Case Report

# A case of thoracic organs migrating into the left upper arm subcutaneously due to a runover

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## Abstract

A man in his 40s was run over by a wheel loader that was slowly backing up behind him late at night at a construction site. The driver stopped when he saw a man lying on the ground after being hit by the right rear and front wheels. Pre-autopsy postmortem computed tomography (PMCT) revealed that a portion of the left lung extended from the left axilla to the subcutaneous area of the upper arm. An oval mass with a point density of 40–60 Hounsfield units was found in the peripheral lung tissue of the left upper arm. Autopsy findings revealed extensive décollement from the left upper arm to the forearm, with a disconnected heart in the interstitial space and lung tissue straying to the central side.

There are no reports of thoracic organs straying into the upper arm subcutaneously, and when reading forensic PMCT images prior to autopsy, not only crush injury but also organs dislocation should be looked for carefully if the organ is absent.


Keywords: Thoracic organ, Migration, Upper arm, Runover, Post-mortem computed tomography, Forensic autopsy

## 1. Introduction

Imaging and autopsy both have been used to demonstrate the traumatic displacement or herniation of organs, such as occurring after blunt chest or abdominal trauma [1]. However, there are few reports on the internal organs not being migrating to other parts of the body[2-6]. We report a case of a man who was run over by a wheel loader, and part of his heart and lung tissues migrated under the skin of his left upper arm.

## 2. Case report

A male worker in his 40s was walking alone wearing a helmet on the premises of his factory in operation late at night in April when he was hit from the left rear by a wheel loader that was moving slowly backward. The factory site was not a place for people to walk; the lighting was dark, and there was much noise from the machines in operation. The drive recorder of a truck parked nearby recorded the video movie about the hit-and-run conditions. The driver of the wheel loader was aware that he had run over something and found a person lying on the ground after he had completely passed by. Immediately after the incident, the man was in a prone position with his left upper limb slightly abducted and his right upper limb retracted into his torso. The head and face were crushed by the trauma, the helmet was deformed and dislodged, the left eyeball was displaced, and the contused brain was displaced from the contusion wound on the head. A large amount of blood spilled around the left axilla. Part of the lung tissue had herniated from the mouth. Further investigation revealed deviated lung tissue from the lacerated wound in the left axilla (Fig. 1A). An autopsy was performed the

following day after postmortem computed tomography (PMCT) performed by 16-slice multi-slice CT scanner (Siemens, Emotion 16, Germany). The images were obtained with the following values: 130 kV, 100 mA, pitch factor 0.75 mm, without contrast media. The data were analyzed by the medical image application the OsiriX (Pixmeo SARL, Bernex, Switzerland) and reconstructed.

PMCT findings

The head showed crushed fractures of the facial bones, calvaria, and skull base, with no apparent hemorrhage in the brain. Spinal dissection was performed between the seventh cervical vertebra and first thoracic vertebra. Multiple crush fractures of the thorax were observed. Both lungs were displaced upward, a piece of lung was herniated through the mandible, and a part of the left lung extended from the left axilla to the subcutaneous region of the upper arm. An oval mass with a point density of 40–60 Hounsfield units was observed in the peripheral lung tissue of the left upper arm (Fig. 2). The mediastinum was obliterated, and the heart could not be identified. The liver and left kidney were contused in the abdomen, and the right iliac crest was fractured.

Autopsy findings

The height and weight of the man were 170 cm and 55 kg. There was extensive décollement of the thoracoabdominal back and from the left upper arm to the left forearm. The skull was crushed, and only 500 g of the brain

remained; however, there were no obvious epidural, subdural, subarachnoid, or intracerebral hemorrhages. The trachea was transected in the upper part of the mediastinum, and the esophagus was transected just above the cardia. The upper parts of the ascending and descending aorta were torn, and the aortic arch was free. The right lung was compressed upward and partially herniated to mouth through the torn trachea, larynx and oral cavity. The left lung was compressed upward and outward and herniated from the contused left thorax into the subcutaneous layer of the left axilla and medial upper arm (Fig. 1B). In addition, part of the lung deviated from the lacerated wound in the axilla. When the body was turned over and the lung tissue that had migrated into the décollement of the left upper arm was removed, the heart slid out through the laceration of his upper arm (Fig. 1C). The heart had been separated at the right atrium and orifice of the aorta and ruptured in the left ventricle, and migrated into the peripheral region of the lung, with the apex of the heart as the advanced part. The liver was almost completely obliterated and scattered throughout the upper abdomen and thoracic cavity. The left kidney was contused resulting in extensive retroperitoneal hemorrhage. The intra-abdominal hemorrhage was slight, and the intra-thoracic hemorrhage drained mostly from the axillary laceration.

## 3. Discussion

Internal organs are sometimes prolapsed from the body after being run over by a car [7,8]. However, cases in which internal organs move to other parts of the body after being hit by a car are rare. In the case of a herniated

heart, there is only one report of the heart protruding from the edge of an incomplete decapitation during a motorcycle-driving accident [3]. We were unable to retrieve reports of thoracic organs dislocating subcutaneously into the upper extremities, as observed in the present case.

In this case, the mechanism by which the heart and some lung tissues moved subcutaneously under the upper arm was inferred to be as follows. The heart was pushed upward to the left before being crushed by the right rear tire, which first ran over it as it slowly crossed from the right caudal side to the left cephalic side. Though the base of heart was fixed by the great vessels, the apex became forward during the process of being pushed out. During this process, the left thorax ruptured, causing profuse bleeding from a lacerated wound in the axilla and décollement from the left upper arm to the forearm. The separated heart then moved when the right front tire ran over it and was thought to have herniated into the left forearm, where the décollement had occurred. In this case, because of the apex forward, it made easier to move the subcutaneous cavity dragging the deviation of the lung tissue due to chest trauma also occurred.

This case showed the important factor due to organ herniation. It was the very low speed of wheel loader for the victim not to bound off. And it made also the time gap to form a décollement before herniation.

PMCT prior to autopsy showed an oval mass under the skin of the left upper arm, a partially migrated lung, and extensive subcutaneous air images, confirming décollement, although the oval mass could not be identified prior to autopsy. PMCT is known to provide useful information for autopsies of car

accident fatalities [9]. When reading forensic PMCT images prior to autopsy, not only crush injury but also organs dislocation should be looked for carefully if the organ is absent. It is important to read the possible ectopic presence of organs.

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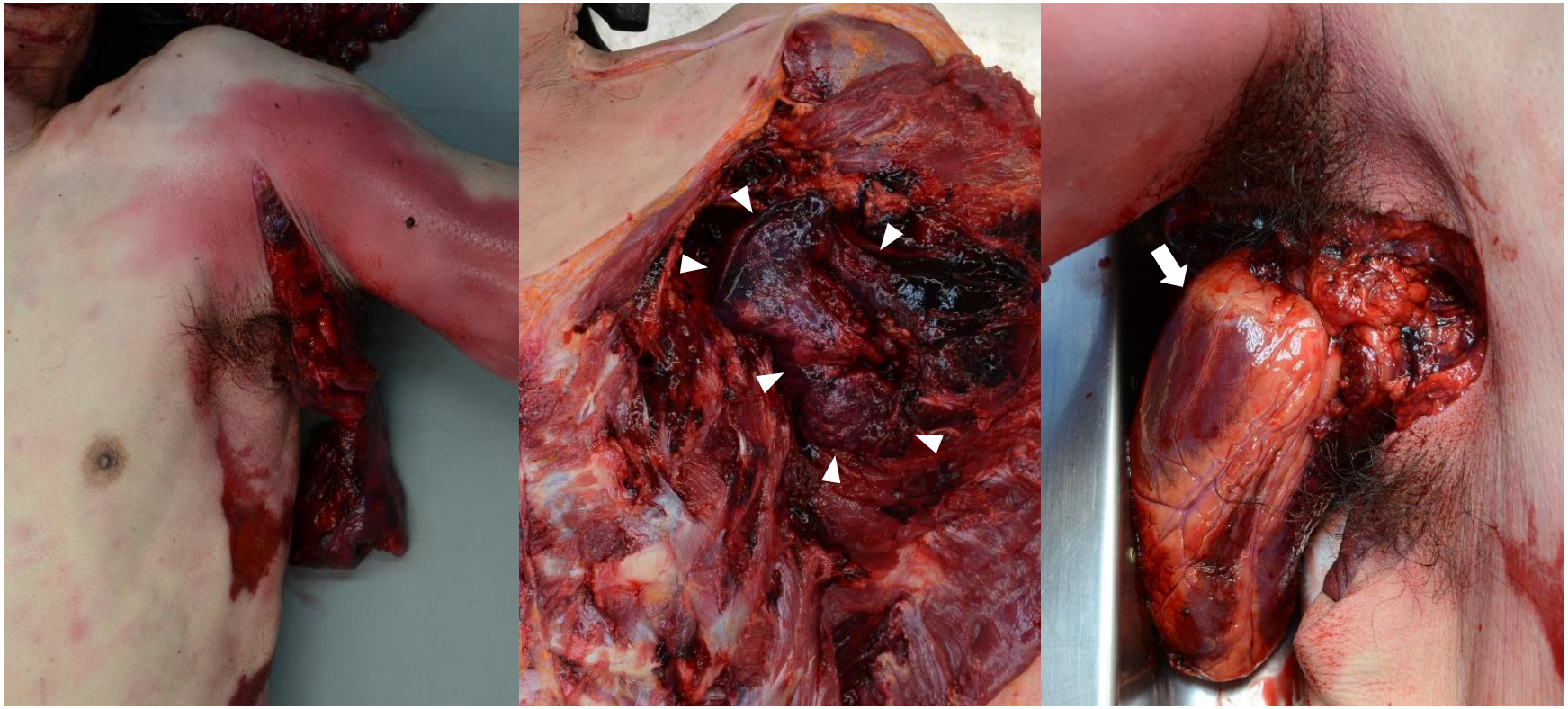
Figure legends

Fig. 1 A: The lung tissue protruded from the lacerated wound in the left axilla. B: The lung tissue (white arrowheads) was herniated from the contused left thorax into the subcutaneous layer of the left axilla. C: When the body was turned over and the lung tissue that had migrated into the décollement of the left upper arm was removed, the heart (white arrow) slid out through the laceration of his upper arm.

Fig. 2 Coronal section of postmortem computed tomography. There is a gas image of a gap by décollement from the left upper arm to the forearm, with an oval mass (black arrow1) on the upper arm and lung tissue (black arrow 2) on its central side. Lung tissue is prolapsed at the axilla. Lung tissue (white arrow) is protruding from the mouth.



A B C

Fig. 1

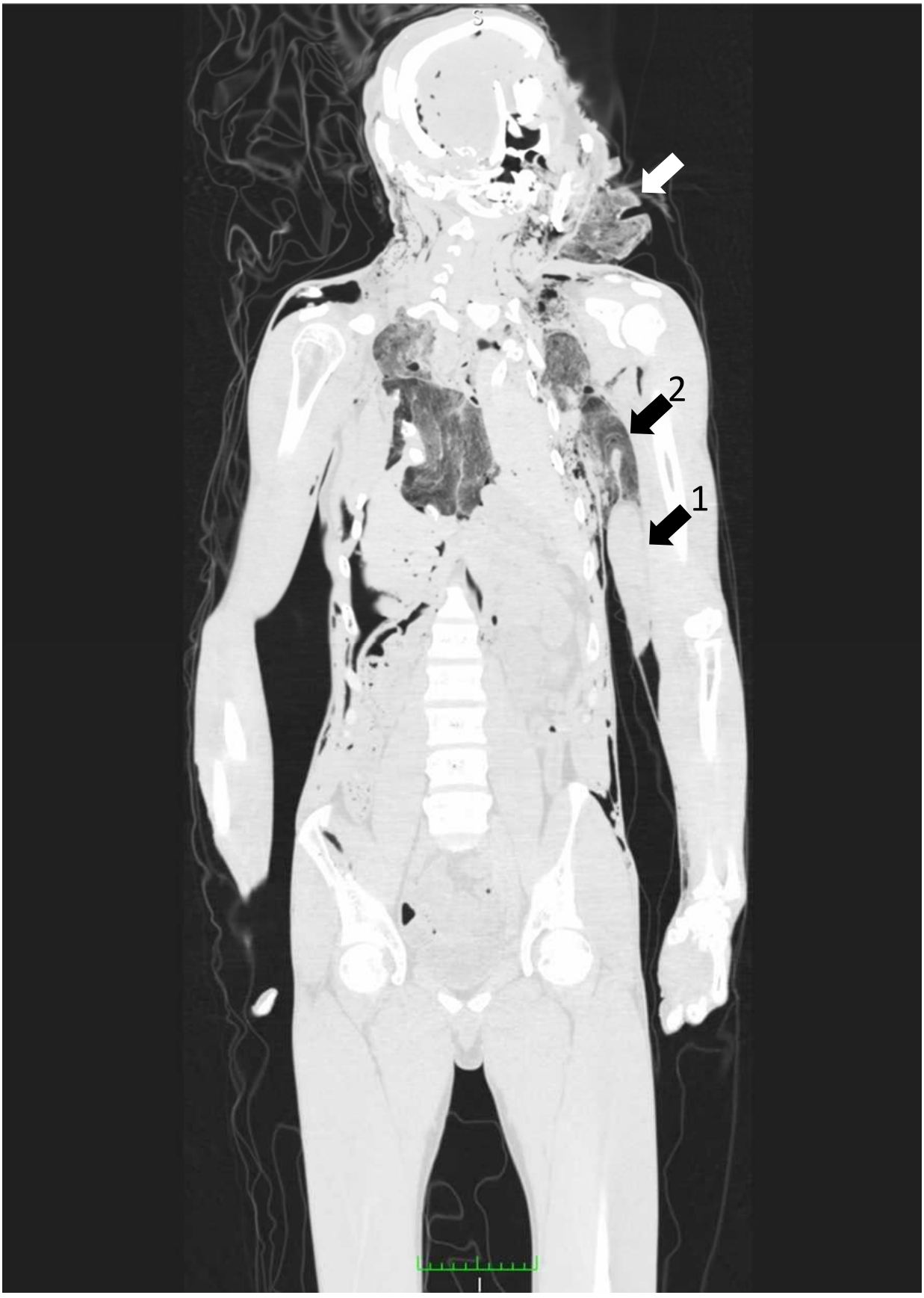



Fig-2