

NEGATIVE IDENTIFICATION USING DNA FROM TOOTH: A CASE REPORT

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ABSTRACT

Molars or the premolars, depending on the availability serve as a very good source of DNA but in some cases the extraction of DNA is difficult and the report may come out negative or may state that the DNA could not be retrieved. It is in these cases that the problem of negative identification occurs wherein the probable relatives alleged that the dead body belongs to them but the scientific evidence either does not support them or totally refutes them. Here in this case report we present such a case wherein a highly decomposed and badly charred body was found in the jungles of Manimajra, Chandigarh and was identified by the relatives based on the artefacts recovered from the dead body. Molars and premolars recovered were sent for DNA extraction but DNA could not be extracted. The DNA could not be extracted and the report of CFSL was used by the defence to save their clients.

Key Words: Negative Identification , DNA extraction, Molars, Premolars, Decomposition

INTRODUCTION

Identification means determination of individuality of a person & the question of identification of individual are of everyday occurrence in life, both in civil and criminal cases.¹ In forensic identification cases, where human remains are extremely

damaged, decomposed or degraded, teeth and bones are often the only available sources of DNA. In these cases forensic odontology is of paramount importance from a legal point of view.² For positive identification the hard tissues like the teeth and bones are the best sources of DNA available. As regards the bones or the teeth,

the unique composition of teeth and their location in the jawbone provide additional protection to DNA, making them a preferred source of DNA in many cases. Despite this, post-mortem changes in the structure and composition of teeth, and the location and diagenesis of DNA within them are poorly understood³. Advances in DNA extraction techniques and short-amplification techniques of DNA typing have greatly increased our chances to retrieve DNA samples and to compare with the control samples for positive identification but at the same time the various interactive and complex reactions between the DNA and the other chemicals is poorly understood which may result in non extraction of the DNA from the sample.

CASE REPORT:

On 25.01.2017 a call was received by the police that a dead body without head was lying in the forest area of Halo majra, Chandigarh in a badly burnt condition. A burnt head was also found lying few meters away from the body. A case under Section 302 IPC was registered. The dead body was brought to GMCH Chandigarh for post mortem after all the formalities and evidence collection from the crime scene. The police was approached 3 days later by the probable relatives including son of the deceased stating that the deceased was

supposed to reach Nepal about 7 days back when they had last talk with him. The relatives identified the body with the help of artifacts (clothes, taveez and as per the last location of his phone) **(Figure 1 to 3)**

Figure 1: Burnt parts of lower limb



Figure 2: Burnt parts of body



Figure 3: Burnt skull with mandible



AUTOPSY FINDINGS

The post mortem was conducted by a board of doctors. All the Dental, anthropometric and other relevant findings were noted meticulously by the board. The body was highly decomposed with stage 3 larvae, burnt, present over the body along with post mortem buns over the body. Samples for DNA analysis (2nd molars from the lower jaw and 3rd molar from the Lt side upper jaw, along with few pubic hairs with roots) were sent to the Central Forensic Science Lab. Meanwhile the police nabbed 4 persons in connection with this case. The 4 accused admitted their involvement in the murder and disposing of the body of their Nepalese friend in the jungle of Halomajra. The positive confirmation of the identity of the deceased was eagerly awaited by the relatives of the deceased. The report of the CFSL was obtained which stated that DNA could not be obtained from the samples sent. The CFSL was not able to extract DNA from the samples provided. What went wrong or why the CFSL scientists could not extract DNA from the "best samples" is a matter of discussion. This report gave a chance to the attorney of the defence stating that the body was not of the missing person (Nepalese national) and that the claimants of the body were not the relatives of the deceased, and that they are being

framed by the police in connection with the murder of the Nepalese national. The report did not proved the relation between the alleged relatives and the deceased. It is a common notion that DNA analysis every time results in positive identification. But in this case the problem of negative identification occurs wherein the probable relatives despite identifying the body could not prove that the dead body belongs to them. The scientific evidence did not supported them and on the contrary it has created hurdle in proving that it was actually their relative who was murdered and then disposed off.

DISCUSSION:

For positive identification the hard tissues like the teeth and bones are frequently the only sources of DNA available for identification in cases of degraded or fragmented human remains.³ The unique composition of teeth and their location in the jawbone provide additional protection to DNA compared to bones making them a preferred source of DNA in many cases. Despite this, post-mortem changes in the structure and composition of teeth, and the location and diagenesis of DNA within them are poorly understood³. Teeth is particularly resistant to incineration, decomposition, humidity, high temperature, microbial action and hence is an excellent

source to collect DNA.^{4,5} In our case the body was highly decomposed with about 50% of the body parts and bones were missing. Stage 3 larvae, and maggots were present on the body but were burnt and charred giving an indication that the body was burnt after it had putrefied and was in an advanced state of decomposition when it was put to fire. This advanced decomposition along with post mortem burns resulting in complete detachment of the mandible from the head may have resulted in either DNA getting denatured or was damaged to the point that DNA sample could not be extracted. DNA can be usually extracted from two vital teeth . canines/molars.⁶ Molar teeth are more preferable⁷ as was in our case wherein both molars and premolars were sent. Raimann et al. in their study suggested that molars and premolars were good candidates to obtain DNA profiles irrespective of the type of the laboratory procedure used or the time period of post mortem interval⁸. In addition, use of concentration columns yielded increased amount of DNA.⁸

The other factors affecting the availability of target DNA in a tooth are: Type of tooth, condition of tooth following trauma or extraction, period of time from extraction to isolation, age of the person,

degree of putrefaction, exposure to high temperatures etc. The tooth's which give the best possible results were sent. The condition of the tooth's extracted were good and all the three teeth's were extracted along with their roots undamaged. In our case the age of the person was about 40-50 yrs. The body was highly decomposed and putrefied. The post mortem burns were of high degree but charring of the teeth was not present. Remualdo⁹ evaluated the PCR amplification of DNA retrieved from teeth subjected to heat (200°C, 400°C, 500°C and 600°C) during 60 minutes, testing three different extraction methods (organic; ammonia acetate/isopropanol and silica). Using the organic method for genomic DNA extraction, 50% of samples subjected to burning were amplified, but only at lower temperatures (200°C and 400°C). At higher temperatures (500°C and 600°C), the isopropanol/ammonia acetate extraction method yielded better results, mainly for extraction of mitochondrial DNA (mtDNA).¹⁰ In our case the temperature must have been to about 600-1000 degrees centigrade and this factor may have contributed to the non extraction of the DNA.

CONCLUSION:

It is a common notion that if DNA samples have been sent to the CFSL for DNA fingerprinting, the analysis every time

results in positive identification. But in this case the problem of negative identification occurs wherein the probable relatives despite identifying the body could not prove that the dead body belongs to them. The scientific evidence did not supported them and on the contrary it has created hurdle in proving that it was actually their relative who was murdered and then disposed off. One of the reasons of DNA not being extracted was high decomposition of the body along with high intensity post mortem burns. Despite advances in the field of forensic odontology, little reliable published information is available on the processes and the effects of decomposition on teeth, or on the location of DNA following post-mortem diagenesis in the teeth, or on the outcomes of various sampling techniques.³ More in depth investigation is required to understand the interaction between DNA in tooth mineral and the various autolytic enzymes produced after death, and how this chemistry affects the DNA extraction process. Some more studies on the topic of post-mortem changes in teeth over a period of time as applicable to forensic investigations would also be extremely valuable so that the problem of negative identification of the person is avoided.

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