

Culture-Positive, Vegetation-Negative Infective Endocarditis: A Case Report of *Aggregatibacter actinomycetemcomitans* Infection and Review of Diagnostic Strategies

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INTRODUCTION

- Infective endocarditis (IE) remains a severe condition with high mortality, often caused by diverse pathogens including *Aggregatibacter actinomycetemcomitans*, a member of the HACEK group known for subacute IE presentations.
- HACEK bacteria are fastidious, slow-growing, gram-negative organisms that are part of the normal oral flora.
- They are a rare cause of infective endocarditis (IE), responsible for 1–3% of cases, and typically lead to a favorable prognosis.

CASE PRESENTATION

- A 58-year-old man with a history of multiple cardiac surgeries, including an aortic valve replacement, presented with lethargy, low-grade fever, and dizziness. He had a known history of non-ischemic dilated cardiomyopathy with a significantly reduced left ventricular ejection fraction.
- On examination, he had a new diastolic murmur and septic emboli in his toe. The microbiological diagnosis was confirmed by blood cultures, which initially showed bacterial growth within two days on the BACTEC FX system. Gram staining of these cultures identified gram-negative coccobacilli (Figure 1.0). Initially, no growth was observed on blood agar and MacConkey agar after 24 hours, but subsequent incubation for a total of 48 hours led to the appearance of growth, particularly on chocolate agar. After 24 hours on chocolate agar (Figure 2), small whitish colonies emerged (Figure 2.0) which were subsequently identified as *Aggregatibacter actinomycetemcomitans* using the Bruker Biotyper MALDI-TOF MS system. The organism was found to be susceptible to augmentin, ceftriaxone, imipenem, and meropenem.
- Despite a transesophageal echocardiogram not showing any vegetations, the patient was diagnosed with infective endocarditis based on the Duke-ISCVID 2023 criteria.
- His diagnosis was supported by the repeated isolation of the bacteria from his blood, a history of prosthetic valve, fever, and evidence of vascular phenomena.
- He was successfully treated with a two-week course of intravenous gentamicin and a four-week course of cefotaxime and was reported to be clinically stable upon discharge.

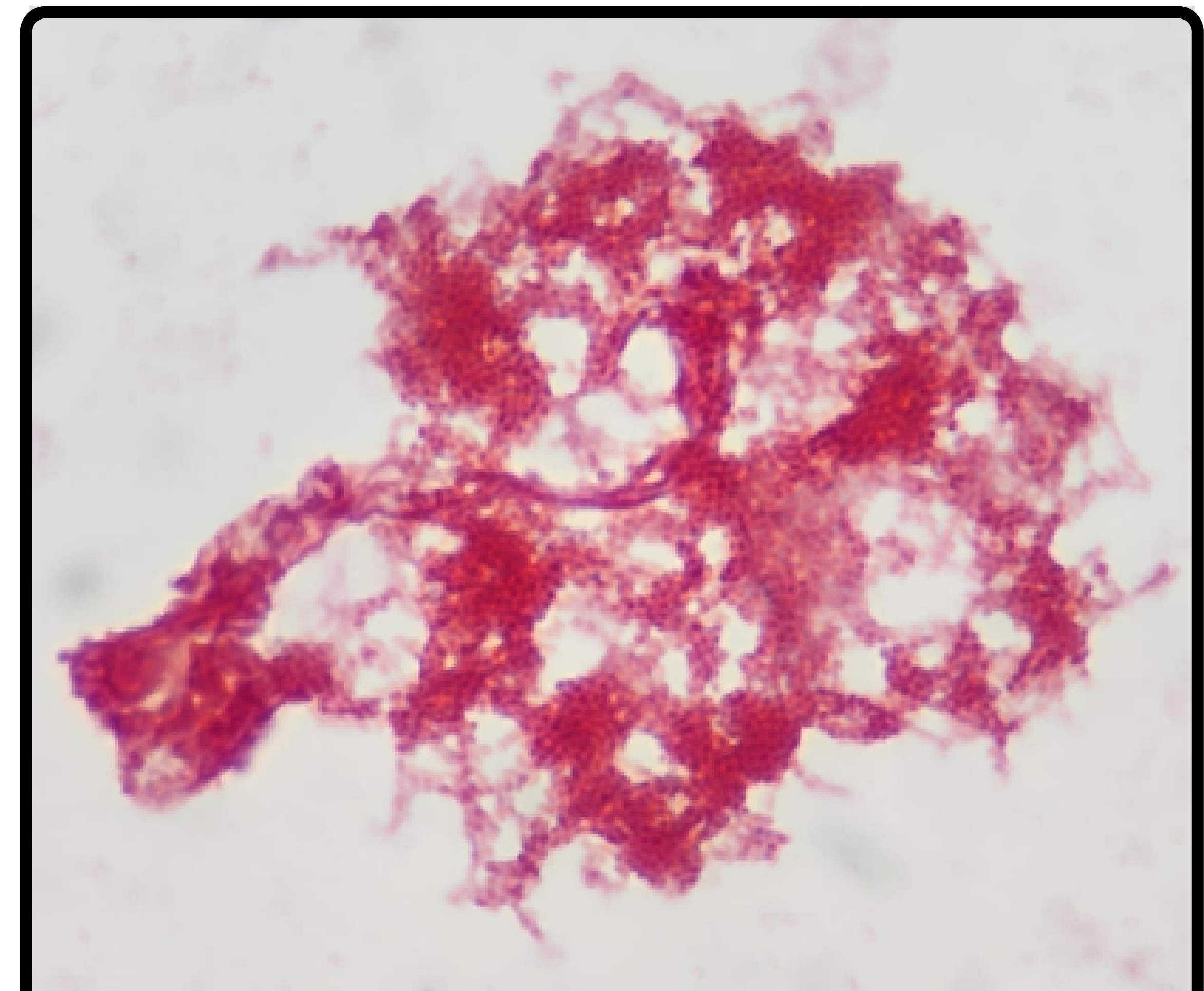


Figure 1.0. Gram staining identified gram-negative coccobacilli

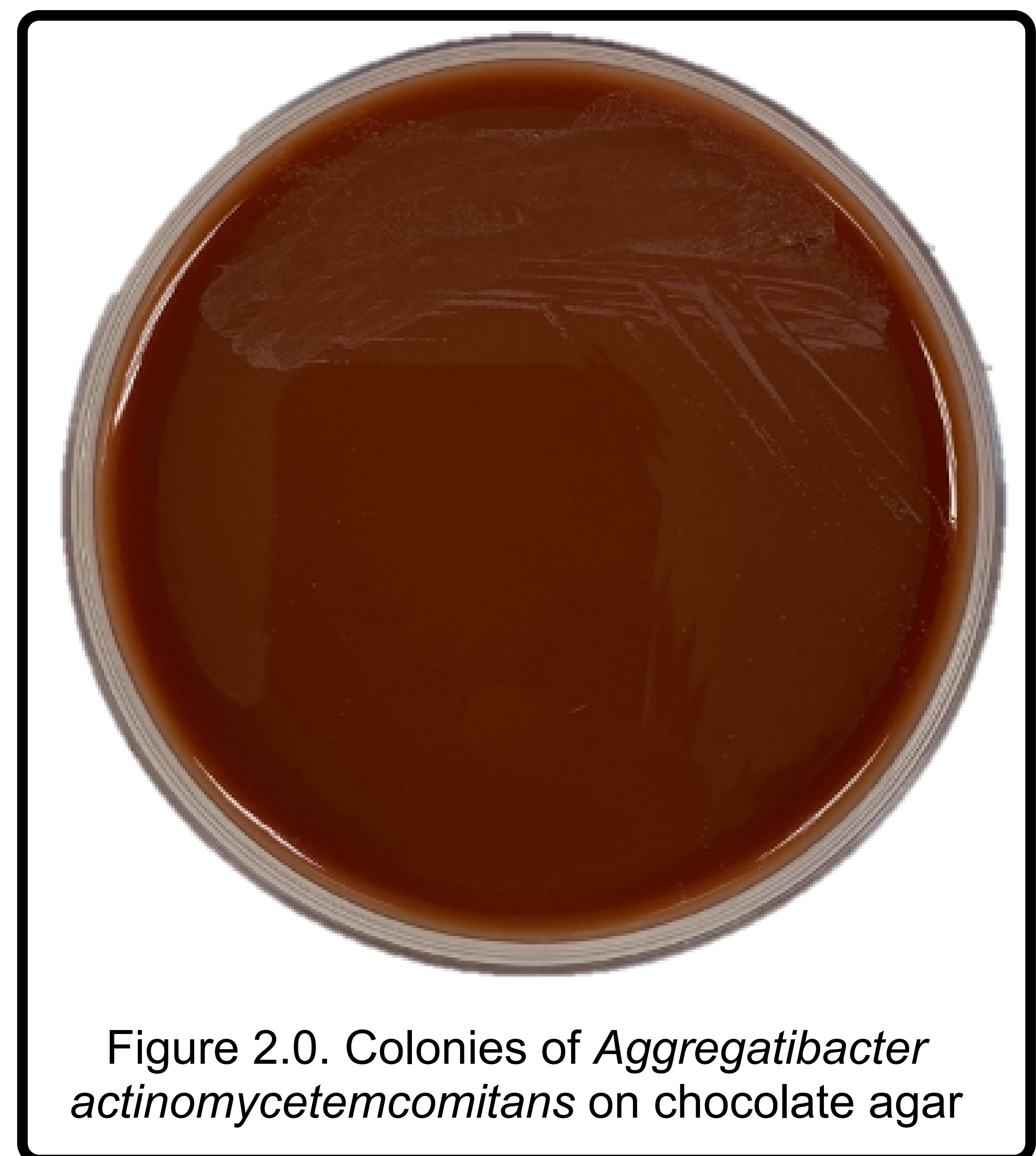


Figure 2.0. Colonies of *Aggregatibacter actinomycetemcomitans* on chocolate agar

DISCUSSION

- Diagnostic challenges:** Detecting *Aggregatibacter actinomycetemcomitans* is difficult due to its slow growth. While standard blood culture protocols may be insufficient, the BACTEC automated system successfully grew the organism within three days in this case. However, prolonged incubation of up to 14 days is still recommended for suspected HACEK-related endocarditis to avoid missing slow-growing organisms.
- Advanced diagnostic tools:** MALDI-TOF mass spectrometry provides a rapid and accurate identification of the organism once it grows in culture. When blood cultures are inconclusive, molecular techniques like PCR and NGS(Next-Generation Sequencing) can be used to detect bacterial DNA directly from blood or tissue.
- Clinical implications:** A high index of suspicion for IE is crucial in patients with predisposing cardiac conditions like prosthetic valves, even when echocardiography is inconclusive. The Duke-ISCVID 2023 criteria can be used to make a diagnosis based on a combination of clinical, microbiological, and imaging findings.
- Echocardiography limitations:** The patient's metallic prosthetic valve likely interfered with the echocardiogram, potentially causing a false-negative result for vegetations. Transesophageal echocardiography (TOE) is a more sensitive and specific imaging modality that should be considered for better visualization, especially when clinical suspicion remains high.

CONCLUSION

- Diagnosing infective endocarditis (IE) caused by *Aggregatibacter actinomycetemcomitans* requires integrating microbiological, clinical, and imaging data, as exemplified by this case.
- The absence of vegetations on an echocardiogram does not rule out the diagnosis if other Duke-ISCVID criteria are met, such as positive blood cultures from multiple samples.
- This highlights the importance of a comprehensive diagnostic approach, especially in patients with a history of complex cardiac conditions or prosthetic valves.

REFERENCES

- Habib, G., Lancellotti, P., Antunes, M. J., Bongiorno, M. G., Casalta, J. P., Del Zotti, F., Dulgheru, R., El Khoury, G., Erba, P. A., Jung, B., & Miro, J. M. (2015). 2015 ESC Guidelines for the management of infective endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). *European Heart Journal*, 36(44), 3075-3128. <https://doi.org/10.1093/eurheartj/ehv319>
- Brouqui, P., & Raoult, D. (2021). Diagnosis and management of infective endocarditis. *Clinical Microbiology Reviews*, 34(1), e00007-21. <https://doi.org/10.1128/CMR.00007-21>
- Gould, F. K., & Denning, D. W. (2023). 2023 Duke-ISCVID criteria for infective endocarditis. *Journal of Cardiovascular Infections*, 17(2), 123-134.
- Lafora, V., & Pérez, J. L. (2022). MALDI-TOF MS in clinical microbiology: An update. *Clinical Infectious Diseases*, 74(8), 1501-1508. <https://doi.org/10.1093/cid/ciab949>
- Revest, M., & Le Fevre, H. (2016). HACEK endocarditis: Epidemiology, clinical features, and prognosis. *Journal of Infection*, 72(5), 453-459. <https://doi.org/10.1016/j.jinf.2016.03.003>
- Haq, M. S., & Khan, A. S. (2021). Echocardiographic imaging techniques in infective endocarditis. *Journal of Cardiovascular Ultrasound*, 29(1), 23-31. <https://doi.org/10.4250/jcu.2021.29.1.23>