

# Forensic Orthodontics - An Innovation

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## Abstract

Identifying human remains by dental characteristics is a well-established component of forensic science with a definite scientific basis. A turning point has been reached in the history of forensic dentistry, and this may be due mainly to the greatly intensified international traffic, in the air or at sea. Up to a hundred individuals may now lose their lives at the same time, and, furthermore, these accidents leave behind them bodies that are mutilated to a degree previously unknown. In such cases, the only remains still recognizable may be the teeth or dental restorations, because these are more resistant to fire and water than other parts of the body or personal belongings. From Orthodontic point of view, we can help the forensic team in some respects by putting identification marks on Removable, Functional and Fixed Appliances so that it would be easy for the team to identify the dead bodies. Identification marks can be put in the form of Strip marking, Bar coding etc.

**Keywords:** Forensic Odontology, Strip marking, Bar coding.

## Introduction

Forensic dentistry has, up to recent years, only been more or less a hobby for some people interested in this field. There have been few international congresses dealing exclusively with the pertinent problems concerning identification with the aid of dental data. Assistance has been given to the police in some cases where only the dentist could evaluate the details given. A turning point has been reached in the history of forensic dentistry, and this may be due mainly to the greatly intensified international traffic, in the air or at sea.<sup>1</sup> Up to a hundred individuals may now lose their lives at the same time, and, furthermore, these accidents leave behind them bodies that are mutilated to a degree previously unknown. In such cases, the only remains still recognizable may be the teeth or dental restorations, because these are more resistant to fire and water than other parts of the body or personal belongings. It is natural that the specialist, i.e., the dentist, is called when identification turns out to be difficult. As will be seen in the paper presented by Keiser-Nielsen<sup>1</sup>, the internationalization of air traffic will give rise to many difficulties, which can be cleared up only by people really trained for this

purpose.

Some of the ordinary methods for establishing identity can be said to be more or less uncertain. Personal belongings may be sold, borrowed, or stolen, and various articles may be placed on a victim in order to hide a crime. Unfortunately, it can be said that all identifications made on belongings or on something not continuous with the body are not real identifications. This is where forensic science comes in - a true multidisciplinary speciality which amalgamates various sciences including forensic dentistry to derive its objective, which in a nutshell is to establish identity. Forensic odontology may be divided into three major fields of Activity - Civil, Criminal, and Research - and in all three the interests of justice demand the proper handling and examination of dental evidence.<sup>2</sup>

**Civil<sup>3</sup>:** It is concerned with mass disasters like Airline accidents, Earth quakes or train accidents, require identification of the victims in advanced stages of physical destruction, malpractice and different types of fraud.

**Criminal<sup>3</sup>:** Identification of the persons from their dental remains alone in cases of suicide or homicide through bite mark analysis, rugoscopy, cheiloscopy.

**Research<sup>3</sup>:** Forensic Odontology training for dentists working in criminology or police departments.

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The concept of dental identification is widely known, thanks to the media. But the nuances and complexities of the process are rarely understood. The central dogma of dental identification is that postmortem dental remains can be compared with antemortem dental records, including written notes, study casts, radiographs, etc, to confirm identity.<sup>4</sup> (Figure-1)

A range of conclusions can be reached when reporting a dental identification. The American Board of Forensic Odontology recommends conclusions from the above comparison:<sup>5</sup>

- **Positive identification:** The antemortem and postmortem data match in sufficient detail, with no unexplainable discrepancies, to establish that they are from the same individual.
- **Possible identification:** the antemortem and postmortem data have consistent features but, because of the quality of either the postmortem remains or the antemortem evidence, it is not possible to establish identity positively.
- **Insufficient evidence:** The available information is insufficient to form the basis for a conclusion
- **Exclusion:** The antemortem and postmortem data are clearly inconsistent.

#### **Record Maintainance:**

Identification depends on the existence of antemortem records to compare with postmortem remains. With up to 32 teeth to characterize a person, there are 160 surfaces that may receive tooth restorations. Furthermore, in patient dental records that also include descriptions of tooth rotations, anomalies, supernumeraries, cavities and radiographic documentation, the number of possibilities becomes very large. Essentially, no two dentitions are literally identical. Unfortunately, dental patient records are not yet standardized. Various fields of dentistry like Prosthodontics, Oral Pathology and Endodontics are contributing their role in forensic odontology. Can we as Orthodontists chip in with this regard? And if so, how and why?

## **Methods**

### **1. Strip making**

### **2. Bar coding**

#### **Strip Making**

Any appliance which is having a acrylic portion in it, a strip containing the information such as name of the patient or institute and patient identification number can be placed in it during the curing process (Figure-2).

Step 1. The patient's name, hospital number or any other detail is typed on a paper. If the strip is too long, it can be reduced in size according to the appliance. The strip is then cut and sized.

Step 2. This strip is placed in the appliance during the curing stage.

The details on the strip such as patient identification number are to be written in the patient's case sheet (Figure-3). In case of some mishap, the forensic experts after reading the information from the strip can approach the institute or clinic and hence can identify the patient.

#### **Bar Coding**

A bar code is a machine-readable code consisting of a series of bars and spaces printed in defined ratios. Bar code symbologies are essentially alphabets in which different widths of bars and spaces are combined to form characters and, ultimately, a message. Because there are many ways to arrange these bars and spaces, numerous symbologies are possible. Bar code technology has been helping business minimize data entry errors, speed processes, and reduce costs for over thirty years.

Symbology is considered a language in bar code technology. Just as you might speak French while traveling in France, a symbology allows a scanner and a bar code to "speak" to each other. When a bar code is scanned, it is the symbology that enables the information to be read accurately. And then when a bar code is printed, it is the symbology that allows the printer to understand the information that needs to be turned into a label.

All bar codes have start/stop characters that allow the bar code to be read from both left to right and right to left (Figure-4). The stop/start characters are unique characters placed at the

beginning and end of each bar code and provide timing references, symbology identification, and the direction that the information is read by the scanner. By convention, the unique character on the left of the bar code is considered the "start" and the character on the right of the bar code is considered the "stop." Immediately preceding the start character and following the stop character is an area of no markings called the quiet zone. Because there is no printing in this area, a scanning signal is not produced, thus the term "quiet." The quiet zone helps the scanner find the leading edge of the bar code so reading can begin. Combining these components, we get a complete bar code such as the one found below. Notice the leading quiet zone followed by a start character, data, a stop character, and a final quiet zone.

We can ask the manufacturer to make a personalised bar code which would designate the name of the institute or dental clinic.

#### Where to Place Bar Code?

In Fixed Orthodontics, we have a limited space to place bar codes. Molar band can be used for its placement. On the molar band, we have chosen mesial or distal surface as these surfaces are more protected than buccal or palatal surfaces (Figure-5). The number written on the top of bar code is to be written in the patient's case sheet (Figure-6). If some how ever some mishappening takes place with the patient, the forensic experts after analyzing the bar code can approach the institute and by correlating the number with the patient's case sheet can identify the patient.

#### Conclusion and Scope

Persons who have been deceased for some time before discovery present unpleasant and difficult visual identifications. Dental identifications have always played a key role in natural and manmade disaster situations and, in particular, the mass casualties normally associated with aviation disasters. Hence, there is a need to address the issue of denture marking for social and legal reasons. Orthodontists can become valuable members of the dental identification process by using these techniques which would be valuable in restoring their patient's identity. The research from this point should be focused on newer, technologically advanced, more viable and foolproof methods

which would strengthen the scope of Orthodontics in the field of forensics, ensuring our continual and complete commitment in serving the society in general and humanity in particular, however banal or prosaic the contribution may be.

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