish may be detected in materials recovered from aircraft lost at sea.

B. *Serologic examination*: Methods and procedures used in forensic serology may also be applied to air-

Alan E. Petty, B.S. (SMSgt., USAF), is in the Toxicology Division, and Robert R. McMeekin, M.D. (LTC, MC, USA), is Chief, Aerospace Pathology Division, Armed Forces Institute of Pathology, Washington, D.C. 20306.

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