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## Lethal Lesions in Aircraft Accidents

Colonel H. G. Mosely, M.D.\*

**SUMMARY:** While most aircraft accident fatalities result from multiple lethal injuries, a significant number are caused by single identifiable lesions such as internal vascular tears (e.g., hemorrhage) especially in the brain area, which prompt surgical action may prevent from being fatal.

Lawyers investigating such cases should ascertain whether or not medical treatment was prompt and skillful enough in the particular circumstances, and whether the particular injury (i.e., lesion) which actually caused death was identified and treated.

**A** REVIEW OF INJURIES INCURRED IN USAF aircraft accidents reveals that approximately two-thirds of the deaths result from multiple severe injuries and as such are beyond the realm of rescue or resurrection by timely medical intervention. The remaining one-third of deaths, however, are due to identifiable causes and offer a challenge to the medical profession. These lethal lesions fall into three categories as follows:

1. *Cranial Injury:* Excluding multiple injuries, this is the most frequent cause of death in aircraft accidents. The range of such injury is extremely broad, varying from concussion to decapitation. The majority of such cases, however, are relatively severe fractures with attendant brain damage and offer little hope of life saving by surgical intervention. Although any case of cranial injury in aircraft accidents needs to be carefully considered because of the possibility of torn blood vessels or other remedial lesions, the following case is quoted as being typical of the type lethal cranial injury frequently encountered.

At 1220 PM, Lt. L. J. D., the pilot of a fighter aircraft, was making a conventional approach to the runway following a routine training flight. The aircraft was observed to make a low turn onto final, and struck short of the runway in wings-level, nose-high attitude. The gear sheared, and the aircraft plowed ahead about 400 feet and struck firm into an eight foot embank-

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[*Editors' Note:* This is a revision, for lawyers, of a paper that appeared in the September 1957 Issue of The American Journal of Surgery. It is most illuminating when read in conjunction with Sanborn's article on "A Study of Fatal Trauma" which appears elsewhere in this issue of this law review.]

ment. The pilot was spontaneously ejected from the aircraft, probably at time of hitting the embankment, thrown over a building, and landed still strapped in the seat. He was immediately taken to the station hospital, where he arrived unconscious and bleeding from an injury of the scalp. He failed to respond to emergency measures and expired at 1425.

Autopsy revealed a simple fracture of the left ankle and numerous superficial abrasions. There were no other significant injuries except to the brain, where there was rather extensive damage on both sides. This was the cause of death.

2. *Burns*: Burns are the second most frequent cause of death in aircraft accidents, again excluding multiple injuries. Due to the fact that this type of injury ordinarily results from intimate association with burning petroleum products, the burns are usually quite extensive and fail to respond to the most vigorous and thorough burn management. In addition asphyxiation from inhalation of hot gases is often encountered. These cases stress the need of prompt rescue as well as vigorous burn management if survival is to be effected. The following case is an example:

Pilot, Capt. M. M., was bringing his fighter airplane in for a landing following a cross-country flight. His technique in approaching the field was very poor (there is considerable evidence that he was suffering from the effects of inadequate oxygen while at a higher altitude), and the aircraft struck the ground in an open field approximately one-half mile short of the runway. It slid approximately 800 yards and burst into flame. Although the cockpit remained relatively intact, the pilot made no attempt to escape. Crash rescue personnel arrived in approximately four minutes and extinguished the fire. The pilot was dead when removed immediately thereafter. Autopsy revealed that the cause of death was attributed to asphyxia due to inhalation of hot air and flames.

3. *Miscellaneous Lethal Lesions*: A small percentage of deaths in aircraft accidents result in miscellaneous and sometimes unexpected lesions. These are of interest not only because they are potentially responsive to treatment, but also because they sometimes constitute a diagnostic challenge. In this category are the deaths from shock secondary to amputations or extensive trauma, deaths from multiple fractures, various spinal cord in-

juries, pulmonary blast injuries, and severe lacerations or injuries to the organs of the thorax and abdomen. Of particular interest in this latter category are deaths due to tears of large blood vessels. It appears that in certain high impact accidents, the weight of the heart or kidneys overstresses the vascular moorings, with resultant tears of veins or arteries and rapid exsanguination. The following is an example of death due to such a cause. This case, incidentally, is remarkable for the tenacity of life in the face of multiple injuries.

Pilot Lt. W. C. S. experienced power failure in his fighter aircraft while coming in for a routine landing. The aircraft stalled, fell off on the left wing, crashed into the ground and exploded. The impact actuated the ejection seat which catapulted the pilot out of the aircraft. He subsequently landed still strapped to his seat approximately 20 yards from the burning aircraft. The time was 1143 AM.

#### Clinical Abstract

The patient was picked up 2,000 feet short of the runway following a flameout of his aircraft. At the scene of the accident the patient was found about 20 yards from the burning aircraft, strapped to the ejection seat, lying on his right side. His left leg was broken below the knee, and he was having difficulty breathing. The patient was released from the seat, placed in the ambulance and taken to the operating room, unconscious. In the operating room, debridement of wound of left palm, debridement of wound in upper left lip and suture, trephination bilaterally, suturing of wound in left palm, tracheotomy; treatment of fracture of middle and lower one-third tibia and fibula, left, and transfusion of 1000 cc's of blood was accomplished. Patient was taken to the ward in fair condition and supportive measures were taken, but patient's condition rapidly became worse and he was pronounced dead at 2400 hours, 29 October 1954, which was 12 hours and 17 minutes after incurrence of injury. Autopsy revealed some brain damage, severance of the spinal cord, moderate hemorrhage into the lungs and extensive hemorrhage in both kidney areas. The latter was probably from torn renal arteries and was the primary cause of death.

4. *Conclusions:* The majority of fatalities in aircraft accidents are caused by extreme forces and result in multiple lethal injuries. However, a significant number of fatalities are caused by single identifiable lesions and present a significant challenge

to the medical profession. The injuries in this category most frequently encountered are head injuries and burns. Also less frequently encountered, nevertheless potentially responsive to prompt surgical intervention, are internal injuries, particularly vascular tears. Such injuries tend to be exceptionally severe and present a serious problem in medical management. Aircraft accidents also appear to present a requirement for the development of new procedures, particularly for the care of serious cranial injury, extensive burns, and vascular tears.