

---

# Role Of Forensic Experts In Post Tsunami Disaster

B Rai, S Anand, S Dhatarwal

---

## Citation

B Rai, S Anand, S Dhatarwal. *Role Of Forensic Experts In Post Tsunami Disaster*. The Internet Journal of Rescue and Disaster Medicine. 2008 Volume 8 Number 1.

## Abstract

The now much discussed tsunami of 26 dec. 2004, attributed to a massive undersea earthquake that occurred off the Coast of Banda Aceh in Sumatra, is reputed to have claimed the lives of over 200,000 in more than 10 countries. This occurred mostly within, or on the fringe of Indian Ocean although its effects extended as far as Somalia and parts of middle east. The systemic application of forensic pathology, DNA profiling, finger prints and forensic dentistry in human identification, is very critical especially in advanced purification. Forward planning, adequate funding, adequate knowledge of forensic science especially forensic dentistry and international co-operation are essential to mounting an effective response to any major mass disaster of future.

## INTRODUCTION

The Indian Ocean tsunami of 26 dec. 2004 created unprecedented challenges for forensic identification of dead bodies. An equally unprecedented collaboration of forensic scientists from more than 29 countries working together helped speed up the process. In Thailand, identification of victims has been carried out methodologically in a well organized manner where approximately 50% of victims were foreigners. In order to correctly identify some one who has died in a disaster such as the recent tsunami in Asia, officials need to complete a postmortem examination of human remains. This physical examination is conducted by a team of trained and experienced forensic specialists. In Sri Lanka, identification of dead was not a high priority in the acute phase. It was established subsequently and carried out with the support of foreign experts<sup>1</sup>.

The first responders departed for Phuket, Thailand, on 31 dec. 2004. They consisted of about 20 DVI trained police officers (including three officers from the forensic management branch of CID). The Health Science Authority contributed a forensic pathologist and a mortuary technician, who were subsequently joined by two DNA scientists and two forensic odontologists<sup>2</sup>. Relief team consists of forensic pathologist, a technician and a forensic death investigator, as well as four dentists in private practice<sup>2</sup>. Each team prepared its relevant staff, necessary equipment and supplies as well as guidelines to follow. Initially, the forensic team had to examine the bodies quickly as refrigerated container or

method to preserve the bodies was not available. Later, dry ice was used to cool bodies and refrigerated containers were procured. Bodies were stored in these containers until unidentified and released. The forensic teams guided by their protocols, recorded external appearances, personal belongings and specific marks on the deceased. Photographs were taken in almost every case, mostly using digital cameras. Volunteer dentists were deployed to the ground by the Thai Dentist Council to conduct dental examinations. DNA specimens were collected from all of the bodies in Sri Lanka, the total deaths were six fold higher than that of Thailand and the total amount to be above 30000<sup>1</sup>. This paper reviews the protocols of "identification of disaster victim" by forensic team and the importance of forensic odontologist in forensic team.

## LOCATION DISASTER

### THAILAND

The most extensive location of disaster such as Khao lak, Phi-phi island and Krabia in area of Khao lak, 1000 bodies were examined by DVI team and divided to mortuaries into four field in Khao lak and the following countries such as New Zealand, Singapore, French, Chinese and Australian helped. In Krabi, the Japanese, Korean and Israel worked uneventfully.

On beach of Thachatchi i.e. Phuket island, bodies were examined by German and Austrian DVI teams.

### IN SRI LANKA

The total deaths were six fold higher than that of Thailand and, 4250 were missing and 23,000 were injured and a total of 5,75,000 people were displaced

### IDENTIFICATION STEPS BY DVI TEAMS

It consisted of four main stage i.e.

- Body tagging and bagging
- Fingerprinting
- Forensic pathology
- Forensic dentistry

First, the bodies were refrigerated, both before and after the procedure.

1. Body tagging and bagging:– The labeling of each body with identifying number, followed by bagging.
2. Fingerprinting:– Fingerprinting was impossible because of highly decomposed bodies, which almost invariably showed extensive postmortem skin desquamation.
3. Forensic pathology:– Each body was examined by a four member team. Team consisted of forensic pathologist, forensic death investigator, mortuary technician and a photographer.

### STEPS IN IDENTIFICATION OF BODY

1. The bodies were transferred to the mortuary from the fingerprinting section.
2. The scribe received and signed the tracking form.
3. The pathologists and scribe confirmed the body number using the pink PM DVI form.
4. The body number was photographed.
5. The technician removed and rinsed or washed the clothes to display their respective brand, size, colour and designs. The attire was then photographed and recorded.
6. All jewellery and personal belongings were washed, photographed with body number, described and recorded. They were then placed in a

sealed bag which, in turn, was placed within body bag.

7. An external examination of the body was carried out, the sex, height, estimated age, tattoos, scars, physical abnormalities and other characteristics were recorded.
8. A midline abdominal incision was made to check for the presence or absence of gallbladder, appendix, female internal genitalia, and for evidence of any other previous operations.
9. Other incisions were made where necessary.
10. Evidence of any other identifiable disease was sought and recorded.
11. The technician removed the mandible to facilitate subsequent forensic dental examination.
12. The body was finally dental examination.

### FORENSIC ODONTOLOGY

The report of the Noronic disaster gives a clear account of the amount of information, that could be derived from dental and oral findings. In fire described by Storm and Tovernd, six of twenty eight victims were identified solely by dental records, another ten could have been identified only if there had been personal belongings available which revealed the identity of the casualties, The results published by Nordtomme and Storm showed how important identification by means of dental evidence can be, when no other method is applicable.

DVI team of paired odontologists, supervised by a senior odontologist, worked in these sections, For dental examination, facial dissection was performed. The skin and under-lying tissue were then reflected upward over the face to expose the maxilla and mandible. The photographs were taken and labeled. The dental investigator then proceeded to produce the postmortem dental record. The dentist carried out the dental examination and called out the finding for every tooth. The dentist scribe charted them in the pink DVI form using the Interpol dental charting system. A profiling gained prominence in human identification following mass disasters in the last decade<sup>8910</sup>.

The Interpol dental charting system applied as the World Dental Federation tooth numbering system. During examination of teeth that might have received root canal

treatment were identified for radiographic investigation.

The untreated tooth preferably the molar provide a source of genomic DNA for profiling, but if teeth were not available then a segment of femur shaft bone would be removed instead by pathologists or anthropologists. One dentist would x-ray the dental remains while other labeled each X-ray film. Two bite-wing radiographs, one for each side of jaws and some additional radiographs were taken. Any information revealed by radiographs would be recorded in the pink DVI form.

The many combination of missing teeth, caries, filling and prostheses involving these 160 surfaces greatly decreases the likelihood of any two adults having identical mouths. It has been shown that even identical twin do not have identical dentition. Dental structures are hardest and most resilient tissues of the body. No matter the manner of death, dentition can survive most postmortem events that can disrupt or changes other body tissue<sub>11</sub>. Infection control and welfare of attending workers were also duly concerned and attended into the process. Postmortem data were recorded on Interpol forms and matched with antemortem data.

### DISCUSSION

The Singapore Disaster Victim Identification (DVI) team quickly became part of the coordinated Disaster Victim Identification effort, which eventually involved forensic teams from more than 30 countries. Each body was number – tagged and photographed. Fingerprints, as available, were lifted and recorded. Forensic pathologists then examined the bodies for distinguishing characteristics such as birthmarks, tattoos and scars, or for personal effects that could assist in identification. The dentition was then photographed, documented, and x-ray by forensic dentists, from each body of two intact molar teeth (if available) and samples obtained from the femur, were removed for DNA profiling.

The scale of the Tsunami-included disaster also suggests that it is important to re-visit the estimates of fatalities incurred by any mass-disaster, where the number of deceased victims may be overwhelming and may exceed that of severely injured casualties. The Health Science's Authority's center for forensic medicine is the nation's sole provider of forensic pathology services. Its mortuary can probably deal with up to 200 deceased victims, without seriously compromising its efficiency. When greater numbers have to be processed, well equipped and fully functional field mortuaries might have to be set up. Potential infrastructure in secure locations, away from public view

and the international news media, has to be identified. These field mortuaries must have adequate ventilation and lighting, and reliable and safe supplies of water and electricity, as well as drainage<sub>11</sub>

### CONCLUSION

The systematic application of forensic pathology, forensic dentistry, DNA profiling and fingerprinting to human identification, especially of the bodies of various nationalities that were in advanced states of putrefaction, was crucial to the entire DVI process.

DVI is both a labour and capital – intensive venture. It requires adequate funding, adequate experience and knowledge of forensic science specially forensic odontology, which should be ringfenced, for all its essential aspects and components. In India, no forensic odontology courses available. So Indian governments should start the forensic dentistry at undergraduate level for B.D.S students.

### CORRESPONDENCE TO

Balwant Rai S.Sct. S/o Sh. Ram Swaroop Village Bhangu, District Sirsa, Post Office Sahuwala First Haryana (INDIA)  
Mobile 0091-9812185855 E-mail :  
drbalwantraissct@rediffmail.com

### References

1. Ministry of health care, nutrition and Vva well assa development: Disaster victim identification. Weekly epidemiological report: 2005 (32) : 1.
2. Lau G et al. Post. Tsunami disaster victim identification. Annls Academy of medicine 2005; (34) 5 : 341–51.
3. Grant EA, Prendergast WK, while EA. Dental identification in the 'Noronic' disaster J Canad Dent Ass 1952; 18: 3–18.
4. Strom F. Odentologiens betydning Ved identi fi kasjon av dodsofre. Norske Tannlaegeforen. Tid. 1946; 56: 153–67.
5. Nordtomme H. Storm F. Exhumation et identification des corps de 183 personnes executees par les allemands (pressnote).
6. Reider Sognaes. Computer comparison of radiographic bite mark patterns in identical twins. J Am Dent Assoc. 1982; 105: 499.
7. Leclair B, Fregqau CJ, Brown KL, Fourney RM. Enhanced kingship analysis and STR based DNA typing for human identification in mass fatality incidents: The swissair flight disaster. J forensic Sci 2004; 49: 1–15.
8. Clayton TM, Whitaker JP, Maguire CN. Identification of bodies from the scene of mass disaster using DNA amplification of short tandem repeat loci. Forensic Sci Int 1995; 76: 17–25.
9. Bud Imlija ZM. World trade centre human identification project; experience with individual body identification cases. Croatia Med J 2003; 44: 259–63
10. Hsu CM, Huang NE, Tsai LC, Kao CH, linacre A, lee JC identification of victims of the 1998 Taoyuan Airbus crash

accident using DNA analysis Int J Legal Med. 1999; 113: 43–6.

11. Sweet D, Dizinno JA. Personal identification through dental evidence –tooth frangements to DNA. J Calif Dent

Assoc. 1996; 24: 35–42.

12. Saukko P, knight B. Mass disasters– the role of the pathologist in : Knight’s forensic pathology. 3rd ed. London : Arnold, 2004 : 41–5.

**Author Information**

**Balwant Rai, B.D.S.**

Resident, Govt. Dental College, PGIMS

**S.C. Anand, Prof. (Brig.)**

Principal, Govt. Dental College, PGIMS

**S.K. Dhatarwal**

Associate Professor, Dept. of Forensic Medicine, PGIMS