

CQ06 Is it possible to distinguish between antemortem pleural effusion and postmortem pleural fluid retention in postmortem images?

Grade of recommendations: C1

Postmortem CT/MRI can evaluate fluid retention in the pleural cavity and its appearance/ increase after some period after death. The volume of liquid retention varies depending on the cause of death and the postmortem interval. It appears more often when the person has been undergoing resuscitation. There are no reports of image findings of the distinction between antemortem and postmortem pleural fluid retention.

Explanation-----

Background

A small amount of pleural cavity fluid retention is present from the antemortem state, but no CT retention is noted in the absence of morbidity. However, it is thought that after some period following death pleural fluid retention can be considered a late cadaveric phenomenon. There is no report that antemortem pleural effusion and postmortem pleural fluid retention can be distinguished by images.

Image Findings

As a postmortem change observed relatively shortly after death, the phenomenon of hypostasis to the gravity side is observed in the lungs, and a ground glass-like appearance absorption region appears. From the early postmortem period, hypostasis in the lung appears and increases up to about 30 hours after death [1]. Due to postmortem changes in the pleural cavity, the alveolar cavity passes through the pleura and increases as fluid accumulation in the pleural cavity up to approximately 42 hours after death [1]. These phenomena have been confirmed by animal experiments, and the timing of the occurrence of fluid accumulation in the thoracic cavity depends on the cause of death and the environment in which the corpse has been placed [2]. Therefore, when postmortem image interpretation is required, pleural space fluid retention should be interpreted in consideration of these differences.

Since postmortem MRI can detect small amounts of pleural effusion, it may be more advantageous than postmortem CT in assessing the presence or absence of fluid retention. Pleural fluid retention was observed in almost all pediatric cases after death, and its relationship with the postmortem period was reported [3]. There, 23 patients aged 1 to 23 days and examined after death were reported to divide into a group where the pleural cavity fluid retention rapidly increased and a group in which it more gradually increased with the period elapsed after death [3]. Unlike the pleural fluid retention

in children, the relationship between adult pleural fluid retention and postmortem elapsed time is not linear, which is partly due to the lower sensitivity of the CT modality as compared with MRI. However, in examinations for the electrolyte evaluation after drowning (not in the examination of postmortem images), no electrolyte abnormality of pleural effusions was found within 2 days after death, but electrolyte abnormalities were identified with the progress of time [4]. That is, fluid does not continually leak from the alveoli into the pleural cavity, and pleural pores form as postmortem changes in the pleura some time after death. It is thought that the fluid in the alveoli moves (increases) from the alveoli to the pleural space [1, 4]. It has been reported that pleural fluid retention and periportal edema appear in significant volumes in patients undergoing resuscitation due to postmortem changes in in-hospital deaths [5]. From the above, it is concluded that there is a difference between the situations of adult and child postmortem CT and postmortem MRI, and therefore the time of appearance of pleural fluid needs to be further investigated. However, fluid retention in the pleural cavity may be affected by the time elapsed postmortem as well as resuscitation.

Column-----

Pleural effusion refers to a state in which fluid is abnormally accumulated in the pleural cavity or just the fluid, and in many cases described in forensic medicine, it is considered to be limited to fluid retention in the pleural cavity antemortem. At the time of postmortem image interpretation, it is necessary to distinguish between pleural effusion in the case of antemortem and pleural fluid retention in the case of postmortem. By describing pleural cavity fluid retention, it is possible to refer to fluid retention without distinction between antemortem and postmortem.

Literature search formula and literature selection (2019/6/3)

PubMed

#	Search formula	Number of documents
1	Search((((("postmortem CT")OR "postmortem MRI")OR "postmortem imaging")OR "post-mortem CT")OR "post-mortem MRI")OR "postmortem imaging"	822
2	Search(#1)AND "pleural effusion"	9
3	Search(#1)AND "postmortem change"	12
4	Search(#1)AND pleural	17
5	Search((#2)OR #3)OR #4	25

Ichushi (Medical journal)

#	Search formula	Number of documents
1	(死後 mri/AL)and(PT= 原著論文, 会議録除く)	15
2	(死後 ct/AL)and(PT= 原著論文, 会議録除く)	191
3	((胸水/TH or 胸水/AL)or(胸膜腔/TH or 胸膜腔/AL)or(液体/TH or 液体/AL))and(PT= 原著論文, 会議録除く)	29,717
4	#1 and #3	2
5	#2 and #3	12
6	#4 or #5	14

From other than search formula

[4]

References

- [1] Hyodoh H et al: Time-related course of pleural space fluid collection and pulmonary aeration on postmortem computed tomography (PMCT). Leg Med 2015; 17: 221-225 (Level4b)
- [2] Hyodoh H et al: Postmortem computed tomography findings in the thorax: experimental evaluation. Leg Med 2016; 19: 96-100 (Level4b)
- [3] Barber JL et al: Pleural fluid accumulation detectable on paediatric post-mortem imaging: a possible marker of interval since death? Int J Legal Med 2016; 130: 1003-1010 (Level4b)
- [4] Yajima D et al: Diagnosis of drowning by summation of sodium, potassium and chloride ion levels in pleural effusion: differentiating between freshwater and seawater drowning and application to bathtub deaths. Forensic Sci Int 2013; 233: 167-173 (Level4b)
- [5] Wagenveld IM et al: Total-body CT and MR features of postmortem change in in-hospital deaths. PLoS One 2017; 12: e0185115 (Level4b)