Case #119

NAME Educational Activities Committee

Case provided by:

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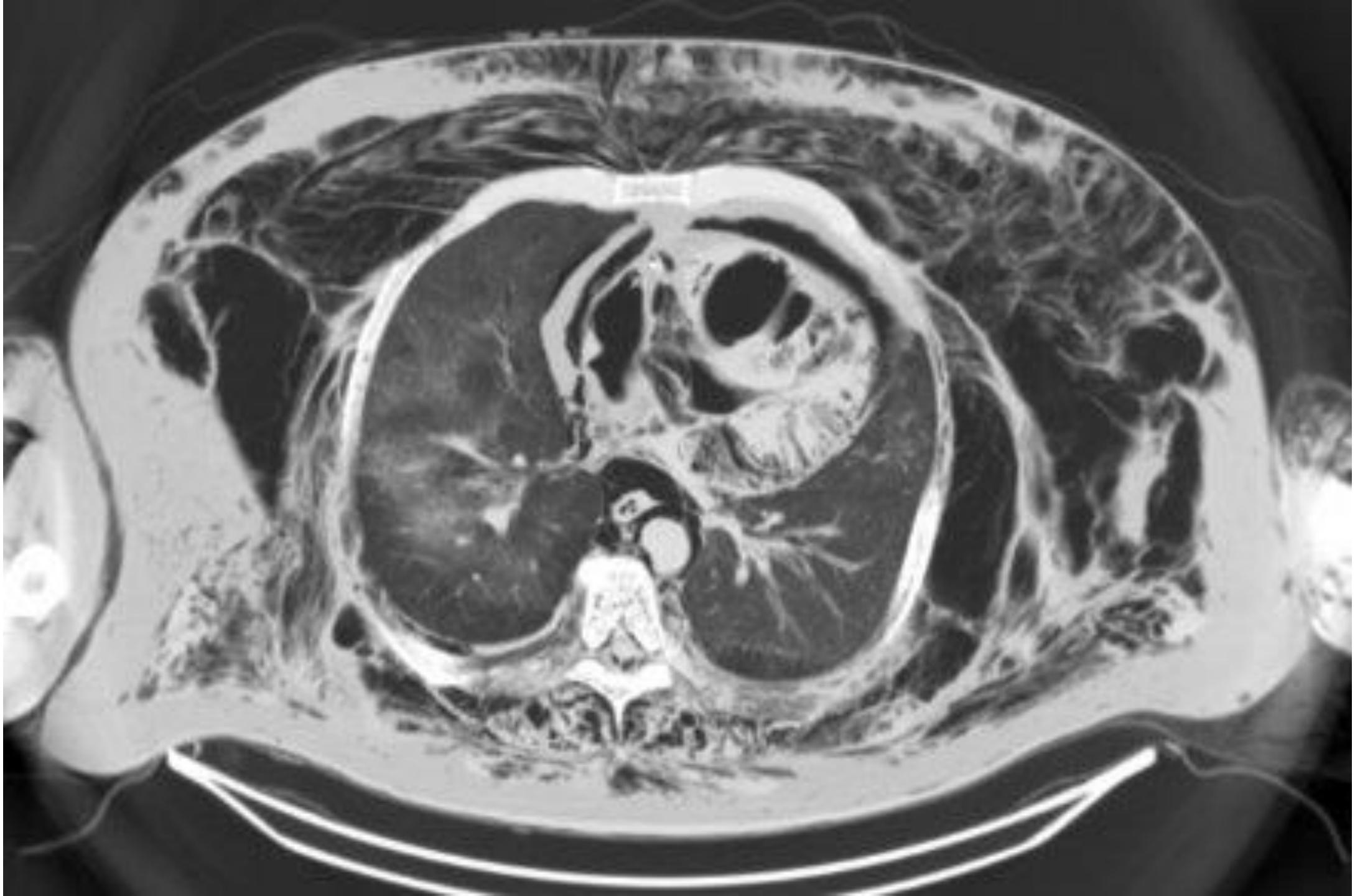

A 60-year-old man with recent cancer diagnosis became progressively unwell over the course of several days. Sudden onset chest pain and shortness of breath led to a call to emergency medical services, but the patient expired. His family did not immediately request autopsy, so his body was temporarily stored at the funeral home before being transported to the hospital for autopsy.

Prior to autopsy, the decedent underwent postmortem CT. Which of the following processes is being shown?

A. Hydrogenation and hydrolysis
B. Iatrogenic emphysema
C. Extended (or prolonged) postmortem interval
D. Gas gangrene

Answer...

C. Extended (or prolonged) postmortem interval

(CORRECT ANSWER, 75.40% of responses)

Unfortunately, the funeral home where the decedent's body was temporarily stored did not have appropriate refrigeration; and the decedent died during a very hot week in the middle of the summer.

Axial PMCT image of the chest with lung windowing shows diffuse subcutaneous emphysema most pronounced in the anterior chest wall. There is also pneumomediastinum, pneumopericardium, and gas within the cardiac chambers.

In the absence of respiration, the lung parenchyma (which in a living person should appear a darker shade of black due to inflation) demonstrate diffuse hazy "ground-glass" opacities secondary to postmortem hypo-inflation and atelectasis.

The diffuse gas seen in this decedent results from a form of decomposition known as **putrefaction, a process of tissue breakdown driven by bacterial growth and fermentation**. This begins in the intestines and results in diffuse gaseous distension of the bowel. As it progresses, loss of mucosal integrity facilitates migration of natural flora into the blood vessels and throughout the body. The presence of intravascular gas is an indirect sign of this process and is typically first seen within the portal venous system and right heart; from there, it spreads throughout the venous system. As decomposition progresses, the body takes on a swollen appearance, and gas can be seen throughout the viscera and within the muscles and other soft tissues. Over time, necrosis and liquefaction lead to dependent visceral collapse and, eventually, skeletonization.

Other responses…

A. Hydrogenation and hydrolysis

(6.00% of responses)

Hydrogenation and hydrolysis occur as part of the decomposition process of saponification. This process results in the formation of an insoluble, soapy or wax-like substance (known as adipocere) from fatty tissues. A pathognomonic sign of this process is the deposition of hyper-attenuating (i.e., bright) calcium in the subcutaneous soft tissues. Unlike putrefaction, this process tends to preserve tissues.
Soft tissue expansion by gas is not characteristic of saponification.

B. Iatrogenic emphysema

(8.80% of responses)

Iatrogenic emphysema occurs in the setting of medical intervention. In the thorax, subcutaneous emphysema and pneumomediastinum may occur secondary to placement of a chest tube, intubation with mechanical ventilation, rigorous CPR attempts (such as with a mechanical resuscitation device) resulting in multiple rib fractures, or head/neck surgery. It has even been described following dental procedures.
While soft tissue gas is seen in this setting, it tends to be more focal. The more diffuse soft tissue expansion by gas and presence of gas in multiple compartments is therefore inconsistent with iatrogenic emphysema.

D. Gas gangrene

(9.80% of responses)

Emphysematous (gas) gangrene, also known as myonecrosis, describes a rapidly progressive, highly lethal deep soft tissue infection caused by *Clostridium* species bacteria, typically *C. perfringens*. It can occur under a wide variety of circumstances, including following trauma, inoculation of a wound or surgical site, or illegal drug use, although spontaneous infections have also been reported. Immunocompromised patients and those with diabetes mellitus are at increased risk. Although soft tissue emphysema is a hallmark finding of gas gangrene, the diffuse distribution of gas within multiple body compartments in this decedent is inconsistent with this diagnosis, as an infection would be expected to demonstrate more focal findings. In postmortem imaging evaluations, care should be taken not to confuse findings related to putrefaction for antemortem pathology.

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