D52 Postmortem Multi-Slice Computed Tomography of Laryngeal Lesions: Forensic Applications

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The goal of this presentation is to provide a description of postmortem laryngeal lesions diagnosed by multi-slice computed tomography. This presentation will impact the forensic community and/or humanity by providing an example of routine application of the multi-slice computed tomography in forensic sciences.

Background: Multi-slice computed tomography (MSCT) is uncommonly used in forensic pathology. This imaging technique was recently improved by technological innovations and has become an essential tool in the management of many pathologies. MSCT allows two or three-dimensional reconstructions, which can be helpful in traumatic pathologies.

Purpose: To evaluate the possible role of MSCT and elaborate a new imaging semeiology in forensic evaluation of laryngeal lesions.

Technique: Thirty-three forensic cases with laryngeal lesions were examined with a sixteen-detector rows CT (Sensation 16, Siemens). Manners of death studied were homicide, suicide, and accident. Anonymity of the deceased was preserved by wrapping corpses in two radiologically artefact-free body bags. Two-and three-dimensional postprocessing (SSD (Surface Shaded Display) or VRT (Volume Rendering Technique)) were made in all cases. Image interpretation and reconstruction were performed by board-certified neuroradiologists and radiologists. In 22 cases, findings were verified by autopsy made by boardcertified forensic pathologists who were blinded to image results. All three body cavities (cranium, thorax and abdomen) were examined. All these autopsies were made because of a judiciary decision. A retrospective correlation between imaging and autopsy results was performed in order to improve postmortem-imaging semeiology.

Results: Eight cases of laryngeal traumatisms were diagnosed. Causes of death in those cases were suicidal hanging (n=6 cases), suicidal gunshot wound (n=1 case) and accidental motor vehicle accident (n=1 case).

Different laryngeal abnormalities were found: fractures of both thyroid cartilage laminae, isolated fracture of one superior thyroid cartilage horn (distal or inferior thirds of the superior horn), isolated hyoid fracture of one greater horn, isolated luxation between one greater horn and hyoid body, combined fractures of the hyoid bone and thyroid cartilage. No fractures of the cricoid cartilage, or cervical spine were demonstrated.

Forensic vital signs such as air embolism, subcutaneous emphysema, haemorrhage at fractures sites, and pulmonary aspiration were diagnosed.

Radiological pitfalls were encountered; some of them can be misinterpreted as fractures or laryngeal lesions and consequently have to be known by radiologists. The synchondrosis between the greater horn and the body of the hyoid bone may easily simulate a fracture. The heterogeneous calcification of the thyroid cartilage may mimic a lamina fracture. The incomplete and heterogeneous calcification of posterior extremities of the greater hyoid horns may also simulate a fracture. Cartilago triticea are potentially confusing points that may encounter in the assessment of possible fractures of neck structures. They may undergo calcification or ossification and may simulate fractures of the upper ends of the superior cornua of the thyroid cartilage.

Three-dimensional reconstructions were helpful, especially in cases of anatomical variations. One variation in the anatomy of the superior cornua of the thyroid cartilage was diagnosed: the bilateral medial deviation of the superior cornua, which is known to increase throughout life. The authors found a case of stylo-hyoid ligament calcification. Three-dimensional reconstructions are more useful than two dimensional in the assessment of laryngeal lesions and anatomical variation of the thyroid cartilage.

Conclusion: Autopsy is the gold standard examination for the determination of causes of death. Nevertheless, it seems that MSCT has a great potential in forensic sciences. It is much more sensitive than classical Xrays in the diagnosis of bone or cartilaginous traumatic lesions. Furthermore, it allows a non-traumatic diagnosis of soft tissues and organs lesions, with no risk of lesions destruction. Even if it is not question of substitution, MSCT must be considered as a complementary technique, as far as it is performed by a radiologist with a good knowledge of medicolegal issues.

Computed Tomography, Postmortem, Larynx

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