Case #53

NAME Educational Activities Committee

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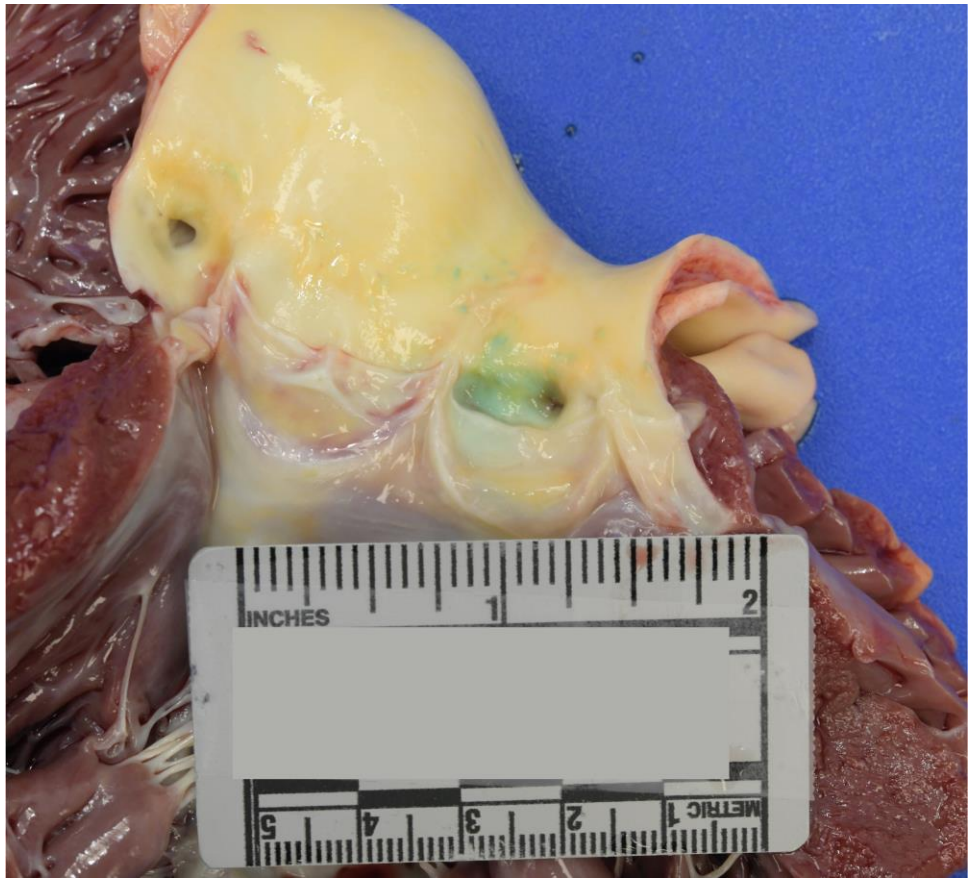
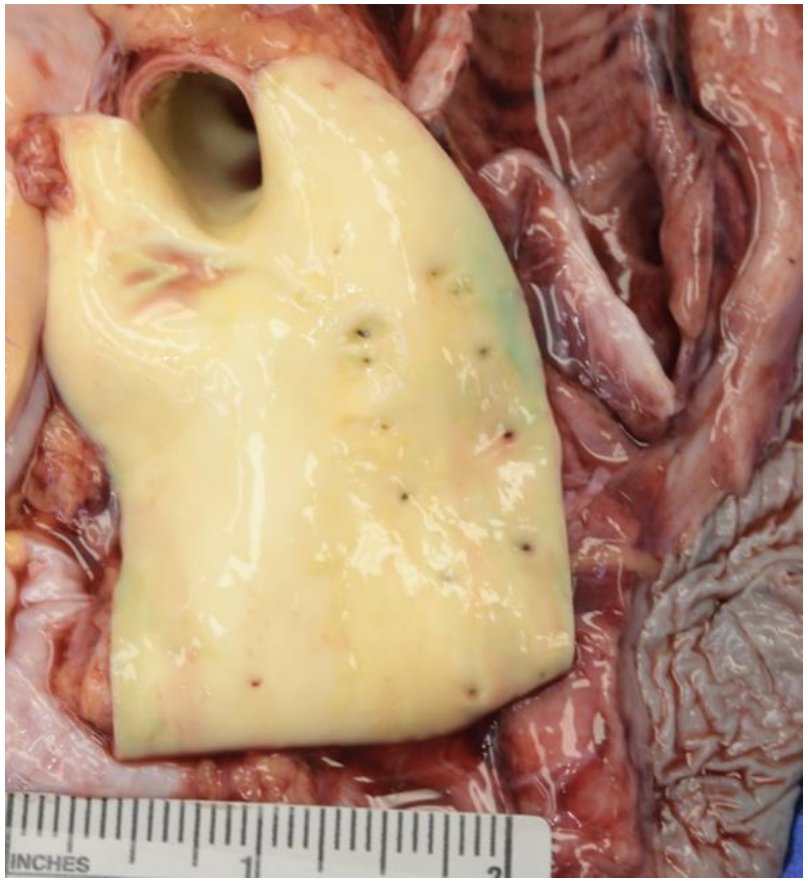
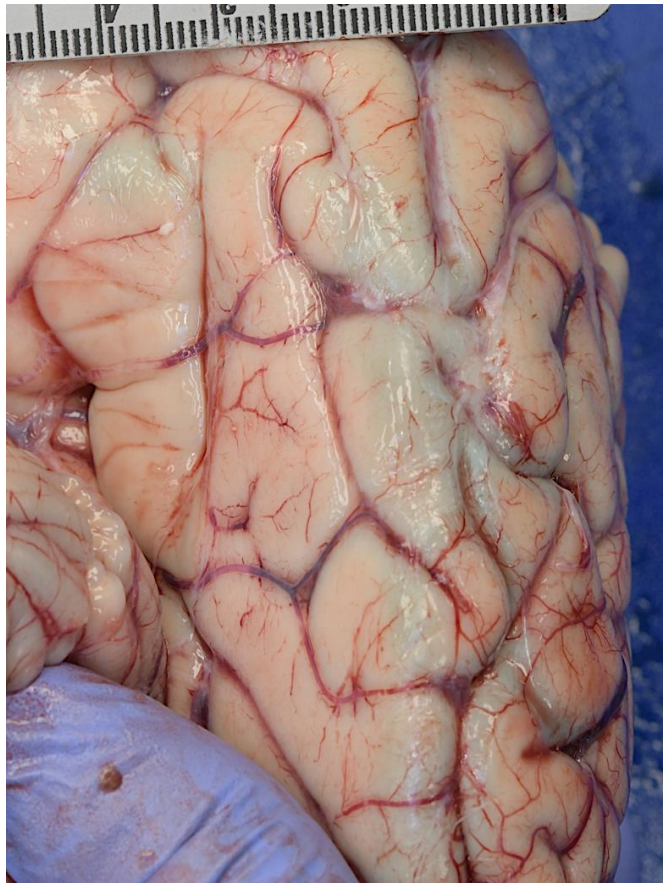
A 41-year-old female with no significant medical history is found unresponsive in her apartment. Emergency services transported her to a local hospital, but despite resuscitative efforts, she died. What is the most likely cause of the autopsy findings seen in the images?







A. Artifact from cardiopulmonary resuscitation.
B. Blood cultures positive for *Streptococcus viridans.*
C. Immunocompromised state with *Pseudomonas aeruginosa* infection
D. Early decomposition.
E. The subject died of hydrogen sulfide poisoning.

A. The subject underwent cardiopulmonary resuscitation.

Correct answer: A. The bluish-green discoloration seen in the photos of the cardiac valve and aortic intima results from methylene blue administration during cardiopulmonary resuscitation. Methylene blue has been traditionally used as a reducing agent in the treatment of methemoglobinemia. Recent studies show that methylene blue can be used as a treatment for refractory shock since it induces systemic and pulmonary vasoconstriction through its action as a selective inhibitor of guanylate cyclase. Moreover, it markedly reduces blood-brain barrier disruption and subsequent neurological injury after ischemia/reperfusion following cardiac arrest. Similar findings can be observed on the cortical surface of the brain. The discoloration becomes more pronounced upon prolonged exposure to air. This unexpected finding is merely a benign artifact in this case.

B. Blood cultures were positive for *Streptococcus viridans.*

Incorrect answer. The viridans streptococci are a large group of commensal streptococcal Gram-positive bacteria species that are α-hemolytic. They are generally considered to be of low pathogenic potential in immunocompetent individuals. They are associated with infective endocarditis, abscess formation, and bacteremia. Typically, some *Streptococcus viridans* species produce a green discoloration on blood agar plates. However, they do not cause green discoloration of internal organs.

C. The subject was immunocompromised and infected by *Pseudomonas aeruginosa.*

Incorrect answer. Immunocompromised subjects are susceptible to opportunistic infections. Among these, *Pseudomonas aeruginosa* is one of the most common. This microorganism typically produces a blue-green pigmentation in culture growth as well as in infected tissue (*chloronychia*) secondary to combinations of multiple metabolites such as pyocyanin and pyoverdine. However, the discoloration is usually limited to the nails.

D. The findings are caused by early decomposition.

Incorrect answer. Decomposition results in discoloration of the organs although the color change is usually red/grey/green/brown and not blue. In this case, the organs showed no evidence of decomposition.

E. The subject died of hydrogen sulfide poisoning.

Incorrect answer. Hydrogen sulfide (H_2S) is a colorless gas that has a pungent odor likened to the smell of rotten eggs. It is flammable and can be explosive. It is produced by the decomposition of sulfur-containing organic matter and is used in some manufacturing processes. Most reported H_2S deaths occurred following exposure to sewer gas containing the compound. Rarely, industrial exposures have been described. Typical autopsy findings following exposure include green discoloration of the gray matter of the brain and green patches on the skin. However, discoloration of the heart and aorta have not been described. The subject had no known exposure prior to death.

References

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