

CQ04 What are the findings of postmortem CT for estimating putrefaction and autolysis?

Grade of recommendations: C2

Gases in blood vessels and a number of other organs can be simply detected by postmortem CT. Postmortem autologous digestive tract perforation may be seen on postmortem CT as a finding showing free air in the abdominal cavity. Even if the abdominal free air on postmortem CT may be strong possibility estimated as due to putrefaction, gastrointestinal perforation cannot be excluded only by postmortem CT. If ambiguous findings suggesting peritonitis, or an uncertain history of ulcers or tumors, an autopsy is preferable to confirm the origin of the gas.

Explanation-----

Putrefaction

Corrosion, which is a late corpse phenomenon, means that proteins and organic matter in the human body are anaerobically decomposed into simple organic compounds by the action of various spoilage bacteria, which are indigenous; and foreign bacteria, especially microorganisms. Putrefaction is caused and persists caused by various intestinal bacteria or spoilage bacteria of foreign bacteria. These spoilage bacteria propagate mainly in the blood in blood vessels, and the progress of putrefaction here is also greatly affected by temperature, humidity and air circulation. Putrefaction gas, which is generated by the action of anaerobic bacteria, is generated in the intestinal tract and gradually in the abdominal cavity and in the parenchymal organs of the whole body and subcutaneous tissue [1].

Putrefaction gas in postmortem CT

Normally, putrefaction gas is found in blood vessels and various organs on postmortem CT as late cadaveric phenomena with postmortem changes. Environmental factors such as the temperature and humidity of the corpse affect gas production, but postmortem CT has shown that gas may continue to evolve even when a corpse is placed in a cold room [2]. When the corpse of a diabetic patient who died from sepsis undergoes putrefaction, the gas is caused by gas-producing bacteria of *Escherichia coli*, *Klebsiella*, and *Clostridium* [3]. It has been reported that intracorporeal gas and intrahepatic gas of liver abscesses was observed in corpses [3].

Postmortem CT detection of gas in organs has been reported mainly for the liver [4, 5]. The gas factor may be putrefaction, but this has not been proved. In general, gas tends to increase with the postmortem interval, and liver gas also tends to increase with the passage of time after death [6, 7]. Examination of the time-dependent increase in intrahepatic gas on postmortem CT has shown that gas was gradually becoming conspicuous in the left lobe, but not in the posterior segment of the right lobe [8]. In addition, postmortem CT intrahepatic gas was first found in the portal vein, and there is a report that there was

no intravenous gas when portal vein gas was absent [6]. There is also a report that intravascular gas was detected by postmortem CT in the early postmortem period, and it is considered possible that this was generated by prenatal bacteremia rather than postmortem putrefaction [9]. In addition, postmortem MRI has been reported to show the presence of intrahepatic gas [10].

In postmortem CT, gas is found not only in the liver but in multiple organs and blood vessels [9, 11, 12]. Postmortem CT in children also shows intravascular gas as in adults [13]. In addition to putrefaction, gas in the arteries is thought to be caused by vaporization of dissolved gas in the blood, barotrauma, or of other origins [13, 14].

Autolysis

The process of aseptically and anaerobically decomposing a carcass by its own enzymes is called autolysis. After death, the gastric mucosa may be autodigested by pepsin in the gastric juice, resulting in thinning of the stomach wall and perforation [1]. As a result of gastric perforation caused by autolysis, a postmortem CT has been reported to be able to show the presence of free air in the abdominal cavity [15]. In the case of gastrointestinal perforation due to autolysis, postmortem CT may show gas along the abdominal wall, in the heart chambers, or liver. In a corpse that shows abdominal free air on postmortem CT, a finding suspected to be a gastrointestinal perforation before death is that there is no gas other than abdominal free air that reflects postmortem changes among the late cadaveric phenomena. This is considered to be the distinguishing factor in digestive tract perforation due to autolysis [15].

Autolysis progresses rapidly in the pancreas and is also found in the adrenal medulla [1]. In postmortem CT, it is common that the normal morphology is maintained in the pancreas and adrenal glands where autolysis occurs early in the organs until putrefaction gas appears [16].

Literature search formula and literature selection (2019/6/7)

PubMed

#	Search formula	Number of documents
1	((((((((((((postmortem)OR post-mortem)OR "post mortem"))AND imaging))OR((((postmortem)OR post-mortem)OR "post mortem")) AND CT))OR((((postmortem)OR post-mortem)OR "post mortem")) AND "computed tomography"))OR((((postmortem)OR post-mortem) OR "post mortem"))AND MR))OR((((postmortem)OR post-mortem) OR "post mortem"))AND "magnetic resonance"))OR((((postmortem) OR post-mortem)OR "post mortem"))AND MDCT))OR((MSCT) AND(((postmortem)OR post-mortem)OR "post mortem"))	23,704

2	(((putrefaction OR gas OR autolysis OR decomposition)))AND #1	445
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Ichushi (Medical journal)

#	Search formula	Number of documents
1	(死後CT/AL or 死後MRI/AL or (死亡時画像診断/TH or 死亡時画像診断/AL) or (死亡時画像診断/TH or オートプシーイメージング/AL)) and (LA=日本語, 英語 and PT= 会議録除く)	529
2	(腐敗 /AL or 自己融解 /AL or 自家融解 /AL)and #1 7	7

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