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ORIGINAL ARTICLE

Use of Endodontic Imaging Modalities in Forensic Identifications

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ABSTRACT

Background: Forensic odontology has a advance role in identifying a deceased person using dental records. Because of the growing trend of litigation around the world, precise recording of clinical dental operations has become increasingly necessary.
Objective: To see the endodontic obturation radiographs have a hidden function in identification.
Study Design: Cross-sectional study.
Place and Duration of Study: Dental OPD, Central Park, Lahore and Private Clinics of Lahore from 1st March 2022 to 31st August 2022.
Methods: From the digital X-ray system's data bank, 30 periapical radiographs of patients who had endodontic treatment of the mandibular left (first molars with three canals) were randomly selected. The ante-mortem data "Set 1" consisted of post-operative radiographs. From the thirty radiographs, ten were reprinted, labelled (A-J), and deemed post-mortem data "Set 2."This "Set 2" post-mortem group of 10 radiographs would be compared to the "Set 1" ante-mortem group of 30 radiographs. Ten dentally educated persons would examine these two sets of radiographs. Each examiner was given thirty radiographs from "Set 1" and ten radiographs from "Set 2," with the task of matching the individual post-mortem radiographs ("Set 2") with the ante-mortem radiographs ("Set 1").
Results: Thirty four examiners had a 100% success rate, 4 examiners had a 97.5% success rate (1 mismatch), and 2 examiners had a 95% success rate (2 mismatches).
Conclusion: On the off chance that after death radiographs are precise duplicates of endodontic obturated radiographs, the obturation's novel shape can be taken advantage of for forensic ID.
Keywords: Forensic odontology, Endodontic obturated radiographs

INTRODUCTION

Forensic dentistry is the reviewing, evaluating, handling, assessment and presentation of dental prof fully intent on giving logical and objective information in judicial proceedings. It is critical for the interpretation of bite marks, personal identification, and establishing a person's individuality, particularly in mass disasters.[1]

Despite the fact that DNA matching is a progressive and exact technique for the identity of humans but still establishing the individual's teeth is as yet the most common and practical strategy for recognizable proof. Forensic expert will initially access the dental data and then matching them prior to investigating different records.(Forrest). Dental radiographs specially digital one is turning out to be exceptionally well known and this allows to store images in a computer ultimately allowing to authors to form database that might be very significant later on just like dactylography.[2]

Ancient history contains evidence of the usage of dental profiling for identification. The contract killing of Lollia Paulina by Agrippina, the mother of the Roman Emperor Nero at the time, is one such occurrence from the first century BC. She had ordered Paulina's head to be delivered to her in order to complete the contract. The dental traits of Paulina's teeth, which included dental abnormalities and unusual alignments, were used to prove her identity.[3]

In our countries, we've seen high-profile situations where the remains of former Pakistan President Gen. Zia-ul-Haq, former Indian Prime Minister Mr. Sanjay Gandhi, and societal celebrities like Junaid Jamshed were only identified by dental records.[4] The radiographs that are taken during and after endodontic treatment are one such source of identification. They give a large number of features for identification since endodontic treatment changes are less common than coronal restoration changes.[5] Maintaining correct dental records of dental surgeries has become more crucial as the trend of dental records being accepted in court of law has grown. The value of endodontic records for human identity, as well as root canal morphology, sophisticated imaging, and newly developed biomaterials in endodontic practice, has been recognized by a number of researchers.[5,6]

The comparison of classic dental traits and past dental procedures to those of a post-mortem dentition is one of the unique tasks performed for identification, and it is regarded critical for both humanitarian and legal reasons.[6]

As a result, dental profiling in national identity program can improve the accessibility of ante-mortem records in conjunction with post-mortem records, and endodontic imaging and biomaterials can play an important part in these records.

MATERIALS AND METHODS

This was a cross-sectional study conducted in Hospital and clinical based setup by maintaining ethical standard and patient's confidentiality. Thirty periapical radiographs of patients undergoing single-rooted canal endodontic treatment were chosen at random from the different patient came for the treatment purpose in a private setup with their consent. The post-treatment dental image was again printed, and the focused crown part was clipped out and labelled (1–30) as ant-mortem data "Set 1. From the thirty dental images, ten were reprinted, labelled (1-10), and used as post-mortem data "Set 2." This post-mortem set of dental image, named "Set 2," would be matched to "Set 1's" thirty images. A total of 40 dentally educated professionals reviewed both sets of radiographs. "Set 1" consists of thirty radiographs, whereas "Set 2" consists of ten post mortem radiographs and ante-mortem radiographs. Three from the dental specialty (maxilla-facial) surgeons, one periodontist, two from the specialty (orthodontists, endodontists), three (prosthodontists), 13 were chosen general dental practitioners, nine were assistants (dental), and 4 dental lab technicians were selected as the examiners. Their radiographic image matching success rates were recorded. The mean and standard deviations of the examiners' scores were calculated using descriptive statistical analysis using SPSS version 21.

RESULTS

Thirty four examiners were successful 100%, 4 examiners were successful 97.5% (1 conflict), and 2 examiners were successful 95% (2 inconsistency). Two specialists (one maxillo-facial surgeon and one endodontist) and two dental assistant staff were among the four examiners who had a 97.5% success rate (1 conflict) (one

dental assistant and one laboratory technician). Both of the examiners who had 95% success rate (2 inconsistencies) were specialists (maxillo-facial surgeon and endodontist. The member's average score was 9.78±0.53. The least conceivable score was 8, and the most noteworthy conceivable score was 10. The most well-known score was ten as per the examiners point of view, general dentists had the most noteworthy pace of full recognizable proof (100%) trailed by Auxiliary staff (84.6%). The most minimal score was given to trained professionals (71.4%). While contrasting the mean score of Specialists with that of general dentists and other auxiliary staff, statistical analysis uncovered a massive distinction (P = 0.038) [Tables 1-2).

Table 1: Recognizable proof fruitful rate among members

Category	Percentage
Dental Specialist	71.4
Dentist (General)	100.0
Staff (Auxiliary)	84.6

Table 2: Comparison of scores between professions

Profession	No.	Mean±SD	95% confidence interval for mean		P value
			Upper	Lower	
Specialist	14	9.6±0.76	9.06	9.94	0.038
General Dentist	13		10	10	
Auxiliary Staff	13	9.85±0.37	9	10	
Total	40	9.78±0.53	9.61	9.94	

DISCUSSION

When post-mortem change develops or a fingerprint database is not available, dental identification plays a crucial role in identifying remains. At the point when a departed individual is burned, or mutilated, the ID of dental remaining parts is basic. Indeed, even an individual's dental state changes with time, and the blend of rotting, missing, and filled teeth might be estimated and looked at any one second. In instances of mass disasters, where there are enormous quantities of losses, dental correlation is the most well-known strategy for separating evidence of setbacks. Forensic dentistry assumes a key part in recognizing individuals who can't be distinguished utilizing regular means. The acknowledgment of typical concordant features by connection of ante mortem and postmortem dental records with no sad contrasts displayed between the two plans of records is the groundwork of scientific dental recognizing proof. Although this is definitely not a recognized widespread norm, Keiser-Nielsen doled out 12 concordant qualities across bet mortem and posthumous dental records to exhibit positive ID. A phenomenal element occurring in over 10% of cases, as per Keiser-Nielsen, could be respected a special component to make a positive distinguishing proof.[7]

In this review, 34 of the 40 dentally qualified inspectors had the option to accurately match the 10 radiographic pictures of obturated single-established channels from "Set 1" and "Set 2" of a similar tooth with a 100% achievement rate. This outcome affirmed that endodontically treated teeth are helpful ID tool.[8] Many different examinations have underlined the significance of radiography in human recognizable proof, like looking at trabecular bone examples, frontal sinus morphology, and maxilla bones.[9,10] For distinguishing reasons, it is recommended that an endodontically treated tooth be utilized as a relative bet and post-mortem milestone.

According to the observers' categorization, general dentists had the most elevated pace of full distinguishing proof (100%) trailed by auxiliary staff (84.6%). The most minimal score was given to subject matter experts (71.4%). Furthermore, among all members, the experts got the most minimal mean score. This shows that looking at the wide example of the obturated channel and encompassing bone in risk and after death radiographs might depend more on broad layouts than the presence of specific subtleties, which Specialists might be drawn.[11]

During measurable examination of radiographic pictures, it is common practice to assess the likenesses of the elements that are available in the two pictures.[12] Some analysts' inability to match the radiographs could be expected to contrasting situating of the X-ray machine's tube when the ante and post-mortem X-ray were taken, bringing about an adjustment of the direction of the photos.[13-17] More examination is required. The discoveries showed that the state of an obturated single root channel can be obviously recognized by correlation.

CONCLUSION

Sufficient information on root and root channel varieties is fundamental for forensic personal identification. The radiography pictures of single-rooted teeth's obturated canals in this investigation revealed extremely specific markers that could serve as a potential identifying aid. The discriminatory potential of the root canal (single-rooted tooth's) unmistakable morphology could be applied in Forensic Dentistry for proof-based direction.

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