



Case Report

Post-autopsy computed tomography. Pros and cons in a firearm death

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ABSTRACT

Many studies have focused on the importance of post-mortem computed tomography (PMCT) prior to or in substitution of standard forensic autopsies in case of firearm death. However, due to the fact that PMCT is not routinely performed in all countries, in cases of death abroad it can happen that a CT scan is performed only after a first autopsy.

A case of post-mortem re-examination, including the external examination and a post-autopsy computed tomography (PACT), of a gunshot victim of homicide in a foreign country is presented, and the pros and cons of imaging in post-autopsy setting are discussed.

PACT could be a tool for carrying out more complete investigations and for obtaining information on bone injuries and foreign bodies trapped within peripheral soft tissues that can be re-analyzed after the arrival of the first autopsy report. Given that the value of information derived may be strongly influenced by the previously performed autopsy, in order to process the definitive considerations it is necessary to compare and interpret the data obtained through PACT with the results of the first autopsy, and to continue the international cooperation effort and the application of international guidelines in order to share information at the repatriation of the corpse.

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1. Introduction

Many studies have focused on the importance of post-mortem computed tomography (PMCT) prior to or in substitution of standard forensic autopsies in case of firearm death [1–8].

In some particular cases, however, a CT scan can only be performed after an autopsy has been carried out. PMCT, in fact, is not routinely executed in all countries, and in case of death abroad the autopsy is generally carried out before the repatriation of the corpse, making it impossible to perform post-mortem cross-sectional imaging.

Furthermore, cases reported in the literature emphasize both the frequent impossibility of participating in post-mortem investigations in foreign countries, and the common lack of autopsy reports, relating to medico-legal investigations conducted, at the repatriation of the corpse [9].

Although the recognition of medico-legal community that a forensic autopsy should be fully performed dates back in time, second post-mortem examinations performed have sometimes revealed surprising findings regarding the technique used, the completeness of the ascertainment and the cause of death notified

after the first investigation [10–13]. Conflicting autopsy results have been reported also in the recent years [9,14–17], thus disregarding the expectation of uniformity and reduction of second autopsies raised by the publishing of the harmonization of medico-legal autopsy rules [18].

Post-mortem re-examination of a dead body is therefore performed also at present times [9,15,19], particularly in cases of public need for clarity or political overtone [20], but – to the best of our knowledge – no cases have reported the potential usefulness of integrating the second assessment with computed tomography.

A case of post-mortem re-examination, including the external examination and a post-autopsy computed tomography (PACT), involving a young person died in a firearm attack in a foreign country is presented, and pros and cons of imaging in post-autopsy setting are discussed.

2. Case report

In the presented case, no information about the post-mortem ascertainment performed and/or the cause and dynamics of death was available at repatriation of the corpse, and the public funeral was scheduled for the following day. In this particular context (absence of any autopsy report and no communication regarding radiological exams performed) and given the public need for

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clarity about the dynamic of death, a forensic examination of the corpse was requested by the public prosecutor in order to obtain information and to prevent any subsequent exhumation. The dissection of the body and/or any other invasive procedure was not authorized, while the permission of performing radiological examinations was accorded.

External examination findings were the following.

- Low amount of hypostasis.
- Entrance gunshot wound on the apex of the nose and the left part of the upper lip with fragmentation of the alar cartilages of the nose, the left upper incisors and the left upper canine.
- Loss of bone and teeth at the left side of the mandible, with large autopsy sutures in the left mandibular and cervical region with infiltrated margins.
- Multiple ecchymosis and excoriations and large autopsy sutures in the left supraclavicular region, with infiltrated and bruised margins.
- Exit gunshot wound at the posterior left thorax, under the scapula.
- Multiple linear incised wounds sutured with twine, with non-infiltrated margins and surrounding unbruised skin on the scalp, the anterior and posterior part of the neck and the torso; sinking of the sternocostal complex and abnormal motility of the skull.

Post-autopsy computed tomography was performed with a 64-slice CT (General Electric) with high-resolution protocol (slice thickness 1.25 mm). The acquired images were reconstructed with bone-window and soft tissue-window, and multiplanar and volume rendering reformations were obtained. Data obtained by PACT confirmed the findings detected at the external examination (loss of upper left incisors and canine; comminuted fracture of the

left part of the mandible with destruction of bone and teeth correspondents; bilateral anterior section of ribs with disarticulation of clavicles from sternum and sinking of the sternocostal complex; continuous, circumferential and full-thickness cut of skull) and provided further elements, as listed below.

- Comminuted fracture of the middle third of the first left rib (Fig. 1a).
- High concentration of hyperdense bone fragments and artifacts due to metal residues in subcutaneous soft tissues of the left supraclavicular region (Fig. 1a).
- Comminuted fracture of the VII and VIII left ribs, near the costal angle, with everted bone fragments (Fig. 1b and c).

3. Discussion

The fundamental role of forensic imaging, and in particular of PMCT in cases of firearm death has been widely demonstrated in the last years [1–8,21–23], concluding that PMCT is excellent at detecting fractures or other bony pathology and foreign bodies [1], and is now utilized in gunshot victims to investigate the number and location of entrance and exit wounds, the detection of bullets and bullet fragments, the bullet tracks, associated injuries and finally, the cause of death [2]. Advantages of the use of CT in firearm deaths are added to general benefits of PMCT, that are the rapidity of the acquisition, the ethical rationale and benefits due to non-invasiveness, the possibility of three dimensional (3D) reconstruction, and the opportunity to re-investigate the body long after [3].

No cases reported in the literature emphasize the strengths and imitations of forensic imaging, and in particular of CT, in a post-mortem re-examination (PACT).

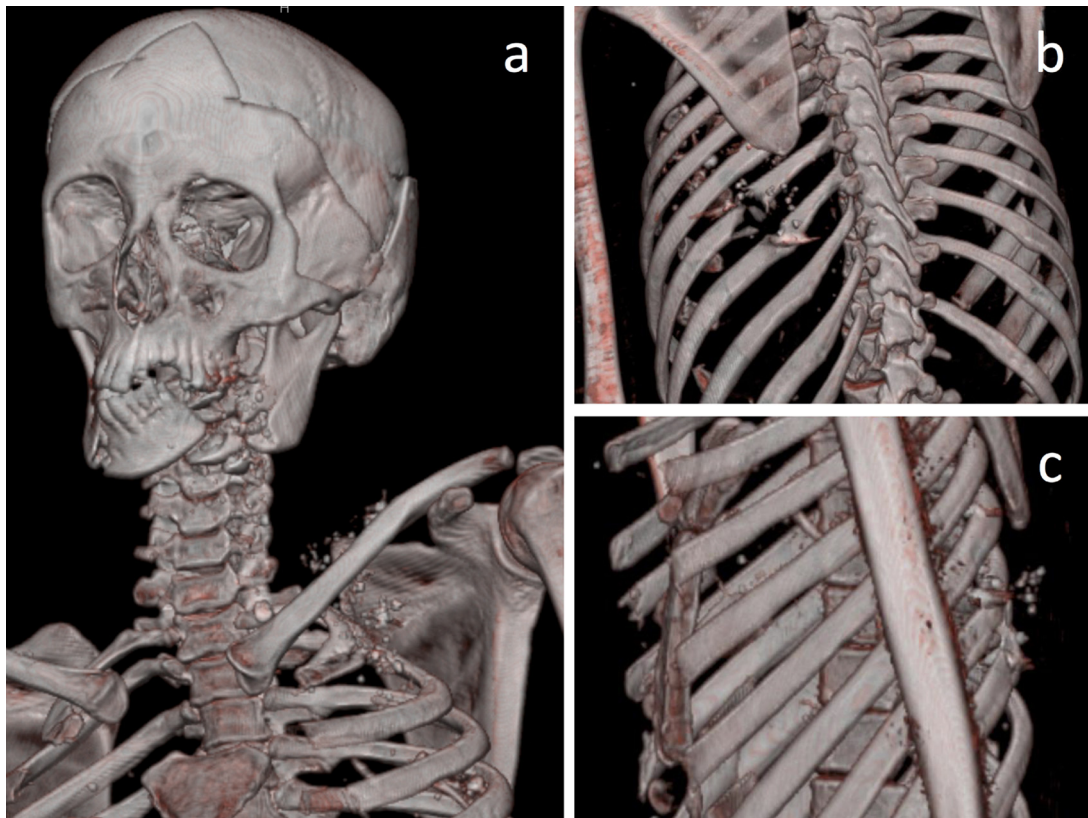


Fig. 1. 3D reconstruction of bone injuries. Comminuted fracture of the middle third of the first left rib, with high concentration of hyperdense bone fragments and artifacts due to metal residues in subcutaneous soft tissues of the left supraclavicular region (a). Comminuted fracture of the VII and VIII left ribs with everted bone fragments (b and c).

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