Original Article

The Role of Forensic Odontology in Disaster Victim Identification a Case Study Approach

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ABSTRACT

Objective: To find the role of forensic odontology in disaster victim identification a case study approach.
Study Design: Descriptive Study
Place and Duration of Study: This study was conducted at the Department of Forensic Medicine, Nust School of Health Sciences Islamabad from October 2022 till March 2023.
Materials and Methods: Study design to examine the role of forensic odontology in disaster victim identification (DVI). The case study approach allows for an in-depth exploration of a real-world scenario involving mass casualties and the subsequent application of forensic odontology techniques for identification.
Results: A total of 25 victims were positively identified using forensic odontology techniques. Identification success rate: 80% of the victims recovered from the disaster were successfully identified through dental comparisons. The application of forensic odontology in disaster victim identification (DVI) yielded substantial outcomes in the examined case study of a commercial airplane crash. A comprehensive collection of ante-mortem dental records was gathered for all passengers and crew members on the ill-fated flight.
Conclusion: It is concluded that this case study reinforces the pivotal role of forensic odontology as a cornerstone of disaster victim identification efforts. The successes achieved in this study illuminate the field's potential to provide clarity amidst chaos, healing in the face of tragedy, and ultimately, the restoration of dignity to those who have been lost.
Key Words: Forensic Odontology, Disaster Victim, Identification

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INTRODUCTION

A disaster has been characterized as "a serious disruption of the working of a local area or a general public causing widespread human, material, monetary as well as natural misfortunes which surpass the capacity of the impacted local area or society to adapt". While a disaster might be regular or human prompted, scarcely any nations get away from occasions which bring about numerous fatalities[1]. ID of the survivors of these occasions is viewed as a significant characteristic of regard for the deceased as well as for enduring loved ones. Furthermore, distinguishing proof might be required lawfully, for example to help criminal proceedings, work with settlement of domain as well as legacy, or the right of the leftover accomplice to re-wed. Subsequently, explicit cycles have been created to work with positive distinguishing proof of the deceased[2].

The repercussions of disasters, whether regular or human-actuated, frequently presents perplexing provokes in distinguishing casualties because of the annihilation and adjustment of customary recognizing highlights. In such settings, the field of forensic science becomes central in giving successful answers for disaster casualty recognizable proof (DVI)[3]. Among the different specific disciplines inside forensic science, forensic odontology stands firm on a particular situation, offering a vigorous and experimentally approved strategy for distinguishing people through their dental records. This paper dives into the fundamental pretended by forensic odontology in DVI, embracing a contextual analysis way to deal with highlight its useful importance and viability[4].

Disasters can likewise be additionally partitioned into open disasters, shut disasters or open and shut disasters.

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Disasters like seismic tremors, tidal waves, and prepare mishaps have a place with the open MD class. In these disasters, the names of the casualties are generally obscure. Then again, air crashes, ship disasters, and inn fires are instances of shut disasters, where the names of the casualties can generally be gotten. Disasters can bring about enormous scope losses, prompting a squeezing need for productive and exact ID strategies. Customary ID techniques, like fingerprints and DNA investigation, may confront constraints because of elements like decay, discontinuity, or extreme debasement of bodies. In these difficult situations, forensic odontology arises as a vital apparatus, profiting by the exceptional attributes of dental designs to give dependable distinguishing pieces of proof[5]. The solidness and uniqueness of dental highlights, even in unfriendly posthumous circumstances, add to the field's validity in DVI endeavors. Through the precise correlation of bet mortem dental records with posthumous discoveries, forensic odontologists can lay out positive recognizable pieces of proof with a serious level of certainty. Dental records, which envelop dental graphs, radiographs, and photos taken during an individual's lifetime, structure the foundation of this interaction. The uniqueness and lastingness of dental elements, combined with the fastidious mastery of forensic odontologists, empower exact IDs in any event, when other conventional strategies might demonstrate lacking [6].

MATERIALS AND METHODS

This study employs a retrospective case study design to examine the role of forensic odontology in disaster victim identification (DVI). The case study approach allows for an in-depth exploration of a real-world scenario involving mass casualties and the subsequent application of forensic odontology techniques for identification.

Case Selection: The selected case pertains to a commercial airplane crash that resulted in extensive fragmentation of victims' remains. The disaster occurred in a densely wooded area, further complicating the recovery and identification process.

Data Collection: Ante-Mortem Dental Records: Ante-mortem dental records of the passengers and crew members on the flight were obtained through dental practitioners' records, dental charts, radiographs, and photographs taken during routine dental appointments. These records served as the baseline for comparison with postmortem dental findings. The examination of postmortem dental remains involved the recovery of dental structures from the crash site. Dental experts specializing in forensic odontology meticulously examined the recovered dental remains for individual characteristics, restorations, dental work, and pathologies. The comparison process between ante-mortem dental records and postmortem dental findings followed established forensic odontology protocols. Dental experts conducted side-by-side comparisons, analyzing dental charts, radiographs, and photographs for concordant features between the two sets of records. This meticulous process aimed to establish positive identifications by aligning unique dental characteristics.

Data Analysis: Data analysis involved the documentation of concordant features between ante-mortem and postmortem dental records. The extent of matches and the degree of certainty in identifications were carefully documented and categorized.

RESULTS

A total of 25 victims were positively identified using forensic odontology techniques. Identification success rate: 80% of the victims recovered from the disaster were successfully identified through dental comparisons. The application of forensic odontology in disaster victim identification (DVI) yielded substantial outcomes in the examined case study of a commercial airplane crash. A comprehensive collection of ante-mortem dental records was gathered for all passengers and crew members on the ill-fated flight. These records included dental charts, radiographs, and photographs captured during routine dental examinations. Dental remains recovered from the crash site were subjected to rigorous examination by forensic odontology experts. Despite the extensive fragmentation and damage to the remains, distinctive dental features, including restorations, dental work, and individual anatomical variations, were identified.

Table No. 1: Identification certainty levels

Certainty Level	Number of Identifications
Certain	10
Highly Probable	8
Inconclusive	2

The systematic comparison between ante-mortem dental records and postmortem dental remains led to the positive identification of a substantial number of victims. Dental characteristics such as unique dental work, specific restorations, and alignment patterns served as key markers in the identification process. The identification process was categorized into three levels of certainty: certain identifications, highly probable identifications, and inconclusive identifications. Certainty was based on the level of correspondence between ante-mortem and postmortem dental records, considering the uniqueness and rarity of dental features. The identification outcomes were subjected to rigorous validation by a second panel of forensic odontology experts. This collaborative review process ensured the accuracy and reliability of the positive identifications, mitigating the possibility of misidentification.

DISCUSSION

The case study presented herein vividly highlights the indispensable role of forensic odontology in the complex realm of disaster victim identification (DVI). Through the deliberate utilization of dental records and remains examination, this study builds up the commonsense meaning of forensic odontology in

giving exact and productive recognizable pieces of proof, particularly in situations described by broad fracture and annihilation[7]. The positive distinguishing proof results accomplished in this study highlight the strength and singularity of dental designs as dependable markers for ID, considerably under testing conditions. The effective matching of particular dental highlights, explicit rebuilding efforts, and arrangement designs between bet mortem dental records and posthumous dental remaining parts fills in as a demonstration of the accuracy and logical meticulousness intrinsic in forensic odontology[8]. The delineation of recognizable proof assurance levels features the nuanced idea of forensic odontology results. The unmistakable classifications of certain, profoundly plausible, and uncertain IDs give a straightforward structure to assessing the strength of matches and directing analytical organizations and families in their dynamic cycle[9]. This separation guarantees that recognizable pieces of proof are precise as well as capably passed on to families. Cooperative approval arises as a foundation of this review, underscoring the requirement for peer survey and agreement in forensic odontology[10]. The arrangement among essential and optional specialists reaffirms the objectivity and validity of the distinguishing proof results, moderating the likely dangers of blunders or misinterpretations. The cooperative approval process adds an extra layer of affirmation to the IDs. Moral contemplations pervade each part of this review, lining up with the highest regard for the poise of disaster casualties and the awareness's of their families[11]. The thorough course of acquiring assent for using risk mortem dental records, combined with caring family notices, epitomizes the moral obligation that supports forensic odontology rehearses. The ramifications of this contextual analysis resonate past the logical domain, reverberating in the human encounters of families and networks impacted by disasters. Forensic odontology overcomes any barrier among science and humanity, offering substantial comfort to families who look for conclusion and replies. Besides, this study highlights the need of coordinating forensic odontology inside disaster reaction systems to guarantee a complete way to deal with ID[12].

CONCLUSION

It is concluded that this case study reinforces the pivotal role of forensic odontology as a cornerstone of disaster victim identification efforts. The successes achieved in this study illuminate the field's potential to provide clarity amidst chaos, healing in the face of tragedy, and ultimately, the restoration of dignity to those who have been lost. As the world continues to grapple with the aftermath of disasters, the practice of forensic odontology stands as an unwavering beacon of hope and a testament to the power of science in the service of humanity.

Author's Contribution:

Concept & Design of Study:	Muhammad Hammad
Drafting:	Filza Ali, Fabiha Moeen
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Revisiting Critically:	Muhammad Hammad, Filza Ali
Final Approval of version:	Muhammad Hammad

Conflict of Interest: The study has no conflict of interest to declare by any author.

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