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RESEARCH ARTICLE

IMPLANT BACKTRACKING- A VALUABLE TOOL IN FORENSIC IDENTIFICATION – AN ADVANCED RADIOLOGICAL STUDY

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ABSTRACT

Introduction: Scientific Advancements come as a boon to mankind. Mishaps bring doom. In mass disasters such as aircraft crashes or bomb blasts where there is gross mutilation of bodies, there has always been a search for the ideal clue which can help in individual identification. There is a demand that the remains be high temperature resistant and can directly point out to the individual without too much hassles. This retrospective study investigates one such valuable evidence- Implants

Aim: To retrospectively correlate Radiographic images of implants with their shapes and designs in catalogues, and Identify Implant Brand with which Person identification can be deciphered from the implant database

Method: 40 implant images will be correlated on basis of implant shapes, size and designs with the implant catalogue/ Library tool, and the implant brand will be recognized.

Result: Out of 40 implant images assessed, a positive correlation was seen in 33 cases. The study found that dental implants could be radio graphically differentiated by company type.

INTRODUCTION

Dental identification of charred bodies consists of a complex procedure, making necessary the investigation of especially unique dental identifiers. In parallel, Implantology has become more accessible worldwide. There is a demand that the remains be high temperature resistant and can directly point out to the individual without too much hassles. Patidar *et al.,* 2010, revealed that teeth and mandible bone become ashy and cracked when exposed to 1100° Celsius for 15 minutes (Valenzuela *et al.,* 2002). Yet metallic materials such as silver amalgam and titanium trend to resist up to 1100° Celsius and 1668° Celsius respectively. Hence implants are unique dental identifiers with extreme importance as forensic evidences for human identification cases. Clinicians must be aware of properly recording and storing steps of daily performances in Implantology in order to aid the justice when requested by law; while forensic dentists must be aware of the alternatives for the use of dental implants, such as investigating morphology, batch numbers, and manufacture pattern for the medico-legal purpose (Pretty and Sweet, 2009). This study was undertaken to determine if dental implants can be radiographically differentiated by company type to aid forensic identification of the deceased.

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Recognition of dental implants on radiographic images was assessed in a blind study using a radiographic examination guide to highlight differences between dental implants.

Aim

To retrospectively correlate Radiographic images of implants with their shapes and designs in catalogues, and Identify Implant Brand with which Person identification can be deciphered from the implant database.

MATERIALS AND METHODS

In this study we retrospective collected 40 implant images (OPG) from different Institution and private practitioners. Also collected the various implant catalogue from different Implant companies. The Computer monitor was divided into two windows, one window is with implant image and the other one with the catalogue/Implant database website (www.whatimplantisthat.com). We correlated on basis of implant shapes, size and designs with the implant catalogue/Implant database website and the implant brand will be recognized. In order to confirm the finding a retrospective reference to the Dentist to assure correct correlation with the patient's case records was done.

RESULTS

Out of 40 implant images assessed, a positive correlation was seen in 33 cases.Giving an accuracy of 82.5% .The study found that dental implants could be radiographically differentiated by company type and was of benefit for radiographic assessment of dental implants for forensic odontologists.

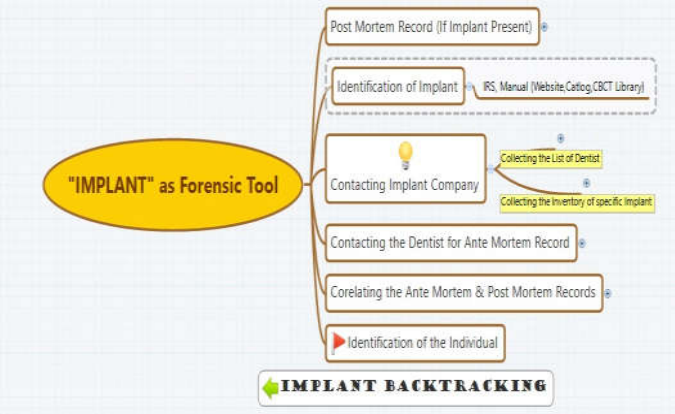

Fig: 1 Proposed protocol for Implant Backtracking in Forensics

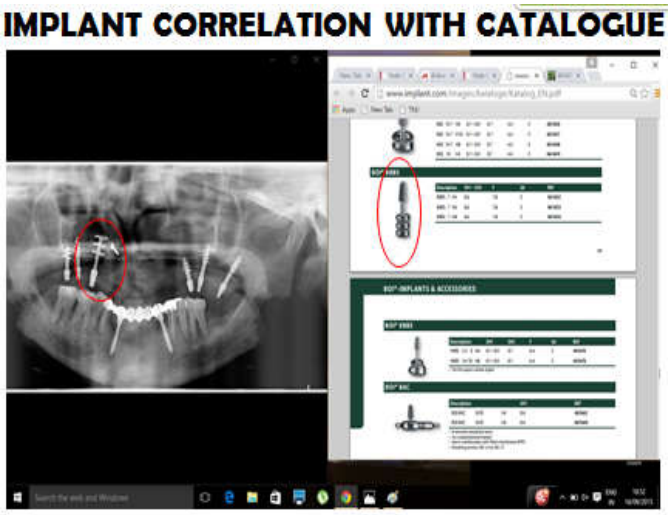

Fig. 2. Implant Correaltion with Catalogue

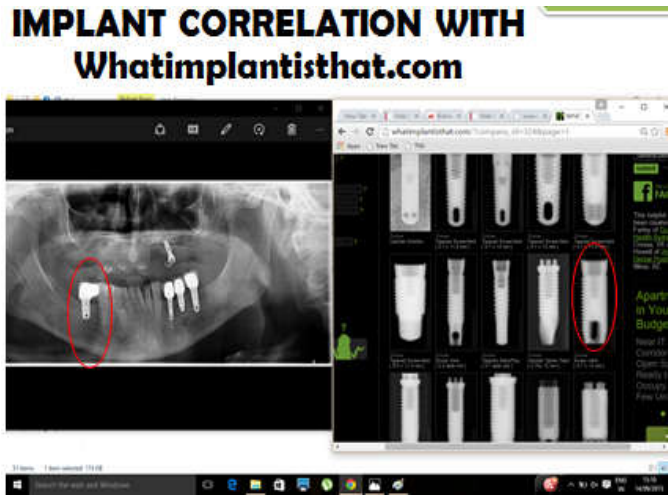

Fig. 3. Implant Correaltion with Website database

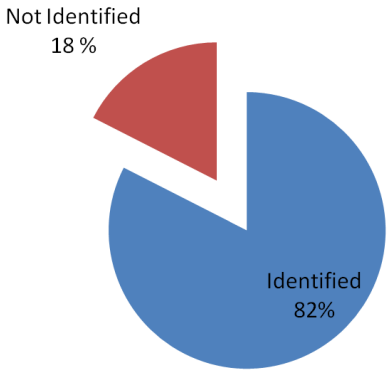

Fig.4 - Results

DISCUSSION

Dental implants have become a common procedure in the recent decade due to its minimal risk and decreasing cost. Dental evidence is widely used in forensic identification because of its low cost, availability of past dental records and its uniqueness to each individual (Stavrianos *et al.,* 2009). As most of the dentition is entirely constructed by implants in the recent years, dental implants are more often used as a tool in forensic identification. Some implants have perforations, grooves, apical chambers, and threads which are visible only at certain rotation or angulations. These features may be unique and enable recognition of specific products. Some other features may confuse the interpretation of an implant which is a clone of another more diffused large international implant company (Komar and Lathrop, 2006). Sahiwal designed a model for implant characterization by dividing the implant in three main parts (apical, midbody and coronal) and describing a set of basic characteristics on each, as follows (Sweet and Dizinno, 1996):

- ***Coronal characteristics****:* description of the prosthetic interface (external or internal hex, morse taper or others), the flange and any unique characteristics (e.g. groove below the flange, fine threads on the entire flange, apical part of flare grooved);
- ***Midbody****:* threaded (shape – V-shaped, square or reverse buttress, presence of grooves or any other unique characteristics) or non-threaded, tapered or non-tapered,.
- ***Apical:*** **shape** (V-shaped, flat, curved), holes (round, oval), presence of an apical chamber, presence and number of grooves, unique characteristics (e.g. two rows of holes, holes and grooves alternate, grooves continuous with body, presence of dimples, expanding screw in middle, etc.).

In the human identification process of unknown victims with no dental records available, the recognition of dental implants detected may give auxiliary information to narrow the search to a smaller number of individuals or eliminate certain candidates altogether (Campobasso *et al.,* 2007). In performing the forensic evaluation and superimposition, forensic odontologists must be familiar with implant designs and implant therapy (Solheim *et al.,* 1992). We like to propose that in mere future, we can use CBCT in the field of forensic odontology. If the CBCT Post-mortem record is taken with the help of CBCT library tool, the image can be compare with

various implant size, diameter and design accurately by different companies provided within the library tool.

Conclusion

Dental Implants have more scope in identification of the deceased. Understanding its potential and incorporating more personalized identification tracking system in implants is proposed as a conclusion considering the increased frequency of use of implants in developing and developed countries.

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