



Role of Oral & Maxillofacial Surgery in Forensic Odontology

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ABSTRACT-

Evidence in civil or criminal matters is frequently requested from dentists despite their diverse fields of specialties. The importance of every super specialty in dentistry is well-known in the context of Forensic Odontology. Oral & Maxillofacial surgeons are highly skillful in head & neck anatomy, trauma & surgical procedures. Also, they are extremely knowledgeable about their field when called upon to provide testimony as part of forensic evidence in typical situations such as disability evaluation following oral or maxillofacial trauma. In situations of suspected carelessness, for feedback on the practices used by other medical professionals, and many more. This paper aims to highlight the areas of forensic dentistry in which oral & maxillofacial surgeons can be of utmost importance in Forensic Odontology and also provides a brief methodology of oral autopsy in medicolegal cases.

Introduction:

The Latin term “forensic,” which means “before the forum,” is the source of the word “forensic,” according to Clark. Odontology is the study of teeth. Even though the scope of forensic odontology is widely recognized among dental practitioners, medicolegal professionals are primarily responsible for its practical implementation.

Forensic odontology is a subspecialty of dentistry that handles, examines, evaluates & interprets dental evidence for justice. Teeth are the toughest material in the human body, and they may give a variety of evidence-based on the surrounding circumstances and the traits are unique to each tooth. Teeth can also withstand an extremely high range of temperatures and pressures during decomposition and upon death.

In almost all medico-legal matters of death, an autopsy is usually conducted, although dental expertise is rarely sought. On the other hand, the mystery surrounding the legal facets of the crime scene and death inquiry may be resolved with the help of an oral autopsy, which entails meticulous visual inspection, imaging, and laboratory techniques.¹

An autopsy often entails the systematic dissection of the visceral organs to examine the corpse's interior and exterior organs. Like other body parts, the oral cavity is composed of

intricate organ tissues, including keratinized, specialized mucosa (the tongue), glandular structures (the salivary gland), A trustworthy source of post-mortem information is the specialized mucosa (tongue), keratinized and non-keratinized mucosa, and dental, hard and soft tissues (enamel, dentin, cementum, and pulp).

An oral autopsy is the “examination of the oral and para-oral structures including the dental apparatus in a dead irrespective of the integrity of the tissues to reveal the identity of the unknown, which involves visual, radiographic, and laboratory investigation by an expert dental surgeon.” Oral autopsies can be performed on bodies that are visually recognizable, decomposed, burned,

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or traumatized, among other post-mortem phases. Dental information may not only be necessary to identify an intact person, but post-mortem effects (such as decomposition, mummification, saponification, skeletonization, animal predation/scavenging, and insect infestation) and specific death conditions such as fire, trauma, disintegration, etc. also.²

Role of oral & maxillofacial surgeons:

Specialist knowledge provided by oral surgeons aids forensic teams in the analysis of specific evidence. Their extensive understanding of the anatomy of the face, jaws, and teeth might reveal hints that can be used to identify unidentified victims or piece together the specifics of a crime. These are a few of the main ways their expertise is contributed.³

(i) Determining the mechanism of facial injuries:

Oral surgeons can get insight into the causes of wounds on the face and mouth by examining the types and locations of these injuries. Based on specific patterns, they can typically determine whether a sharp weapon or a blunt item caused the damage. These specificities aid in the reconstruction of crime scenes by forensic teams during inquiries.

(ii) Linking suspects and bite marks:

It is possible to match certain dental imprints of a suspect to bite marks left on a victim. When comparing dental characteristics to bite placements, shapes, and sizes, oral surgeons make an assessment. Regarding the likelihood that the wound was caused by the suspect's teeth, they offer professional advice.

(iii) Reconstructing Facial Images from Remnants:

In cases where a deceased person's face is unaltered, forensic experts are not necessary to determine the identity of the deceased person. However forensic odontology plays a crucial role in the identification of a person when it has been severely damaged. Identification of the retrieved human remains whether whole or in pieces is the responsibility of forensic experts. Maxillofacial surgeons can play an important role in achieving normal anatomy because of their expertise in head & neck anatomy & their employment in the specialist understanding of face bones and their interactions with underlying tissues to instruct forensic artists. In the majority of cases, the deceased person's corpse may be skeletonized or decomposed after a significant accident or tragedy. When this happens, the

only piece that is kept might be the rest of the bones, including the skull. Even after millions of years, skulls can stay unchanged and serve as a unique form of identification on which a successful facial reconstruction can be done for identification. This aids in appropriately identifying unknown victims.⁴ Trauma patients frequently have facial injuries, which call for immediate diagnosis and care. However, most of these injuries end in death because of substantial sequelae or concomitant injuries to the skull, brain, and cervical regions.⁵

(iv) Ethical and legal knowledge:

Oral surgeons are surgical healthcare specialists who adhere strongly to ethical principles based on truth and morality. They promote the system's integrity and fairness by providing credible evidence and eliminating conjecture in court issues. Also, they are well aware of the ethical & legal implications of the concerned region. Oral surgeons have particular talents that are useful in solving difficult forensic situations. Their experience and understanding help to achieve righteous and ethical outcomes. Maxillofacial surgeons whenever asked by the court for their expert opinion, present the testimony briefly and concisely.

Oral & maxillofacial surgeons are considered an extended arm of precision in the field of forensic odontology as their vast experience in day-to-day surgical procedures and enormous knowledge of anatomy prove to be of great aid in the autopsy field. The area of dentistry known as oral and maxillofacial surgery focuses on treating illnesses, injuries, and deformities of the oral and maxillofacial region surgically as well as an adjuvant measure. This specialty is used for craniofacial superimposition, surgical repairs, implants, and identification of people through maxillomandibular and dentoalveolar fractures.⁶

Nonetheless, the oral surgeon must appear in court for a medicolegal examination in forensic cases when this injury may be connected to criminal activities.

(v) Radiological, Imaging & Pathological examinations:

They work with radiographs regularly and can identify diseases and pathologies in radiographs as well as live on the patients more accurately. An Oral and



Maxillofacial surgeon can draw more conclusions from their wide skill set.⁷

(vi) **Age estimation:**

An individual's growth, development, and age estimate are important factors in identifying trauma or any illness, which aids a maxillofacial surgeon in drawing precise judgments. The dependability of this technique is mostly determined by the expert's subjective assessment and expertise in the field.

(vii) **Abuse:**

A range of abusive behaviours, including threats and acts of violence against individuals of all ages and genders, including economic, physical, sexual, emotional, and psychological abuse, are collectively referred to as domestic violence (DV). Victims of DV are typically women who are intimate partners or children. Domestic violence (DV) is a worldwide problem that crosses all social, racial, religious, and cultural barriers. It has disastrous short- and long-term effects on the physical and mental health of its victims, sometimes even resulting in suicide or death. Oral and maxillofacial surgeons are usually the specialists referred to in such medicolegal cases for treatment, rehabilitation, and expert opinions in the court.⁸

(viii) **Virtopsy:** Compared to a traditional autopsy, a virtopsy procedure produces a more sensitive, focused, and accurate result by scanning the deceased using contemporary radiographic tools like computed tomography (CT) and/or magnetic resonance imaging (MRI). When it comes to determining the entrance and exit patterns of wounds (fracture patterns), pathological gas collections, and gross tissue injuries, CT is a more effective method than traditional autopsy.⁹

Oral autopsy procedure:

Before the operation, informed consent should be obtained along with pictures and private details about the departed from the relative. The deceased's antemortem and post-mortem records from the dentist or physician should also be collected.

Intraoral access in a well-preserved body becomes challenging as soon as rigor mortis sets in following a person's death. Mouth gags, trismus screws, and intraoral myotomies can be used in this circumstance. Extraoral facial or infra-mandibular dissection is typically the next step.

Better access to the underlying oral soft and hard tissues is made possible by the extra-oral facial incision (Figure 1A), which extends from the mouth's angle to the anterior border of the ramus. Traditionally, this kind of incision was made on a cadaver that had burnt or decayed, leaving the soft tissue desiccated. To preserve face aesthetics, the infra-mandibular incision (Figure 1B) is made on a body that may be easily recognized. Bilateral incisions are made at places posterior and inferior to the ears, running across the anterior region of the neck and across the midline. The mandible is then visible across the lower face as a reflection of the skin and underlying tissues (Figure 1C).¹⁰

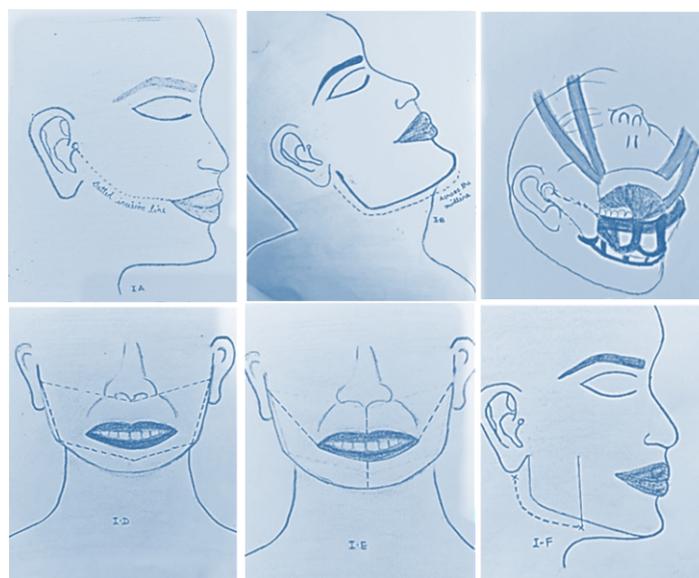


Figure 1: Oral autopsy: Incision methods

Rajkumari S. Oral Autopsy – Dental Surgeon's Perspective. *jfds*. 2020 Apr. 1, 12(1):66-71.

To evaluate the oral cavity, Ferreira et al. 11(1997) proposed a method (Figure 1D) that involves making a rectangular incision. The superior incision crosses the anterior nasal spine and the tragus of the ear on either side of the mid-face, while the inferior incision crosses the mental eminence and extends below the mandibular alveolar process to the ramus. The superior and inferior incisions are joined by the two lateral incisions. The periosteum divides the muscles of the lip, cheek, and other areas. To accomplish the proper repositioning, this is important to keep a photographic record at every stage of the incision. The modified extraoral facial incision was used by Silver and Souvion¹²⁻¹³⁻¹⁴ (2009), [Silver and Roy] as shown in Figure 1E, wherein a bilateral horizontal incision was performed from the lip commissure top to the tragus, with a separate vertical incision made in the middle of the lips to divide the



horizontal incision.

Adults in the retromandibular area had bilateral “C-shaped” incisions by Heit OF et al.¹⁵ (2014), measuring around 6 cm. The incisions were made one centimeter below the ear lobe and extended up to the virtual vertical line from the anterior boundary of the mandibular ramus. The incision is situated two centimeters from the mandible’s posterior edge (Figure 1F). The procedure may vary in each case, as in Table - 1. The technique differs in infants because of the less severe rigor mortis. Once the incision is made jaw can be resected for further investigation which can be done by the Stryker autopsy saw method / Mallet & chisel method/ pruning shears method. Along with surgical procedures all relevant visual & radiographic examinations are to be performed simultaneously.¹⁰

Table 1: Procedures involved in autopsy

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S. No	TYPE OF CORPSE	PROCEDURE INVOLVED IN AUTOPSY
1.	Visually identifiable body	<ul style="list-style-type: none"> ▪ Depending upon the rigor, extra or intra oral incision of masticatory muscle with or without fracture of condyle. ▪ Mandibular resection or infra-mandibular dissection. ▪ At autopsy, the tongue and larynx are removed to improve dentition visibility and intraoral film positioning.
2.	Disintegrate, Burned, or Broken Corpses	<ul style="list-style-type: none"> ▪ When dealing with decaying remains, sterilising the tissue ought to be done first. ▪ When dealing with burned fragments, radiography must be the first step since they could revert to ashes when handled. ▪ In each of these situations, jaw excision is performed if necessary.
3.	Skeletonized Remains	<ul style="list-style-type: none"> ▪ Mandible and skull would have been split apart by now, which avoids the need for jaw resection.

Collaboration of maxillofacial surgeons and forensic odontology:

A maxillofacial surgeon can handle forensic cases with improved eyesight in collaboration with an oral pathologist, oral radiologist, forensic odontologist, or other specialties. The cooperation of the aforementioned specialties is critical for the correct use of forensic odontology in medicolegal cases. Forensics may be utilized to resolve concerns in criminal cases in a variety of ways. Although the breadth of forensic odontology is widely known among dentists, its practical use is mostly dependent on legal and medical specialists. The timely interplay of these fraternities is critical for their appropriate implementation in medicolegal issues and no hesitation and refrainment should be there to

seek others’ advice whenever needed. Injuries to teeth, oral tissues, and jaws caused by a variety of factors such as abuse, assault, and crime-related injuries must be thoroughly evaluated and inspected when they arrive at the main healthcare facility. Timely collection and documenting of forensic evidence are only possible with the support of medical experts, who are usually the first to arrive at the scene of a crime or to interact with the victim.¹⁶ This interdisciplinary collaboration of forensic odontology with Oral & maxillofacial surgery and other specializations of Dentistry along with forensic specialists, law enforcement & legal professionals may help in righteous, specific & early disposal of medicolegal cases.

Conclusion:

Forensic odontology is a growing discipline of dentistry with many opportunities for advancement. Forensic odontologists play an important role at crime scenes by studying and interpreting dental evidence. However, because of the limited number of trained forensic odontologists, a dental specialist is called for expert opinion in medicolegal cases, who are incapable of performing such scientific procedures and analyses, unless they are trained. Instead, we have many maxillofacial surgeons who can easily render their facilities in medico-legal cases or can work in a team of forensic experts & forensic odontologists. Their expertise bridges the gap between medicine, dentistry & law, making them invaluable in Forensic Odontology.

Conflict of Interest: None.

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