

Role of dentists in Disaster Victim Identification of Sita air crash, Nepal

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Abstract

Introduction: Sita Air Dornier 228, an early-morning flight from Tribhuvan International Airport Kathmandu to Lukla on Friday 28 September 2012 plunged into the banks of the Manohara River in Bhaktapur three minutes after takeoff, killing all 16 passengers and 3 crew members out of which seven were Britons, five were Chinese, one American and the rest, including the crew members, were Nepalese. All deceased were brought to Department of Forensic Medicine, Institute of Medicine for identification.

Methods: Autopsy was carried out systematically by Forensic Medicine experts and dental experts. Personal belongings, medical and dental findings were recorded. Ante-mortem data was collected from family members, relatives and respective embassies. Reconciliation was carried out comparing ante-mortem and post-mortem records.

Results: Of the human remains recovered, sixteen positive identifications were made by dental findings correlated with dental records and description given by family member. Two passengers were identified on medical grounds and the last one by exclusion.

Conclusion: This paper describes the crash victim identification of Sita Air Dornier 228. It highlights the importance of dental records and involvement of Forensic odontologist as a part of Disaster Victim Identification team. The authors were part of Disaster Victim Identification Team, Nepal for Sita Air Crash.

Key words: Sita Air, Disaster victim identification, Forensic odontology, Aircrash identification

Introduction

Mass disasters are a consequence of an unexpected event, usually instantly, resulting in a significant material damage, considerable movement of people and an enormous amount of fatal or grave victims^{1,2}. These are caused by natural events such as severe flooding, earthquake, or volcanic eruption, or they may be associated with human activity such as mass transport by land, sea, or air².

The teeth, being the hardest and most durable part of the human body, serve as one of the most reliable elements in the identification of the deceased¹⁻⁶, due to its unique feature of retrieval even in cases of completely burnt bodies. One similar mass disaster took place in Kathmandu on 28th of September, 2012, where all the bodies were completely

burnt. An early-morning flight, by Sita Air Dornier 228-202, registered as 9N-AHA with serial number 8123 scheduled from Tribhuvan International Airport, Kathmandu, Nepal to Tenzing-Hillary Airport, Lukla, Solukhumbu District, plunged into the banks of the Manohara River in Madhyapur, Bhaktapur District, Nepal three minutes after takeoff, killing all 16 passengers and 3 crew members out of which seven were Britons, five were Chinese, one American and the rest, including the crew, were Nepalese. All the bodies of the plane crash were brought to the Department of Forensic Medicine, Institute of Medicine (IOM), Tribhuvan University Teaching Hospital (TUTH), Kathmandu, Nepal for evaluation by Disaster Victim Identification (DVI) team.

Methodology

Post mortem was carried out in the autopsy room of Department of Forensic Medicine, IOM, TUTH by the team comprising of forensic medicine experts and two dental experts (authors of the article) carrying out Forensic odontology work.

As soon as all the bodies were received, each body was assigned a unique number. All the bodies were photographed first. Then the burnt remains of clothing stuck on the bodies were removed and details were recorded. Similarly the jewellerys were also removed and details were recorded. Once all the personal belongings were removed and recorded, autopsy was carried out in a systematic manner. Since all the deceased bodies were burnt and visual identification was not possible (Figure 1), utmost care was taken in recording each detail.



Figure 1. General condition of air crash victims

First of all, autopsy of the bodies was carried out by Forensic medicine experts. All the information derived from autopsy was recorded. Part of Femur was removed for DNA analysis if required in the future and were labelled accordingly. Dental experts then recorded dental findings in the pink DVI forms. All teeth present, missing ante-mortem or peri-mortem, restored, fractured were recorded as per the codes of DVI forms. Similarly crowns, dentures, diastemas, chronic teeth injuries were also recorded accordingly.

Once the autopsies were carried out and all the data recorded in the appropriate forms, the deceased bodies were packed and stored accordingly. In the mean time, family members, friends and respective embassies related to the deceased ones were handed ante-mortem DVI forms to be filled in with as much details as possible. Medical records and dental records of the deceased ones were procured in the mean time. All the related data were then entered in the ante-mortem yellow DVI forms.

Then the reconciliation was carried out. Based on

reconciliation, following results were obtained related to the identification of the deceased ones. Male and female were first identified based on genitals. Then personal belongings, medical records and dental records were matched. Body no. 1 was identified positively based on the findings of personal belongings like clothing and jewellerys, supported by dental information. Body no. 2 was identified based on dental data matching. The significant findings were porcelain fused to metal (PFM) crowns on 16, 26 and 36 and gold crown on 46 (Figure 2).



Figure 2. Gold crown on 46 of Body No. 2

Body no. 3 was positively identified to be air hostess based on her personal belongings and support of dental findings. Body no. 4 was positively identified based on the significant dental findings like missing 16, composite restoration on 21 and 35, and also presence of silver ring in the right middle finger. Body no. 5 was positively identified based on missing appendix matched with history of appendectomy. Body no. 6 was positively identified based on significant dental findings like missing 14, 24 and 34, and amalgam restorations on 15, 36, 37, 38, 46, 47 and 48. Body no. 7 was identified based on exclusion among males and support of dental information. Body no. 8 was identified based on significant dental findings like porcelain crown on 36 and composite restoration on 16 and 26. Body no. 9 was positively identified based on significant dental findings like composite restoration on 16 and 14, missing 26, 28, 36, 46 and 48. Body no. 10 was identified positively on significant dental findings like gold crown on 26, porcelain jacket crown on 36 and 46, and restorations on 16 15 25 27 and 45. Body no. 11 was identified positively after superimposing post-mortem dental photograph over smiling photograph of the deceased. Body no. 12 was identified based on ring of the finger and ear stud and support from dental information. Body no. 13 was identified positively based on presence of copper-T (Figure 3) in the uterus and dental information support.



Figure 3. Copper-T in uterus of Body No. 13

Body no. 14 was positively identified based on support from dental information. Body no. 15 was identified positively based on significant dental findings like porcelain jacket crown on 25, and amalgam restorations on 17,16,26,27,37,36,46,47 and 48. Body no. 16 was identified positively based on significant dental findings like restorations on 22, 36 and 46. Similarly, first premolars of all quadrants were missing which correlated with the extractions carried out during orthodontic treatment in the past. Body no. 17 was identified based on significant dental information and presence of pendant which correlated with the description provided in ante-mortem records. Body no. 18 (Fig 4) was identified positively based significant dental findings like gold restorations on 15,14,25,26,27,35,34,44,46 and gold crown on 16 and 36. And finally body no. 19 was identified positively based on significant dental findings like porcelain jacket crowns on 35 and 36.



Figure 4. Gold restorations in maxillary teeth of Body No. 18

Finally, all nineteen deceased were identified and bodies were handed over to their respective families. Out of nineteen bodies, sixteen positive identifications were made by dental finding correlated with dental records and description given by family members, two on medical grounds and the last one by exclusion.

Discussion

The diversity of dental characteristics is wide, making each dentition unique⁷. The teeth are more resistant abstracting the elements of all body tissues, these are important in the identification due to the fact that there are no teeth in the same feature which shows two individuals, clearly, the importance of this process for identification⁸.

For the first time dental comparison was utilized in Disaster Victim Identification in Nepal and it proved to be a breakthrough in establishing identity of the deceased in the disaster. Traditionally, dental comparison was not used during previous numerous air crash disasters of Nepal. Thus when dental comparison was used for the first time in DVI, it resulted in significant number of identifications of the deceased ones. In most of the cases, dental features were the only basis for identification. This situation was similar to that in Croatia, where dental comparison was introduced for the first time in airplane accident in 1976².

There were several factors that aided in complete identification of all the deceased ones. Since air plane crash is a closed disaster, the complete list of passengers, their personal details and medical and dental records helped in identification. Out of nineteen deceased, seven were Britons. Their antemortem dental records made available by the British embassy made it possible to identify all of them positively. Similarly, dental records made available for one American national of Chinese origin, helped in the positive identification. Poor dental records of Chinese and Nepalese rendered few problems in the identification. However, co-pilot was the first Nepalese to be identified in an air crash disaster of Nepal based on dental comparison.

There were mainly two types of problems encountered as classified by Brannon and Kessler⁹. These were handling remains, records, media, family members and administration, and lack of modern equipments under external problems. Similarly, stress and inexperience were internal problems. The major drawback from dental examination point in our scenario was unavailability of portable oral xray machine. The ante-mortem dental records received were of different styles and abbreviations used were also different. This posed a major problem during our identification process. This problem is also addressed by Ligthelm¹⁰ who explains the need of international standardization in record keeping styles.

There have been many instances worldwide where dental comparisons have helped in establishing identity. 74% of the victims in airline disaster in Malaysia in 1995¹¹, were identified on dental basis. Similarly, 66% of the deceased were identified based on dental comparison in Lyan-

Strasbourg airline disaster in 1992¹², and 89% of the victims were identified based on comparison of antemortem and postmortem dental radiographs in Dash 7 airline disaster in 1988 in Norway¹³.

The possibility of identification during a disaster depends on various factors like nature of disaster, injury sustained during disaster, number of dental treatment done along with available dental records. Sweet and Dizinno identified these factors as a function of nationality and country of residence of victims¹⁴.

Not only teeth but dentures and appliances used by the victims can be of utmost importance in identifying an individual. Among these labelled dentures can be useful in identification of an individual¹⁵. Unlabelled dentures can also be of use, when the recovered denture from the victim is fitted to casts retained by the treating dentist or laboratory, which is an accepted method of identification¹⁶. Similarly, removable orthodontic appliance can also be used in identification¹. However, in our investigations we did not come across any of these appliances.

Deoxyribo Nucleic Acid (DNA) can be helpful in assessing sex and establishing full identity of the victim provided that comparison of DNA specimen can be done with that of relatives¹⁷⁻¹⁹. Teeth can also be used in extracting DNA, when it becomes difficult to identify victims by classic forensic methods²⁰⁻²² as dental tissue is resistant to incineration, immersion, trauma, mutilation and decomposition thus representing an excellent reservoir of DNA materials²³. However, in our case, we need not use DNA comparison as all the victims were identified, most of them based on dental findings.

Conclusion: To summarize, this experience highlighted the importance of dental records and involvement of Forensic Odontologists in Disaster Victim Identification team of Nepal.

Conflict of interest: None declared

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