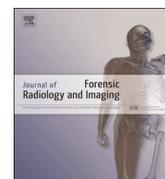




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Case report

Fatal aorto-esophageal fistula detected on postmortem computed tomography angiography

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ABSTRACT

The aorto-esophageal fistula (AEF) is a rare life threatening event, mostly first diagnosed postmortem during the autopsy, although an accurate diagnosis can still be complicated. The postmortem computed tomography (PMCT) including an angiography (PMCTA) is a helpful tool to find the correct diagnosis. This is a case of a fatal gastro-intestinal hemorrhage that occurred due to an aorto-esophageal fistula, diagnosed prior to the conventional autopsy by PMCTA.

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1. Introduction

The aorto-esophageal fistula (AEF) is characterized by an abnormal communication between the thoracic aorta and the esophagus. It is a rare entity which often results in a massive upper gastro-intestinal hemorrhage. Without immediate surgery treatment it almost ends up fatal. Therefore, most of these cases are firstly diagnosed postmortem during the autopsy [1].

The AEF is an uncommon but in most cases life threatening cause of upper gastro-intestinal hemorrhage. Aorto-enteric fistulae are only responsible for 3.5% of cases of upper gastro-intestinal hemorrhage. The AEF constitutes less than 10% of the aorto-enteric fistulae [2,3].

The etiology of aorto-esophageal fistula can be divided into two groups. The primary fistulas could be caused mostly by aortic aneurysms (80%) [3], esophageal or aortic malignancies, ingestion of foreign bodies, aortitis, severe atherosclerosis, esophagitis, or secondary after a surgical treatment or an intervention of the aorta or the esophagus [4,5] like stenting of a thoracic aortic aneurysm. In children, rare instances of congenital aorto-esophageal fistula were described according to developmental anomalies of the great thoracic vessels [5].

The typical symptom trias associated with AEF, which were reported by Chiari [6] in 1914, consists of mid-thoracic pain or

dysphagia, sentinel arterial bleeding, and exsanguinations after a symptom-free interval. However, approximately half of the patients do not present these symptoms [3]. Though, these symptoms were not described in our presented case.

This case report demonstrates that postmortem computed tomography (PMCT) combined with PMCT angiography (PMCTA) enhances forensic investigation and facilitates focused dissection of complex regions like fistula in natural death.

2. Case history

A 76 year old woman was found dead in her apartment one day after being dismissed from hospital. Initial hospitalization was caused by severe, spasmodic upper abdominal pain as well as a mild dyspnea. The first examination in the hospital included blood test, an ultrasound examination of the abdomen and the measurement of the vital parameters. At first the working diagnosis was pancreatitis.

During the hospital stay further work-up was done, including an esophagogastroduodenoscopy leading to the further diagnosis of mild gastritis. Subsequent colonoscopy and a native computed tomography (CT) scan for pneumonia were determined as negative. In the later magnet resonance imaging (MRI) abdomen scan no diagnostic signs of pancreatitis were detected. After final work-up, considering the results of the blood analyses, the patient's symptoms and the further diagnostic procedures, the patient was

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treated for a chronic pancreatitis. After three weeks and an extensive pain treatment, the patient was discharged from the hospital in good physical condition.

At the death scene the corpse and the carpet was covered with a bright reddish fluid, resembling fresh, arterial blood. Natural cause of death was suspected, however the responsible district attorney ordered a full post-mortem investigation to rule out medical maltreatment.

3. Technical data

The corpse was transported to the Institute of Forensic Medicine and underwent a standardized whole body CT-scan using a dual source helical 128-slice CT (Somatom Definition Flash, Siemens Medical Solution, Forchheim, Germany). The following parameters were used: 120 kVp, a reference dose of 400 mAs with automatic exposure control with tube current-time modulation (CareDose4D, Siemens Healthcare, Forchheim, Germany), slice thickness 1 mm, acquisition of 128×0.6 mm.

Because of a suspected bleeding additionally, a PMCTA was performed by cannulation of the femoral arterial and venous vessels. This was according to the adapted protocol of Ross et al. [7] and Grabherr et al. [8]. The used contrast medium was a mixture of polyethylene glycol and an ionized water-soluble contrast medium at a ratio 1:10. The amount of the contrast medium was 3300 ml.

After this injection an additional CT-Scan of the thorax and the abdomen was performed. The chosen parameters were 80/140 kVp, a tube current of 360/140 mAs, slice thickness 1 mm, acquisition of 0.6 mm.

The autopsy was performed directly after the PMCTA. There was a time gap of about 24 h between the estimated time of death and the autopsy.

4. Results

4.1. Imaging findings

On unenhanced whole-body PMCT there was generalized severe atherosclerosis of the entire vascular system. The lungs showed peribronchial ground-glass opacities resembling a tree-in-bud pattern according to aspiration, e.g. blood or stomach content (Fig. 1) and pulmonary emphysema.

The GI-tract presented with mainly hyperdense material localized in the stomach (Fig. 2a) and the small bowel (Fig. 2b), with a density of 57–66 Hounsfield Units (HU), consistent with gastrointestinal hemorrhage [9].

In the arterial PMCTA scan a small connection with extravasation of contrast agent between the descending aorta and the medial part of the esophagus was detected. There was a distinct breach of contrast media into the esophagus, clearly being consistent with a fistula.

In the unenhanced, arterial and venous PMCTA scan no other relevant pathologies were noted. Imaging findings revealed a natural cause of death based on exsanguination due to an AEF, possibly on base of a ruptured atherosclerotic plaque (Fig. 3).

4.2. Autopsy findings

The subsequent autopsy was directed for dissection based on prior imaging finding. Therefore the entire thoracic organs were exenterated en-bloc.

In accordance with imaging the fistula was located about 8 cm distal of the aortic arch.



Fig. 1. Axial PMCT image in lung window showing aspiration (black dashed circle), predominantly in the right lung.

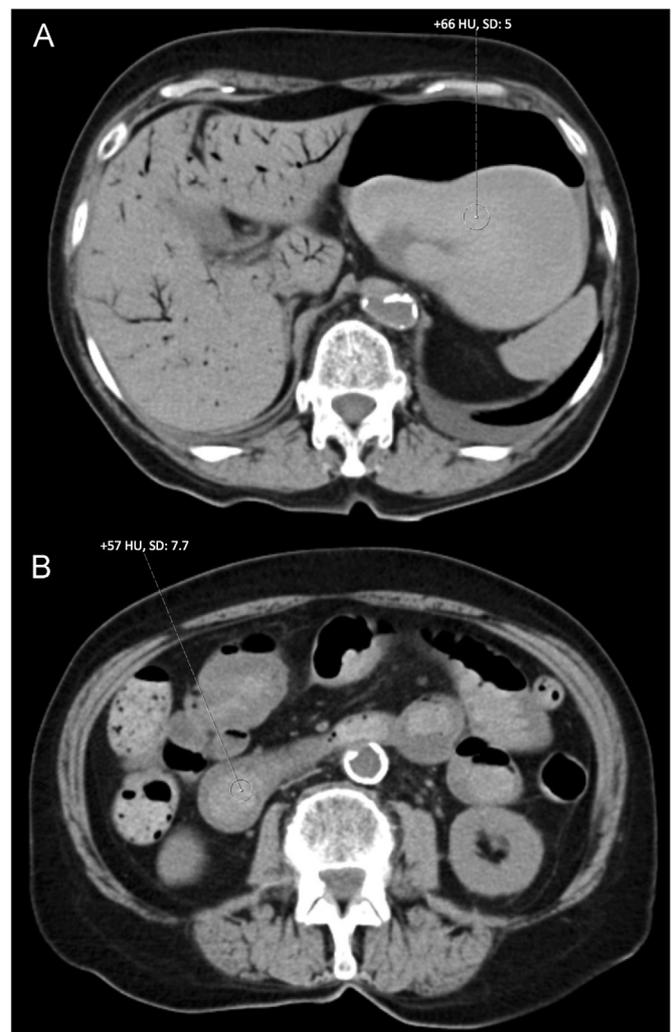


Fig. 2. Axial PMCT images in soft tissue window show hyperdense material in the stomach (A) with +66 HU and in the small bowel (B) with +57 HU. The elevated HU corresponded to gastrointestinal hemorrhage.

The aortal portion of the fistula was embedded in an ulcerous plaque (Fig. 4a). On the esophageal side of the fistula only a small lesion with a maximum diameter of about 2 mm was detected

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