

Injury Analysis of Fatalities in a Commercial Airline Crash

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Autopsy reports of 90 individuals killed in a commercial airline crash were analysed. The seating pattern of 64 victims was obtainable from the airline authorities. Most of the deaths had occurred in the passengers in rows 1-10, rows 17-20, the air-hostess occupying the forward seats, and the cockpit crew. Passengers near the rear door and in the vicinity of the emergency exits had escaped to safety. 32 persons sustained injury to the lower limbs, 20 sustained injury to the head, and 7 sustained thoracic injury. It is highly probable that atleast some these individuals have died of burns because of physical inability to escape quickly. In 11 cases death was considered to be due to multiple injuries. All others died due to burns.

Key words : Injury analysis, Commercial airline crash

On the 14th of the February 1990, Indian Airlines Airbus A-320 crashed while coming in to land at Bangalore airport. 90 people were killed in the crash. Survivors were treated at various hospitals in Bangalore including Command Hospital, Air Force. The autopsies were conducted at Victoria Hospital, Bowring Hospital and Jayanagar General Hospital. Copies of these autopsy reports were sent to IAM by the Court of Inquiry, and these reports have been studied with a view to analyse the pattern of injuries in the victims.

Material and Methods

The following documents were studied :-

- Post mortem reports of the 90 fatalities in the crash.
- Histopathological/toxicological report done in (only) one case (Initially assumed to be the body of the Captain of the aircraft)
- The seating pattern of the 64 Victims as identified by Airline authorities.

Findings

Post mortem reports were not as per DGCA (Air Safety Directorate) Circular 3 of 1984 but were on the proforma of the post mortem report as

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available in Karnataka. The post mortems were conducted by Medical Officers in the 3 civil hospitals.

The pattern of injuries among the 90 fatalities is seen in Table I.

Table-I Injury Pattern

No.	Injury	Body No.	Total No.
1.	Injury to leg/ankle	1, 2, 5, 6, 7, 8, 9, 11, 13, 18, 21, 31, 39, 49, 54, 65, 69, 70, 73, 75, 85, 88, 89, 90	24
2.	Injury to Knee/thigh	7, 8, 9, 13, 20, 40, 41, 63, 63, 67, 70, 76, 90	13
3.	Pelvic Injury	40, 41	2
4.	Injury to hand/forearm	3, 5, 6, 8, 9, 11, 20, 31, 39, 67, 70, 81, 86, 88, 89	15
5.	Injury to shoulder/arm elbows	6, 22, 23, 25, 28, 35, 39, 40, 63, 69, 71, 76, 88, 89	14
6.	Head injury	4, 16, 22, 23, 25, 29, 31, 34, 35, 40, 41, 57, 62, 63, 66, 70, 71, 76, 88, 89	20
7.	Injury thorax	23, 24, 33, 35, 40, 41, 88	7

The seating pattern of 64 victims as identified by the Airline authorities alongwith the injuries in these victims is shown in figure I.

82 cases showed extensive burns. In 8 cases (body nos 22, 35, 40, 41, 62, 88, 89) burns are not mentioned in the post mortem report. But since almost all these were seated in rows 2, 5 and 6 it is unlikely that there were no burn injuries. In 58 cases soot particles were present in the trachea indicating inhalation of smoke.

In 11 Cases (body nos 22, 23, 31, 34, 35, 40, 41, 62, 71, 88 and 89) the post mortem report mentions the cause of death as multiple injuries.

In the only case in which histopathological/

Fig-1.



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Sl. No. of body	Injury
8	BURNS
1	INJURY LEG, ANKLE
2	??- KNEE, THIGH
3	??- PELVIS
4	??- HAND, FOREARM
5	??- ARM, SHOULDER
6	??- HEAD
7	??- THORAX
8	??- ABDOMEN

- 6A - 6, 6
- 6A - 23, 5, 6, 7
- 9B - 6, 2, 5, 6
- 9B - 6, 2
- 10A - 6, 2
- 10A - 6, 1, 4, 6
- ? 6E/6 - 1, 4, 5, 6, 7

toxicological examination was done, there were extensive autolytic changes. Lung findings were consistent with traumatic etiology and there was grade I atherosclerosis with mild fatty liver. The skin did not show any reactive/inflammatory changes and carbon monoxide and alcohol were not detected.

Discussion

In this air crash, there was visual as well as photographic evidence that the fire started immediately after the crash. In the fatal cases, all bodies were charred although this was not specifically mentioned in the post mortem report in 8 cases. 58 victims had definitely survived the crash forces, but died subsequently due to burns as is evident from the presence of soot in the trachea. This figure could be higher because the absence of soot in trachea is not specifically mentioned in the other cases.

In all the 11 cases where death was considered to be due to multiple injuries, there was no mention of soot in the trachea. Most of these victims probably died instantaneously due to injury to vital organs (almost all these cases had severe head injury).

The Histopathological/toxicological examination was done in only one case. This victim was initially identified as the Captain of the aircraft because of his blue trousers. This identification was later found to be incorrect. In this unidentified victim there was no evidence of survival after the crash.

Among the four infants killed, 2 (bodies 23 and 31) had sustained multiple injuries to limbs, trunk and head indicating that they were thrown about and collided with several objects. Both these infants did not have soot in trachea suggesting that they died before the fire broke out. The other two infants (bodies 38 and 64) did not have injuries, and died due to burns with soot in the trachea. They were presumably held tightly during the crash.

The two children killed (body 41, aged 6 yrs and body 86, aged 9 yrs) had multiple injuries. They were probably thrown from their seats during the crash and suffered contact injuries.

From the injury pattern it is seen that 32 persons sustained injury to the lower limb, 20

sustained injury to the head and 7 sustained thoracic injury. It is highly probable that at least some of these have died of burns because of physical inability to escape quickly.

From the seating pattern it is evident that most of the deaths have occurred in passengers occupying the first 10 rows, in rows 17-20, the cockpit, crew and the airhostesses occupying the forward seats. This finding is consistent with the observation that those in the vicinity of the emergency exits and those near the door managed to escape to safety.

Body No 88 stated to be seated in seat 6E is most likely to have been seated in 6C because of the injury pattern similar to passengers in 62B, 52B and 5C. And also because another passenger (body No 59) was occupying seat 6E.

All passengers occupying the port side seats of rows 5 and 6 had sustained multiple injuries including head injuries. There is a possibility that the crash forces have caused damage to these rows of seats.

From the injury pattern it seems possible that the occupants of seats 8A (vertical laceration shoulder to head right side) and 8B (Vertical

laceration forehead to chin left side) had sustained injuries due to a hard object like a brief-case hitting the head/shoulder.

It seems extremely unlikely that body nos 15 and 48 were occupying the allotted seats 26A and 38D respectively. It is probable that they had shifted to some vacant seats further forward.

In this accident, the post mortem forms used did not give all the detail that are required for injury analysis. Histopathological and toxicological analysis in crew and passengers would have greatly increased the information gained from these post mortems.

References

1. Mason JK : Aviation Accident Pathology, Butterworths, London; 1962.
2. Stevens PJ : Fatal Civil Aircraft Accidents, John Wright and sons, Bristol; 1970.

Editors Note

Post mortem examination of all victims in a fatal aircraft accident is a legal requirement. In the victims of commercial airline disaster, the procedure to be followed is given in detail in the DGCA (Air Safety Directorate) Circular 3 of 84.