Review Article

Oral pathologist in development of the subject of Forensic Odontology – The road ahead

Aman Chowdhry[1]*, Priyanka Kapoor[2], Deepika Bablani Popli[3]

[1, 3]Professor, Department of Oral Pathology,

[2]Professor, Department of Orthodontics and Dentofacial Orthopedics,

Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India.

** Corresponding author: achowdhry@jmi.ac.in*

According to Webstergs student dictionary the word forensic means:

ñof, pertaining to or appropriate for the court of justice or public de- bateò

ñA branch of dentistry which deals with the proper handling and ex-amination of dental evidence and with the proper evaluation and presentation of dental findings in the interest of the dentist.ò
-Keiser-Nielsen (1970)

ñThat Branch of dentistry, which in interest of justice, deals with proper handling and examination of dental evidence, and with proper evaluation and presentation of dental findings.ò
-Fédération Dentaire International (FDI)

ñForensic dentistryò is often used interchangeably with ñForensic odontologyò Forensic odontology is a sub-domain of dentistry that deals with the application of oral and para-oral evidence to civil and criminal matters. Pan India interest in forensic odontology has grown, which is evident by the fact that organisation of number of continuing dental education (CDE) and congresses in the subject have grown per year.

It is however ironic that forensic odontology as subject is yet to be accepted by the Dental Council of India as a separate specialty. The teaching of the subject to Bachelors of dentistry (BDS) students is presently being shared by 1. Oral Pathology and Microbiology; and 2. Oral Medicine and

Radiology. [1]. But clinically it is being handled by almost all branches of dentistry who work in unison for contribution towards this domain. Of them, the role of oral pathologists in forensic investigations has been researched by Shamim T 2013, 2015 and Thetakala RK 2017 in an audit of scientific journals.[2, 3, 4] This letter aims to compile and highlight role that oral pathologist can play in development of the subject of forensic odontology. This will not only sensitize readers about how oral pathologist can contribute in forensic odontology subject but also open future research avenues

Oral and Maxillofacial Pathology: Oral pathology is the specialty of dentistry and discipline of pathology that deals with the nature, identification, and management of diseases affecting the oral and maxillofacial regions. It is a science that investigates the causes, processes, and effects of these diseases. The practice of oral pathology includes research and diagnosis of diseases using clinical, radiographic, microscopic, biochemical, or other examinations. (ADA, adopted May 1991)

In routine Department of Oral pathology is involved in render students :

1. Basic knowledge regarding normal anatomy & histology of oral and para-oral structures. (subject of Dental anatomy and dental histology)
2. Understanding of identifying, classifying, genesis, diagnosis and prognosis of diseases of oral cavity and surrounding structures.
3. Aquaintance with concept of clinicopathological correlation by sound knowledge of triad of clinical, radiographic, and main histopathologic features of pathologies affecting oral and maxillofacial region.

After careful appraisal of literature following fields have been identified where oral pathologist can play an important role both as a researcher and crime investigator:

1. Post-mortem identification, by identifying peculiar underlying oral disease or anomaly of the deceased, through comparison with antemortem records.(e.g. dens in dente) [5]
2. Investigating dental morphological and histological changes of age estimation of deceased. (e.g. tooth attrition, secondary dentinal deposition, cementum incremental lines, and sclerotic dentine can be used)
3. Investigating dental morphology for deriving sex of deceased. (e.g. canine dimorphism for sex determination)
4. Investigating dental metric and non-metric traits for deriving ethnicity of

deceased. (ASUDAS for pointing towards the geographic origin or ethnicity)

5. Studying and understanding dynamics of jaw movements are integral to investigating human bite marks.
6. Biometry:
   Ameloglyphics: ñEnamel rod patterns are unique for each tooth in an individual, and the biometric study of enamel rod patterns from individual tooth for identification purpose is called ameloglyphics.ò[6]
7. Racemization of collagen in dentin: Age estimation on an individual can be done calibration of extent of racemization of asparatic acid present in coronal pulp, which converts from L-aspartic acid to D-aspartic acid.[7, 8]
8. Teeth as a source of DNA [9]
9. Forensic Facial Approximation: Since oral pathologist are involved in teaching oral and para oral anatomy. They can be handy while reconstruction and should be included in team of forensic odontologists.[10]
10. Study of salivary signature [11]: Used both in comparative and reconstructive identification. Includes assessment of salivary microbiome for personal characteristics, biomarkers and flow/ composition changes for health characteristics, methylation level for age and hormone levels for identifying sex of individual. Role of saliva in forensics is still a relatively under-represented phenomenon and needs to be explored further.

Conclusion and road ahead:

With advancements of technology and interdisciplinary approach , forensic odontology is making a paradigm shift towards involving many branches of sciences. Oral pathologist have shown keen interest in the field of oral pathology and contributed in evolution of forensic odontology.[5] Conventions and newer techniques related to discipline of oral pathology are finding its place in forensic odontology research and investigations.

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REFERENCES

1. Shamim T. Publication trends in the journal of forensic dental sciences 2009-2012. J Scientometric Res. 2013;2:152ï 6.
2. Shamim T. The relationship of forensic odontology with various dental specialties in the articles published in the Journal of Forensic odonto-stomatology from 2005 to 2012. Indian J Dent. 2015 Apr-Jun; 6(2):75-80.
3. Thetakala RK, Chandrashekar BR, Sunitha S, Sharma P. The relationship of forensic

odontology with various dental specialties in the articles published in a National and an International Forensic Odontology Journal: A 5-year content analysis. J Forensic Dent Sci. 2017;9(2):65ï 72. doi:10.4103/jfo.jfds_17_16

4. Dentistry definitions. https://www.cincinnatidental.org/asp/other.asp?ID=1002. Accessed on 17 May 2020.
5. Acharya BA. . An Intersection of Oral Pathology and Forensic Odontology . International Journal of Oral & Maxillofacial Pathology; 2011:2(1):3
6. Juneja M, Juneja S, Rakesh N, Bhoomareddy Kantharaj YD. Ameloglyphics: A possible forensic tool for person identification following high temperature and acid exposure. J Forensic Dent Sci. 2016;8:28ï 31.
7. Adserias-Garriga J, Thomas C, Ubelaker DH, C Zapico S. When forensic odontology met biochemistry: Multidisciplinary approach in forensic human identification. Arch Oral Biol. 2017;87:7ï 14.
8. Rastogi M, Logani A, Shah N, Kumar A, Arora S. Age estimation of living Indian individuals based on aspartic acid racemization from tooth biopsy specimen. J Forensic Dent Sci. 2017;9:83ï 90.
9. Manjunath BC, Chandrashekar BR, Mahesh M, Vatchala Rani RM. DNA profiling and forensic dentistry--a review of the recent concepts and trends. J Forensic Leg Med. 2011 Jul;18(5):191-7.
10. Jasuja O.P, Chowdhry A and Kapoor P. Handbook of Forensic of Forensic Odontology (1st ed.). Forensic Facial Reconstruction: Role of dentist, Century Publications, Pages: 126-133, 2018.
11. Kapoor P, Chowdhry A. Salivary signature in forensic profiling: A scoping review. J Forensic Dent Sci. 2018;10(3):123□127.