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CASE REPORT

Silent Clue: Froth in the Airway of Burn Victim: A Medicolegal Perspective

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ABSTRACT

This case report highlights the significance of froth formation in the airways as a vital postmortem clue in burn-related deaths. A 38-year-old male was found unresponsive with partial-thickness burns covering 15–20% of his body, following a suspected fire incident in his residence. Although froth was not visible at the scene, white froth was noted oozing from the nose and mouth during autopsy. Internal examination revealed cherry-red, congested, and edematous lungs with petechial haemorrhages, and froth exuding on compression. Histopathological analysis confirmed interstitial haemorrhage and pulmonary edema. The presence of froth, coupled with respiratory tract findings, indicated ante-mortem inhalation of smoke or hot gases. Chronic smoking and acute alcohol intoxication were likely contributory factors, increasing susceptibility to inhalation injury and impairing protective reflexes. This case highlights that the absence of froth at the scene does not exclude inhalational injury, and that postmortem froth formation, although delayed, can be a crucial indicator of respiratory involvement. Thus, careful correlation of scene findings, autopsy observations, and histological evidence is essential for determining the exact cause of death in burn victims.

KEYWORDS

• Burns • Pulmonary Edema • Cherry Red • Froth

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INTRODUCTION

India experiences approximately 6–7 million burn injuries annually, of which about 1.4 lakh (140,000) result in death each year.[1] Fire and inhalation casualties are combined in this total; deaths from thermal burns cannot always be distinguished from fatalities resulting from the inhalation of smoke and toxins. Burn injuries remain a critical concern in Forensic Medicine, not only due to their physical impact but also because of the complex interplay of thermal and inhalational injuries that can lead to fatal outcomes. While classical findings such as soot in airways, cherry-red discoloration, and burn wound characteristics are commonly discussed, this case brings attention to a less emphasized postmortem sign-the appearance of froth during post-mortem. In severe conflagrations, either in buildings or vehicles, the terminal state of the body often does not reflect the condition at the time of death. Indeed, many deaths will have occurred before any heat reaches the body, death being caused by the inhalation of smoke. It may be difficult or impossible for the forensic experts to determine the extent of ante-mortem damage if the ensuing fire later reaches the body and causes post-mortem burning.[2] Accurate determination of the cause of death in such cases requires a multidisciplinary approach involving crime scene investigation, autopsy findings, and toxicological analysis.

CASE HISTORY

An alleged history of 38-year-old male was found unconscious and unresponsive lying on the floor of his residence with burn injuries at around 4:30 AM on 10/03/2025. The neighbour smelled smoke and saw smoke coming from the deceased's house and immediately called the police. On further investigation by the police, the body was found lying on the floor of the hall. They also found burnt cigarettes and alcohol bottles lying around the bed. A completely burnt bed was found on the floor of the hall. The body was then brought to the medical college for postmortem examination.

Figure 1: crime scene photo

AUTOPSY FINDINGS

On external examination of the body, there were superficial burns over the abdomen, upper and lower limbs with a Total Body Surface Area (TBSA) burnt of about 15-20%. Blackening of both the lower one-third of the leg and soles. Eyes were closed and congested. White froth oozed out of both nostrils and the mouth. But in the crime scene photos, there was no froth found in the mouth and nostrils. Scalp contusion was seen in the occipital region. The trachea was congested and oedematous with mucus secretions present.

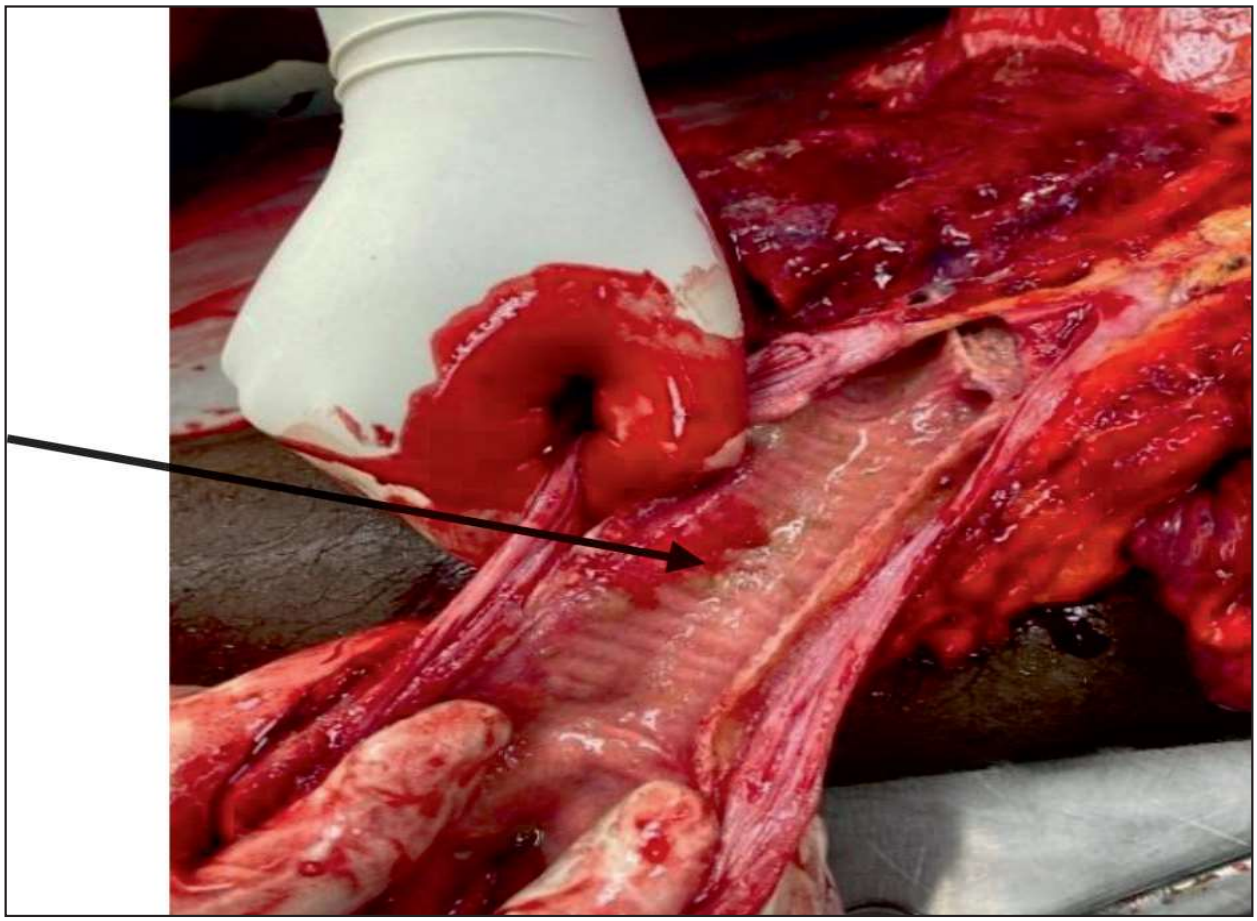


Figure 2: Shows congestion and presence of soot particles in the trachea

The lungs were cherry red in colour. Both lungs showed multiple petechial haemorrhages on the interlobar surface, and on cut section, were congested and oedematous, and white froth oozed out on squeezing the lungs. The blood was cherry red in colour. The stomach contained around 250ml brown colour fluid with a burnt odor and without any food particles.

Histopathology Report: Both lungs were sent for histopathological examination, which showed Interstitial haemorrhage and oedema.

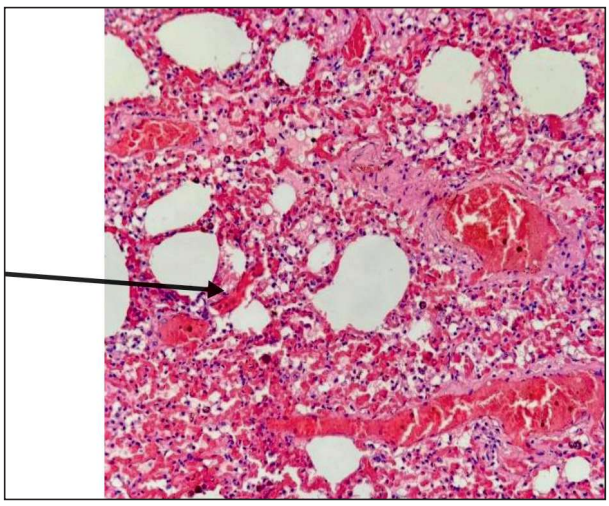


Figure 3: shows interstitial haemorrhage

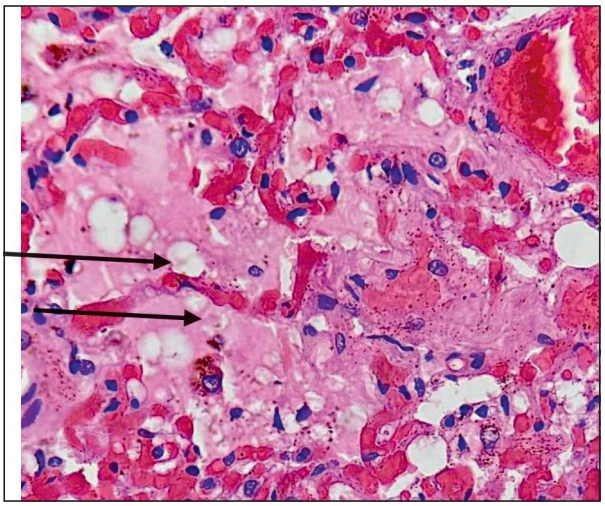


Figure 4: shows interstitial oedema

AUTOPSY PHOTOS

Figure 5: shows white froth oozing out of the mouth and nostrils

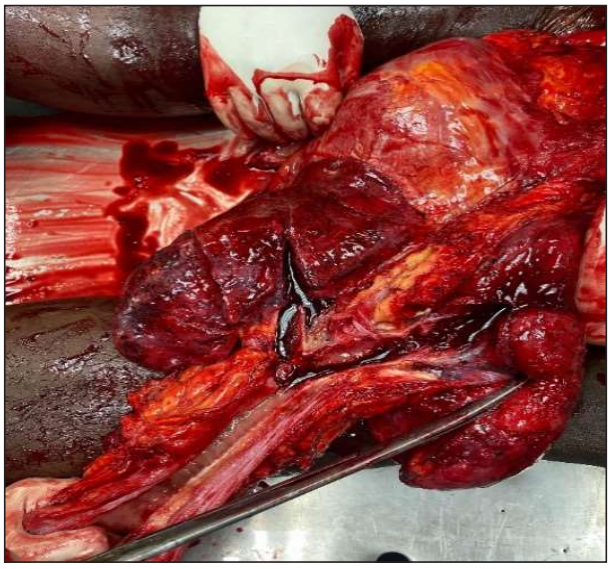


Figure 6: shows cherry-red color lungs

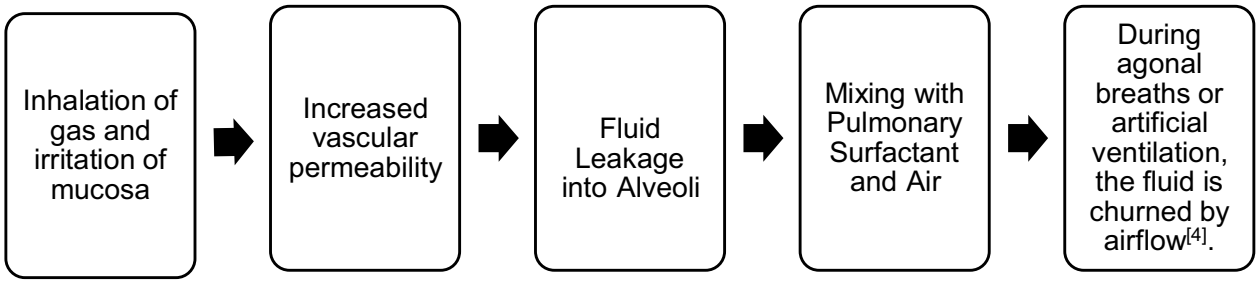
Figure 7: shows cherry-red color blood

DISCUSSION

Although froth in the airway is a classical feature of drowning and pulmonary edema of cardiac origin, its role in burn-related deaths is rarely highlighted. Only a limited number of published case reports have mentioned frothy secretions in the airways of fire-related deaths. In this case, the emergence of froth from the nose and mouth during autopsy suggests ante-mortem inhalation of smoke or hot gases. The lungs become engorged with protein-rich fluid, and upon manipulation during transport, this fluid mixes with air to form fine white froth [3]. Even though there were fewer soot particles, there was extensive mucosal secretion and froth formation due to increased susceptibility to inhalational injury caused by chronic smoking and alcohol intoxication.[4] Acute alcohol intake can lead to central respiratory depression, increase the risk of aspiration and vomiting, and impair protective airway reflexes. While alcohol doesn't directly increase or prevent froth formation, it increases susceptibility to inhalation injury by reducing consciousness and respiratory defences. Alcohol can also contribute to pulmonary edema via vasodilation and myocardial depression, potentially enhancing froth formation.[5]

The pulmonary system has three fundamental functions: ventilation, oxygenation, and expectoration. The duration of smoke exposure, temperature of the inhaled smoke, and composition of the smoke are determinants of injury severity.[6]

Mechanism of froth formation due to gas inhalation:



Froth at the mouth/nose is often seen in pulmonary edema caused by drug overdose (opioids, cocaine), drowning, cardiac failure, and acute respiratory distress syndrome (ARDS).

Froth may also appear after death due to movement of the body during transport of the body, increased thoracic pressure during autopsy, or bacterial decomposition (in later stages).[7] Gases produced during decomposition can cause fluid-air mixing in the lungs or airways. This may lead to bubble-like discharge from the mouth/nose. However, this froth is usually scanty, thicker, and foul-smelling.[8]

OPINION

On gross examination, the lungs were congested, edematous, and exuded copious amounts of fine, white froth on cut section. The cut surfaces revealed fluid-filled alveoli with a crepitant consistency. Histopathological examination showed distended alveolar spaces filled with pale fluid, congestion of pulmonary capillaries, and interstitial edema, consistent with pulmonary edema. These findings, in correlation with the scene and clinical context, confirm pulmonary edema as the immediate cause of death.

CONCLUSION

In this case, the delayed appearance of froth was thus not incidental but a vital sign, revealing that the victim was alive and breathing during the fire incident. This case also highlights the complexity of determining the exact cause of death in burn victims, where multiple mechanisms coexist. Initially, the absence of froth at the scene offered no clear indicator of inhalation injury. However, a thorough post-mortem examination revealed froth emerging from the airways, prompting deeper evaluation of the respiratory system. Histopathological and gross findings confirmed pulmonary edema, a key manifestation of inhalation injury, as the definitive cause of death.

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