Case Report

Importance of Adipocere in Determining the Cause of Death

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Abstract
Adipocere (term coined by Fourcroy in 1789) also known as corpse wax or grave wax or mortuary wax, derives its name ‘adipo’ and ‘cire’ meaning the affinity with both fat and wax. It is a late but sure sign of death. It becomes extremely difficult for crime investigators to determine the cause of death in bodies in an advanced stage of decomposition. In such instances, changes like the formation of adipocere and mummification help to preserve certain features and injuries that aid in the determination of identity and in determination of the cause of death of the body. This paper highlights a case in which adipocere was developed and its significance in determining the cause of death. However, decomposition changes like the formation of adipocere, helps to preserve injuries which can aid the forensic experts in opining about the cause of death and hence thereby assisting the law enforcers in administering of justice.

Key Words: Adipocere, Cause of death, Investigations, Injuries

Introduction:
Adipocere [1] (term coined by Fourcroy in 1789) also known as corpse wax [2] or grave wax [2, 3] or mortuary wax [2], derives its name ‘adipo’ and ‘cire’ meaning the affinity with both fat and wax. It is a late but sure sign of death.

Adipocere is relatively resistant to both bacteriologic and chemical degradation. [1, 8] Endogenous lipases and bacterial enzymes hydrolyse the fat to free fatty acids.[8] Bacterial enzymes such as Clostridium perfringens [1,8,] clostridium welchii [3] convert these free fatty acids to hydroxy fatty acids leading to the formation of greasy or waxy substances. These substances consist of palmitic, oleic and stearic fatty acids with glycerol. [1, 8]

Water is essential for the formation of adipocere as it removes the glycerine that is formed during the hydrolysis of fats. [7]

It has been demonstrated by Mant AK that the intrinsic water content of the body may be sufficient for the development of adipocere in the body kept in lead sealed coffins. [6] Adipocere is first formed in the subcutaneous tissues of the body and then subsequently affects the various other parts and organs of the body, though sometimes the entire body may be converted into adipocere. Adipocere may persist for decades but finally it either degenerates or is removed by mechanical forces or by animals. [7] The smell of adipocere has characteristically been described by WED Evans as being earthy, cheesy and ammoniacal. [1] It is similar to the smell of rancid butter. [6, 7] Adipocere is inflammable and burns with a feebly luminant yellowish flame and melts at about 200°F. [6]

Case report:
A body of a female was recovered from a shallow pond in rainy season near Gokulpuri area in Delhi. The body had been disposed in a plastic bag. Post mortem examination of the body was conducted in Guru Teg Bahadur hospital. On examination the bag was found to be intact. The body was decomposed with adipocere present all over the body [Fig 1], with strong cheesy and ammoniacal odour.

On further examination there was a cut wound present in the lower part of front of neck. The internal neck structures including the trachea, both the carotids and oesophagus had been transected [Fig 2]. The age of the body was estimated to be 40 – 50 years by the
examination of pubic symphysis. Rest of the examination of the body yielded no significant results. The cause of death was given as cut throat injury by sharp edged weapon.

Fig 1: Adipocere

Fig 2: Cut throat wound with cut Trachea and carotids

Discussion:

Warm and moist conditions facilitate the formation of adipocere. However, not all bodies developing adipocere are found in water. For example, bodies found in plastic bags which provide a moist environment may also undergo this change. [5] Adipocere has been known to form within 3 weeks to 6 months of death though the shortest time of formation of adipocere has been reported as 3 days in India. [4]

It becomes extremely difficult to determine the cause of death in bodies in advanced stage of decomposition. The changes of decomposition such as formation of adipocere and mummification preserve the body to such an extent that it is possible to determine the wounds such as stab wounds or gunshots, present on the body and in determining the cause of death. The facial features are usually recognizable and the time since death can be estimated in adipocere. The presence of adipocere has been useful in the past to implicate people for various crimes and to determine the technique used or weapon utilized for committing the crime. In a case reported by Sigrist T. et al [9] in a human skeleton with lumps of adipocere the gunshot injuries were identified. Bullet was recovered from a lump which further allowed the identification of the weapon and the confession of a 74 year old man as the murderer. Another case was reported by Masahiko kobayashi et al [10] in which, there was two defects identified in a case of adipocere, one of a gunshot wound and the other a keyhole lesion. In a case where the adipocere was developing in the body of a female who was submerged for about three months, the mark due to a cable wire on her neck which was tied to concrete to aid in sinking of the body was clearly demonstrable. [5]

This case holds importance due to the formation of adipocere which resulted in preservation of the fatal injury and in reaching an opinion regarding the cause of death. The cut throat wound and the internal structures of neck clearly demonstrated that the injury was caused by a sharp edged weapon. Also the fact that the plastic bag containing the body was undamaged, ruled out the possibility of damage by predators or any other external influence. In this case however the facial features were not well preserved which hampered the identification of deceased.

Conclusion:

In this case the opinion regarding the cause of death was made possible only due to the preservation of injuries due to the formation of adipocere. It is extremely difficult to determine the cause of death in decomposed bodies. However, decomposition changes like the formation of adipocere, helps to preserve injuries which can aid the forensic experts in opining about the cause of death and hence thereby assisting the law enforcers in administering of justice.

References: