

## Forensic Dentistry: Post-mortem Jaw Resection for Dental Evaluation

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**Abstract:** Dental evaluation is used by forensic dentists in the identification process of victims. In cases of deformed external features or characteristics of the victim the recognition is difficult without assessing dental morphological signs. We report a case of fatal burn injury where the victim's characteristics were totally deformed. The removal of mandible and maxilla was essential for the identification process. The technique is discussed with a special interest on the documents kept including digital photography. The storage of the specimens is significant for future evaluation and law recall.

**Key words:** Post-mortem, jaw resection, dental evaluation, forensic dentistry

### INTRODUCTION

The storage of specimens removed from a dead body is considered a common practice for the forensic scientists (Howard *et al.*, 1988). In forensic dentistry the center of attention of the police doctors is mainly located in the uppermost part of the body, the head (Pretty, 2007). Immediately after death in the body initiates a process of muscular system stiffening, a condition called rigor mortis (Varetto and Curto, 2005). In cases where rigidity of the body is established the procedure of specimen removal may be found difficult. Therefore it is necessary to perform this important procedure early after death without allowing the primary rigor to be completed usually few hours post-mortem (Henssge *et al.*, 1988). However, in most of the cases the victims are found in complete stiffness.

Access to the oral cavity may be troublesome when muscular stiffness existed. The common procedure of manual mouth opening is not useful in those cases. The use of lift-type of mouth gag may be possibly more appropriate due to increased application of force. In completely burned areas the tissues are stiff enough to prevent any operator manual attempt to increase mouth opening. The loss of tissue fluids may accelerate this stiffening process (Rochet and Hareb, 2002). Therefore, the necessity of removing the jaws considered to be essential for gaining access to the oral cavity.

In our case a post-mortem removal of jaws is performed in a case of complete and fatal burned process due to a traffic accident-explosion. The forensic aspects of this procedure are discussed giving a great emphasis on the burnt tissues.

### CASE REPORT

A male victim in a military service had an extreme and rare accident in a non-war area. The tank passing through the road had an electronic black out inducing fall of the vehicle out of the road. The oil reservoir exploded having as a consequence the fatal burn injury of the soldiers. The situation was critical considering that the tank was protected by both conventional armour-plating and explosive reactive armour increasing the temperature quickly inside.

The dead body transferred to the forensic department for necropsy. In autopsy the victim was found in the classical boxer-like situation (Fig. 1); a finding usually seen in complete body fatal burn injuries. The recognition of the victim in such a situation may be investigated using dental anatomical findings. To release extensive stiffness of the soft tissues it is essential to cut lateral anatomical structures of the face. The muscular stiffness did not allow the investigation of the teeth without such a procedure (Fig. 2). Therefore, it was decided to remove mandible and maxilla performing lateral labial commissurotomy extended to the mandibular rami, cut of



Fig. 1: The typical boxer-like position caused by fatal burn injury indicated the increased stiffness



Fig. 3: Bone cut of the ramus of the left mandible using special forceps. This procedure was performed after bilateral labial commissurotomy extending back to the rami of the mandible



Fig. 2: The anterior teeth of the mandible and maxilla were exposed. The thin structure of incisors was deformed by the high temperature or fracture during the accident. It was necessary to perform excision of the jaws for further forensic evaluation

the muscular system attached to mandible and bilateral osteotomy on its ramus and finally Le Fort 1-like osteotomy for the maxilla.

The mandible removed using special bone forceps (Fig 3) where the maxilla released using electrical saw. Both specimens stored in containers filled in 10% buffered formalin for future use.

## DISCUSSION

In forensic dentistry the evaluation of teeth is considered of great importance mainly in the field of victim recognition (Chourdakis and Stavrianos, 1983). In cases where epidermal features such as finger prints, are deformed by chronic external or internal stimuli, police doctors should evaluate hard tissue such as bone structures and teeth. Teeth considered being the hardest structure of the human body, a property mainly based on the enamel microstructure (Paine and Snead, 2005). Therefore, in extreme external stimuli such as fatal high temperature, human teeth remain in many cases without major alterations. The contents of the pulp at the time of examination may be found under destruction process. Root canal filling materials may be also found in cases of endodontically treated teeth. The previous feature may be found helpful in identification of the body comparing ante-mortem x-rays. Another important issue may be to preserve the apices of the teeth; a characteristic used in forensics for estimation of victims age.

Lateral incisions of lip commissures enable the operator to gain access in the jaw structures. It is recommended to remove first lower jaw because the cut design is easier. This will allow the removal of maxilla in second stage without great difficulties. In the mandible is very important to destruct muscular attachment of masseters and medial pterygoids. Afterwards with a bone forcep, handpiece-bur, chisel mallet or using an electrical saw the bone should break in areas selected for this purpose. This case report described the technique using manual forcep bilaterally in the rami of the mandible releasing the anterior area. The maxilla may be removed in

the same manner but is easiest if the operator handled with an electrical saw for bone cut. In our case maxilla removed using electrical saw for this reason. It is necessary to wear face mask with maximum protection layers and eye-glasses to shield eyes from external microbial entrance. Furthermore high-power suction will protect the operator from air-borne infections.

In forensic dentistry it is significant to keep records about any performed technique in the presence of an educated police officer including digital photography of each described step. These documents must be retained safely in a locked place for many years according to the law of each country. Therefore any call from justice mechanisms may require the observation of the stored specimens for re-examination. The digital photographs should be of general and special forensic interest (Karazalus *et al.*, 2001). We recommend the operator to have at least one photograph of the whole body (general aspect) and many photographs of the interested site (special aspect). The forensic dentist may use digital cameras with an increased ability to focus and high pixel presentation. These characteristics will enable the forensic dentist to use the photographs in specific computer software's to improve quality or to focus further without increasing the photographic blur.

### CONCLUSION

The role of forensic dentistry is essential in identification procedure especially when other morphological characteristics are totally deformed. The

storage of mandible and maxilla is very important in fatal burn injuries for future evaluation. The photographic documents may be considered useful if handled with new technological image software's.

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