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Cross-Sectional Comparative Study of Teledentistry and Forensic Odontology

Nicolas Giraudeau*

Department of Forensic Science, University of Montpellier, Montpellier, France

Abstract

Introduction: The study of teeth and jaws is the focus of forensic dentistry, a subfield of forensic science. New comparative identification tools are being developed to make the work of experts easier. Digital methods like the intra-oral camera are also revolutionizing the way forensic dentistry works today.

Objective: The aim of this study is to assess the diagnostic accuracy of a post-mortem odontogram that was taken remotely using an intra-oral camera to capture a video of the oral cavity. The post-mortem odontogram that is obtained through the standard identification method during the clinical examination is the gold standard.

Materials and Method: Data were gathered at the University Hospital of Montpellier's Forensic Medicine and Thanatology Department from 25 deceased patients. There were three stages to the protocol: the gold-standard consultation, the Soprocare® camera-enabled video recording, and the remote image analysis. Two distinct dental surgeons were responsible for completing a clinical file that would be used to establish the odontogram of the deceased patient. They carried out the gold standard consultation as well as the remote analysis.

Results: Between May 13 and June 12, 2019, the study was conducted on 25 deceased subjects. There were 68% men and 32% women in our sample. The odontogram performed with a sensitivity threshold of 0.97, meaning that 97% of the teeth actually present in the mouth of all study participants could be identified from intraoral camera videos. With a PPV of 97.9 percent and a NPV of 98.2 percent, the intra-oral camera examination demonstrated excellent diagnostic performance in the detection of missing teeth. The intra-oral camera recording skills of the practitioner improved.

Conclusion: The Soprocare® intraoral camera has acceptable diagnostic validity in establishing the odontogram of the deceased. This digital tool's ease of use gradually improved with the number of subjects in the study. It makes it possible to identify fundamental elements effectively. However, there are still a few things that need to be improved to make using the camera for data collection as simple and effective as possible.

Keywords: Forensic dentistry •Teledentistry •Odontogram • Identification • Telemedicine

Introduction

Teledentistry is a type of information and communication technology-based remote medical practice in France. It brings together one or more healthcare professionals, such as a physician and, when necessary, other professionals who are providing the patient with care. Teledentistry has the potential to make it easier to get care, especially in areas with low resources. Through coordinated care that is as close to the patient's home as possible, it makes it possible to improve efficiency and organization. Teledentistry has been praised by a number of authors in the literature. Teledentistry has been used by the Montpellier team for more than six years, particularly to organize care for elderly patients and people with disabilities. Thanks to new technologies and the digital age, this field has changed a lot in recent years. To work with crafted by specialists, new assessment apparatuses are currently arising, and specifically, intra-oral cameras [1].

***Address for Correspondence:** Nicolas Giraudeau, Department of Forensic Science, University of Montpellier, Montpellier, France, E-mail: giraudeau@gmail.com*

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Teledentistry in forensic dentistry has been the subject of very few studies. As a member of the forensic team, the forensic dentist is tasked with identifying corpses and examining bite marks on living and deceased individuals, for instance. In particular, in France, their contribution to the identification is based on the creation of an odontogram, which is then distributed to the national network of odontologists for the purpose of locating patients with compatible odontograms. However, there are insufficient forensic dentists in all of France, which can delay an individual's identification [2].

Literature Review

The issue becomes even more pressing during massive disasters, which necessitate the simultaneous deployment of numerous experts to identify victims. Telemedicine's establishment of a post-mortem odontogram is novel because it has never been utilized in forensic odontology. As a result, post-mortem data could be collected in previously inaccessible locations by someone other than the forensic odontology expert. However, oral telemedicine cannot guarantee the accuracy of identification in this setting. In the consultation center, the teledentistry odontogram's sensitivity was 100% accurate on 99.9% of patients. The location of the forensic examination, the condition of the deceased, and the period of time between the death and data collection distinguish it from the clinical examination, which may affect the teledentistry odontogram's accuracy. A collection of dental observations is called an odontogram. Therefore, the quality of each of these observations determines the quality of an odontogram produced by teledentistry. The purpose of this study is to assess the diagnostic validity of the components that make up the post-mortem odontogram. This is done by using images from

an intra-oral camera taken from subjects whose bodies were autopsied for medical or legal reasons [3,4].

The requirement for odontogram identification was not a factor in selection. Therefore, this identification context did not apply to the majority of the individuals included. The passage of the intra-oral camera or the establishment of the odontogram using the images may be more challenging in an identification context, particularly in a traumatic setting. Because all tests were blind, classification bias was avoided. With large confidence intervals, we can point to a lack of statistical power. The small sample size is to blame for this. This study was a test to see if it was possible to do so. This was affirmed by the primary outcomes [5].

The significant contrasts between the two procedures were on carious injuries and teeth treated with composite gum. These differences are in contrast to a previous study that used the same instrument and team and found that 594 teeth had sensitivity of 86.7 percent. The absence of fluorescence in the forensic department's study accounts for the distinction between the two studies. The sensitivity of composites is no different. Fluorescence makes it simpler to objectively observe the presence of composite resin on a dental surface. The teledentist's absence of involvement rehearsing of perished patients could likewise make sense of the low responsiveness of holes and composite pitches. He typically conducted teleconsultations with inmates, disabled individuals, and elderly patients. The differences between the two methods should be considered in the context of the possibility that two practitioners who are physically present might also have a different interpretation, particularly regarding the presence of tooth enamel demineralization, also known as early tooth decay, or a composite [6].

In addition, a cavity is not the most interesting part of identification because a comparison with the deceased person's previous dental plan—which was carried out by the deceased person's dentist—may not reveal the cavity. In fact, the cavity could have developed between the individual's last visit to the dentist and their death. Teledentistry is less accurate with cavities and composite resins. To increase the accuracy, this study needs to be the first of many. The concordance between two odontograms is also evaluated in the context of odontogram identification. The weight of differences varies. For instance, when there are a lot of missing teeth, it can be hard to tell which teeth are still there. Because of this, the doctor won't give much thought to an error in identifying just one tooth. We can make the assumption that the identification of individuals will not be significantly altered given our data, which demonstrate that these errors are uncommon. However, an ad hoc study is needed to confirm this [7].

Discussion

The intra-oral camera learning curve is similar to that of any new practice. A learning curve that is comparable to that analyzed in the previous comparative study is depicted. The recording time is considerably more limited in this concentrate in the criminological medication office (4 min (normal time) for keep 4 areas in the legal medication division contrasted with 11 min in the similar review with 200 living patients). The deceased's "cooperation" is most definitely to blame for this difference. It is essential to note that a young dentist inserted the camera. He was used to examining mouths, so he had more clues than an autopsy room attendant who was not used to examining mouths. However, he had never used this camera before this study [8].

The number of odontological identification specialists in all forensic medicine units in France and around the world is very low. Even though there are some limitations that need to be addressed, this study demonstrates that teledentistry identification may offer intriguing possibilities for future applications. Teledentistry should be considered for use in all forensic medicine units in France and elsewhere, but this essential component of the innovative procedure is not the only factor. Without a doubt, contemplating carrying out this sort of framework inside a unit is significant. This has been the subject of research in the past, but not in the context of a forensic unit. A forensic medicine unit's ability to incorporate teledentistry into its structure would be extremely intriguing to examine [9].

A forensic medicine unit without a dental surgeon might be able to use this novel method to speed up the identification process and, most importantly, the time bodies spend in storage there. The dentist would be able to analyze the data on the server from his or her usual place of practice, in between two appointments, or when a patient in his or her practice has not honored his or her appointment, eliminating the need for the dentist to travel at the expense of his or her usual activity. To ensure that the odontogram produced during a teledentistry consultation is comparable to that produced during a face-to-face consultation, it is essential to work on increasing the precision of the method. The goal of this study is to determine the current restrictions and open the door to using teledentistry in forensic dentistry [10].

Conclusion

When compared to the clinical examination, the teledentistry examination of the deceased patient's jaws produced encouraging results. Because it eliminates the requirement for the forensic odontology expert to be present at the autopsy site, this study suggests that teledentistry could be utilized as a novel, non-invasive identification method in mass disasters. As a result, it would save time in the process of recording post-mortem data. In addition, it ensures the integrity of the deceased by providing improved working conditions and an accurate post-mortem odontogram. However, in order to make using the intra-oral camera as simple and effective as possible, there are still a few aspects that need to be improved, particularly accuracy. These include transferring data and information pertaining to the deceased and training competent personnel in intra-oral imaging. It is necessary to carry out additional research in order to find the best device that will enable a consultation that is comparable to a face-to-face examination and improve accuracy. A particularly interesting area of research would be evaluating the implementation of this kind of teledentistry program for dental identification in a forensic medicine unit.

Acknowledgement

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Conflict of Interest

None.

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