

Bordetella holmseii Endocarditis: A Case Study

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Abstract

A nine year old asplenic, febrile patient with history of a heart valve replacement was admitted with suspected endocarditis. *Bordetella holmseii*, a rare, opportunistic, gram negative cocci was identified in blood cultures. *Bordetella holmseii* can cause serious infections including endocarditis, and asplenia appears to be a risk factor for such infections. There is a lack of awareness of *Bordetella holmseii*. Clinicians should be aware of the bacteremia risk with *Bordetella holmseii* in febrile, asplenic patients. Likewise, microbiologists should suspect this organism when gram negative rods or coccobacilli present in this population leading them to scrutinize routine procedures for identifying organisms. Automated systems may not include rare organisms, and standardized treatment data is not available for *Bordetella holmseii* thus alternative identification methods may need to be performed and susceptibility testing should be performed for every case. In the future, mass spectrometry may overcome limitations involved in identifying rare organisms.

Introduction

A 9 year old patient presents to the ER because his parents are concerned that he may be dehydrated as due suffering from gastritis for 5 days. The patient is febrile.

Medical History

- Congenital dextrocardia
- Congenital asplenia
- Mitral Valve replacement in 2006

LABORATORY RESULTS

WBC count: $19.2 \times 10^3/\mu\text{L}$
3 positive blood cultures out of 10 sets

Blood Culture results

Small to moderate sized gram negative rods
Grew best on Chocolate Agar and appeared after 72 hours

Catalase Negative

No growth on Mac Conkey agar at 3 days

Identification

Confirmed to be *Bordetella holmseii* by 16S RNA gene sequencing

Microbiology

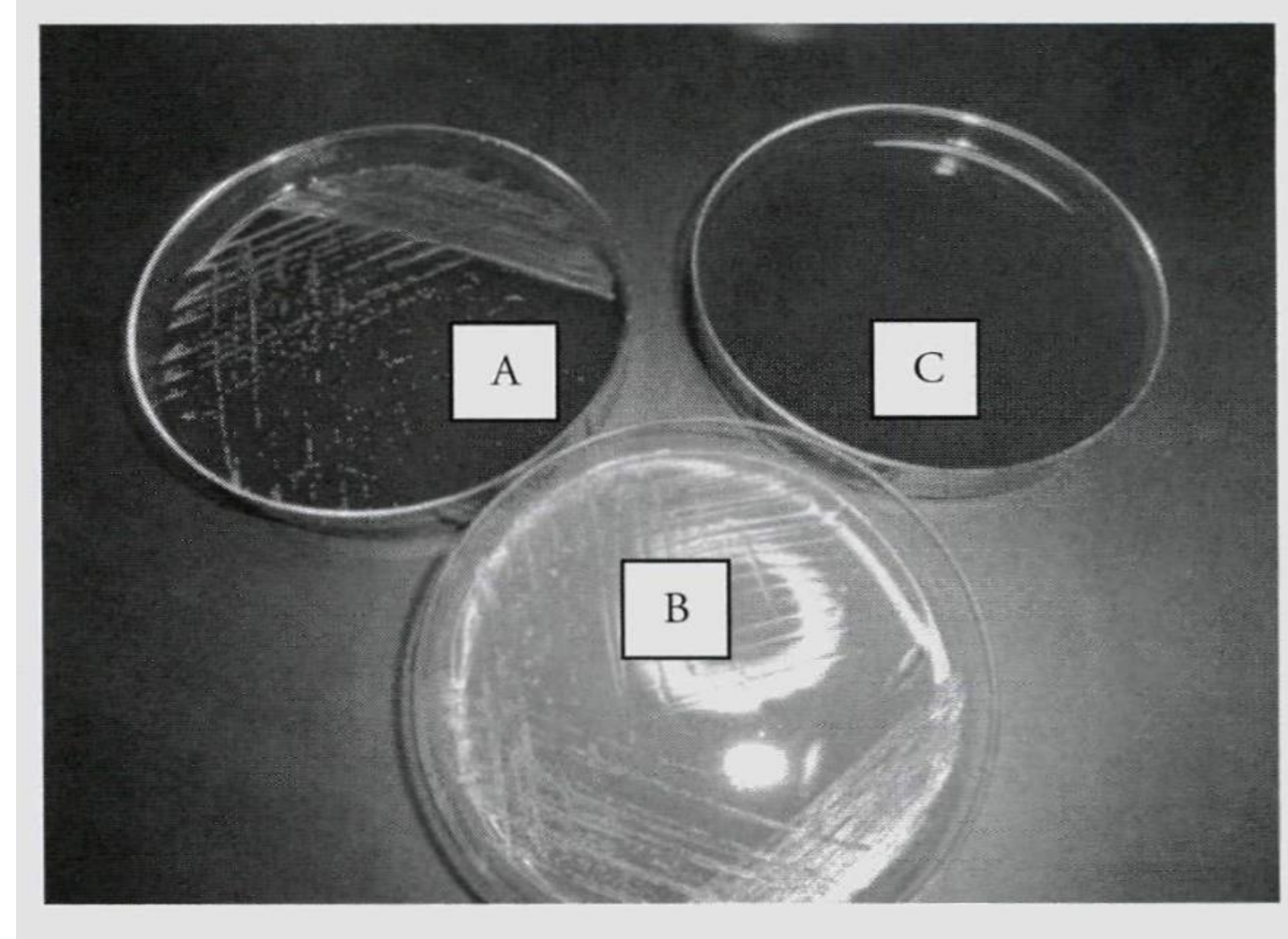
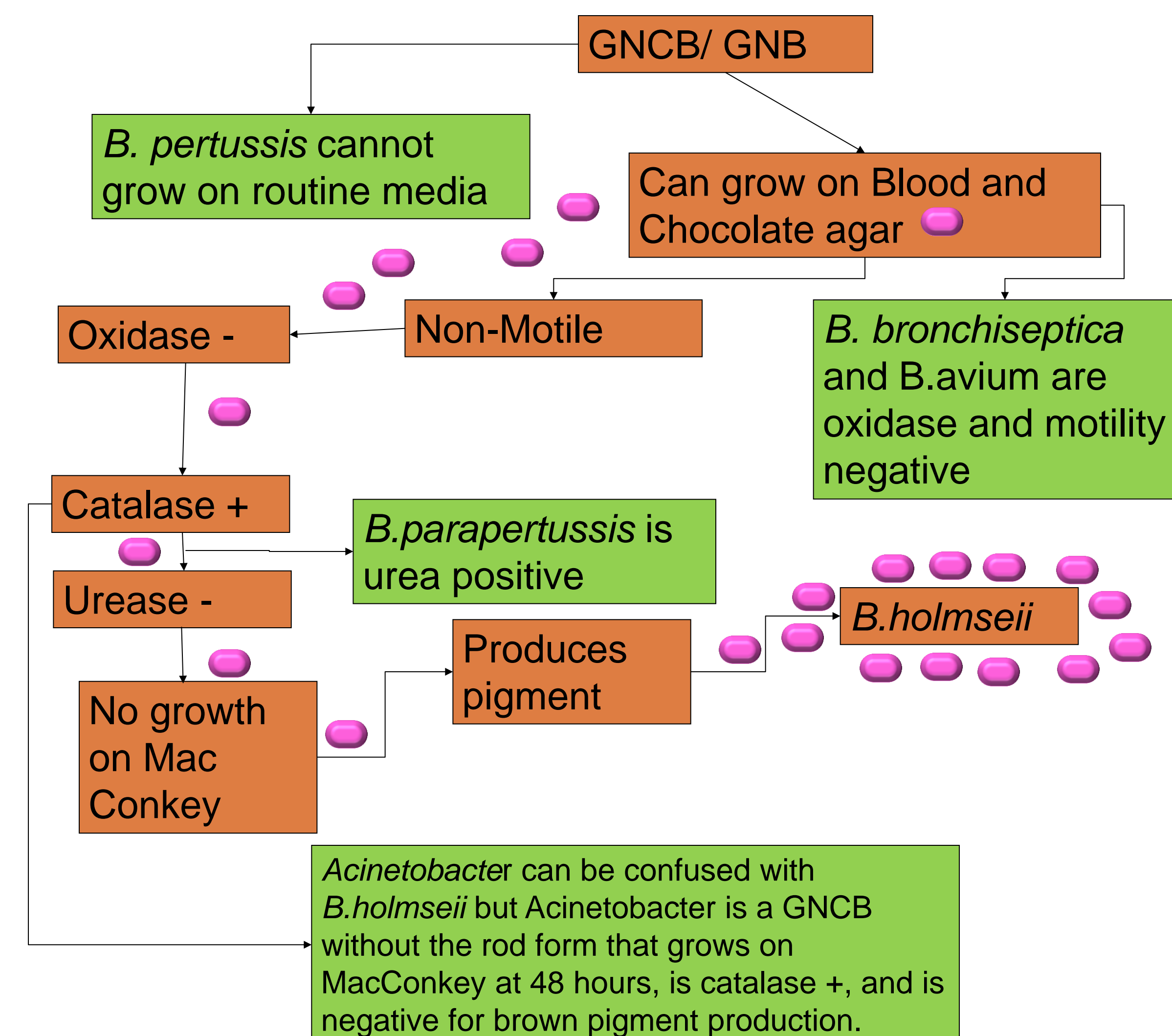


Figure 1. Growth of *Bordetella holmseii* at 72 hours . Pinpoint growth on Blood Agar(A) and Chocolate agar (B) and no growth on MacConkey.



The Identification of *Bordetella holmseii*.

Clinical Features, epidemiology, and transmission.

Bordetella holmseii :

- is a rare opportunistic isolate
- primarily occurs in immunocompromised patients causing non respiratory infections including endocarditis.
- is associated with pertussis like respiratory infections.
- is associated with anatomical or functional asplenia (most patients infected have asplenia)
- heart valve replacement is also a risk factor
- habitat and transmission are unknown.

Treatment

- No standardized treatment data is available.
- The patient in this case responded positively to Azithromycin, given orally along with intravenous meropenem but several studies have shown that β -lactams are not ideal for treatment of *B. holmseii*.
- In this case the *B. holmseii* isolated was resistant to 3rd generation cephalosporins.
- Due to variable sensitivity results in *B. holmseii* cases, susceptibilities should be performed for every case of *B. holmseii*.
- Respiratory infections often resolve on their own.
- Favorable outcome for other more serious infections with proper treatment.

Discussion

B. holmseii is a rare opportunistic pathogen mostly affecting immunocompromised individuals.

Blood Culture collection

- In suspected cases of acute endocarditis : 3 sets of BCs are collected from 3 different sites in a 1-2 hour site.
- In suspected sub-acute endocarditis 3 sets of BC collected from separate sites over a 24 hour period.

Why is *B. holmseii* not isolated more frequently in respiratory specimens?

- Low pathogenicity of *B. holmseii*.
- Slow organism growth.
- Cephalixin presence in routine transport medium used for isolation of *B. pertussis* does not support *B. holmseii*.

Rare Pathogens

- Routine procedures need to be scrutinized when attempting to isolate rare organisms
- Automated systems may not include information about rare pathogens.
- If an automated system does not have information on a rare pathogen, it will not be able to determine susceptibilities thus alternative methods must be used to determine susceptibilities.
- Catalase and pigment production are important in the identification of *B. holmseii*.

Conclusion

- Clinicians and Microbiologists should be mindful of the increased chances of bacteremia with *Bordetella holmseii* in febrile, asplenic patients.
- The presence of slow growing GNR or GNCR seen asplenic, febrile patients should be highly suspicious of *B. holmseii*
- *Acinetobacter* ID with unusual biochemical characteristics should be questioned.
- Awareness of clinical criteria can help lab staff recognize possible organism misidentification.
- 16 rRNA gene sequencing was accurate in identifying *B. holmseii* in this case.
- Mass Spectrometry may be very useful in identifying rare organisms in the future.

Acknowledgements

The information for this poster is comes from a case study written by Jeanne M Stoddard. This poster solely presents this information.

References

1. Stoddard JM. A case of *Bordetella holmseii* Endocarditis in an Asplenic Pediatric Patient. Clin Lab Sci. 2015;25(4):171.