Moraxella Catarrhalis

Previously known as: Branhamella catarrhalis, Neisseria catarrhalis or Micrococcus catarrhalis.

Pathogenesis

This is a Gram-negative, aerobic, oxidase-positive diplococcus. The genera Moraxella (including the former Branhamella), Acinetobacter and Psychrobacter currently belong to the family Moraxellaceae; the classification is currently under review.

Moraxella catarrhalis is an exclusively human commensal and mucosal pathogen.\(^1\)

It is a common commensal organism of the upper respiratory tract, particularly in children; however, it is increasingly being recognised as a pathological organism causing otitis media, sinusitis, ocular infection and occasionally laryngitis.\(^2\) It may cause bronchitis or pneumonia in adults and children with underlying lung disease.\(^3, 4\)

Rarely, it may lead to bacteraemia and meningitis in the immunocompromised. Bacteraemic infection can lead to localised complications such as osteomyelitis and septic arthropathy. It can also cause nosocomial infection in a hospital setting, particularly in respiratory, paediatric and intensive care units.

Epidemiology

- The prevalence of M. catarrhalis colonisation is highly dependent on age.
- Healthy adults are rarely colonised with this organism, whereas most infants have upper respiratory tract colonisation at some time in the first several years of life.
- Carriage rates among populations of children vary from 28% to100%.\(^5, 6\)
- M. catarrhalis has been shown to be positively cultured in at least one site in 42% of patients with sinusitis and 27% of well adults.\(^7\)
- In healthy adults the carriage rate is much lower at 1-10%. Carriage rates among those with underlying lung disease and the elderly are higher.\(^8\)
- It is a leading cause of otitis media in children.\(^9\)
- Only a proportion of positive bacteriological cultures occurring in children are thought to be of clinical significance (~9% in those aged <5 years and ~33% in those aged 6-10 years).
- M. catarrhalis is estimated to cause ~10% of exacerbations in chronic obstructive pulmonary disease (COPD) patients.\(^1\)

Presentation

**In children**

It may present with typical clinical features of:

- Upper respiratory tract infection.
- Sinusitis.
- Otitis media.
- Lower respiratory tract infection.
- Tracheitis.
- Conjunctivitis.
- Keratitis.
- Bacteraemia (usually in the immunocompromised).

**In adults**

In those with underlying respiratory disease such as COPD, it may present as:

- Laryngitis.
- Bronchitis.
- Pneumonia.
- Nosocomial outbreaks of infection (thought to be transferred from carers/visitors).

**In the immunocompromised**

This includes patients with cystic fibrosis. It rarely causes:

- Pericarditis.
- Endocarditis.
- Septic arthritis.
Sporadic cases
These include:

- Neonatal ophthalmic infection.
- Urinary tract infection.
- Wound infection.
- Peritonitis in patients undergoing chronic ambulatory peritoneal dialysis (CAPD).

There are no examination findings peculiar to, or discriminatory for, infection with *M. catarrhalis* and findings will be as expected for each of the disease entities it causes. Differentiation from other pathogens is on microbiological grounds.

Differential diagnosis

Bacteriological differential diagnosis is between those conditions that commonly cause infection in the sites listed above such as:

- *Streptococcus pneumoniae*.
- *Haemophilus influenzae*.
- Causes of atypical pneumonia.
- Viral causes of upper/lower respiratory tract infection.
- Fungal infection (should be considered as a possible cause of illness in the immunocompromised).

Investigations

- FBC may reveal elevated WCC (predominantly neutrophils).
- Gram-staining of sputum, middle-ear effusion fluid/aspirate, nasopharyngeal aspirate, sinus aspirate, transtracheal/transbronchial aspirate, blood, peritoneal fluid, wounds or urine will reveal Gram-negative diplococci.
- The organism may be cultured from the same sources.
- It may be difficult to discriminate *M. catarrhalis* from *Neisseria* spp. but use of differential culture media can help.
- Serological tests are of little use due to significant cross-reactivity with *Neisseria* spp.
- Imaging may be used to determine the site and extent of infection - eg, CT scan of sinuses and CXR.
- Lumbar puncture and blood cultures are useful in diagnosing bacteraemic infection and meningitis.

Management

- The vast majority of isolates of *M. catarrhalis* are penicillin-resistant through the production of beta-lactamase.[2]
- Trimethoprim resistance is also common.
- Macrolide antibiotics such as erythromycin and clarithromycin are useful. However, there is some resistance to these antibiotics.[10]
- There is less resistance with newer macrolides such as azithromycin.[2]
- There is also low resistance with amoxicillin with clavulanate.[2]
- Quinolones such as ciprofloxacin and ofloxacin can be effective.
- Second- or third-generation cephalosporins may be used.[11]
- Tetracyclines are also active against this pathogen - eg, doxycycline.

Complications

- Recurrence/failure to respond to antibiotic therapy.
- Bacteraemia/systemic sepsis (mainly in the immunocompromised).
- Meningitis (mainly in the immunocompromised).
- Mastoiditis complicating otitis media.
- Hearing impairment complicating otitis media.
- Pleural effusion complicating pneumonia.
- Death in advanced cases.

Prognosis

The vast majority of cases of community-acquired upper respiratory tract infection will recover spontaneously or respond to antibiotics, without complications or sequelae.

Prognosis among the immunocompromised, those with underlying lung disease, those in hospital, the elderly and the very young is variable but tends to be worse.

Prevention

- Nosocomial outbreaks can be prevented by good hygiene techniques in hospitals, particularly hand washing/use of alcohol gel hand rubs.
• It is thought that the infection may spread from person to person via droplet infection from expectorated sputum; it may help to isolate confirmed cases in hospital where this is possible and give attention to general hygiene measures to prevent spread in community cases.
• Smoking cessation should reduce susceptibility to infection in those with respiratory disease.
• Vaccines are currently in development.[9]

Further reading & references


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