



Case Report

Detection of toluene in a body buried for years with a fatal cardiac contusion



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ABSTRACT

This report aimed to present the postmortem finding of toluene in a homicide victim buried under the ground for six years. The bones of the skull and limbs were exposed, and the remainder of the subcutaneous tissues, brain and heart had formed into adipocere. There were numerous fractures in the skull and the anterior side of the ribs. A cardiac contusion extending into the cavity of the right ventricle was also observed. No other obvious injuries were identified on the body. The concentration of toluene in the bone marrow within the head of the humerus was 58.4 $\mu\text{g/g}$. The cause of death was suspected as heart rupture, possibly from a forceful impact or compression of the anterior chest under toluene intoxication. This report presents a rare case where toluene intake by a human was disclosed by autopsy even after several years of death.

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1. Introduction

Toluene is used in a variety of applications in our daily lives and has been frequently abused by teenagers and adults, who inhale the vapors of paint and glue solvents for its intoxicating effects [1]. The presence of toluene in postmortem autopsy cases has been reported in several studies [1–15]; however, there is no report of toluene detection in cases where autopsy was conducted several years after death. In this report we present the autopsy case of a toluene abuser who had been buried underground for six years. Postmortem analysis revealed the presence of a high content of toluene in the bone marrow. Toluene detection in a cadaver after the passage of several years of death is rare.

2. Case history

A 20s-year-old man had been reported missing for six years. His body was discovered at a depth of one meter below the damp surface of the earth after the confession of the criminals. The place located in the forest area facing the narrow animal trail that followed the road of dead-end, where general public would not enter easily. The body wore clothes. The autopsy was held one day after the body was found.

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The circumstance of the case was revealed subsequent to the autopsy. The victim had staggered due to thinner abuse on the day of incident. The criminals had beaten and kicked the whole body of the victim repeatedly with their fists and knees. The victim had gone down and uttered a moan of pain pressing his hand to his chest in the middle of the assault. His face and neck had turned to be congested soon, and he had got to wheeze like asthmatically. His respiration had become gradually weaker. His face, arms and the tops of the foot had looked swollen when his breathing had stopped forever. It had been less than one hour from the start of the assault to his end.

3. Autopsy findings

Almost all of the skin and muscles on his head and extremities were lost, and the bones of the skull and limbs were exposed (Fig. 1). The remainder of the subcutaneous tissues, brain and heart had completely converted into adipocere. Sediment and mold attached to all over the surface of the body. The remains of the muscles also appeared to be formed in adipocere. Several fractures were discovered on the skull surrounding the bilateral orbital rims and the right side of the frontal bone of the skull. Articulate fractures were also noted on both sides of the mandible. The brain had turned into a mass of blackish-green clay with no sign of bleeding. The skin and muscles in the upper part of the torso had turned into adipocere resulting in the loss of several tissue details. The costal cartilage was also lost under the soft tissues such as the skin, fat and muscles. There were several fractures in the anterior

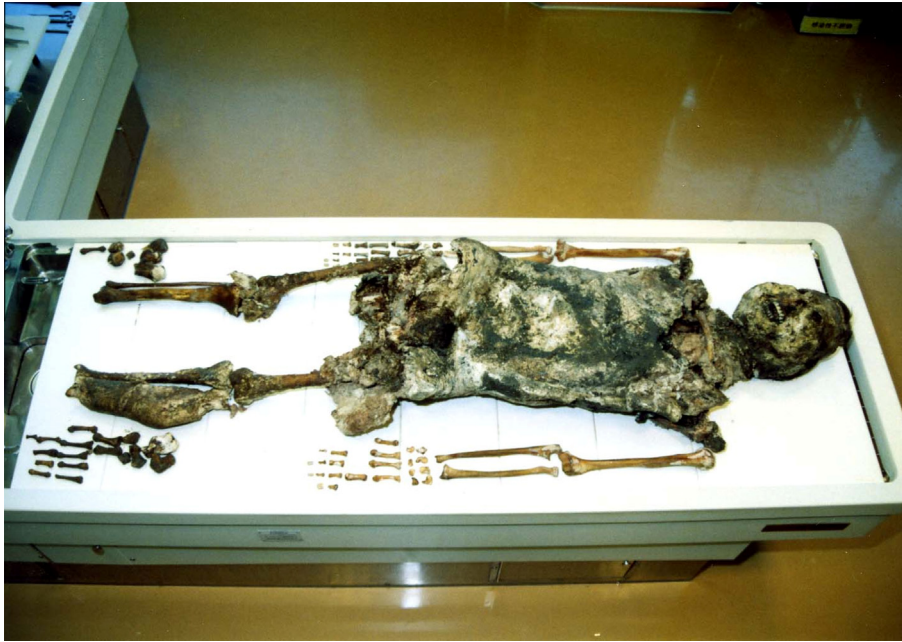


Fig. 1. The clinical appearance of the cadaver.

side of the ribs shown with white arrows in Fig. 2. The spinous process of the fifth thoracic vertebra was fractured, while the adipocere heart was located in the normal position. The left and right panels in Fig. 3A show the anterior and posterior sides of the heart. There was a contusion on the right ventricle that extended from the anterior to the posterior side of the heart. The ventricles of heart were horizontally sectioned into four blocks to confirm the extent of the injury. The left panel in Fig. 3B illustrates the topsides of the four sections of the heart, whereas the images on the right panel demonstrate the bottom sides of the same sections. Arrows show the sites of dehiscence; the injury to the heart was nearly linear in appearance and extended into the cavity of the right ventricle. The total length of the split in the heart was slightly greater than 15 cm. There was not any obvious contusion in the right atrium or in the other area of the heart. No obvious splits

or contusions were observed either in liver or aorta. None of the other primary organs could be determined in the thoracic cavity or in the abdominal cavity.

4. Toxicological analysis

The remaining muscles of the body had been almost adipocere. The inner content of the head of the left humerus was the only sample of bone marrow available for toxicological analysis. The surface of the humerus did not appear to be broken. The inner contents had turned into a dry, oily and blackish material that adhered to the inner walls of the humerus, and was scratched and collected for analysis. The drug screening analysis was performed using the NAGINATA™ gas chromatography/mass spectrometry (GC/MS)



Fig. 2. The anterior side of the chest under the soft tissue. The soft tissue covering the breast was removed revealing rib fractures (white arrows).

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