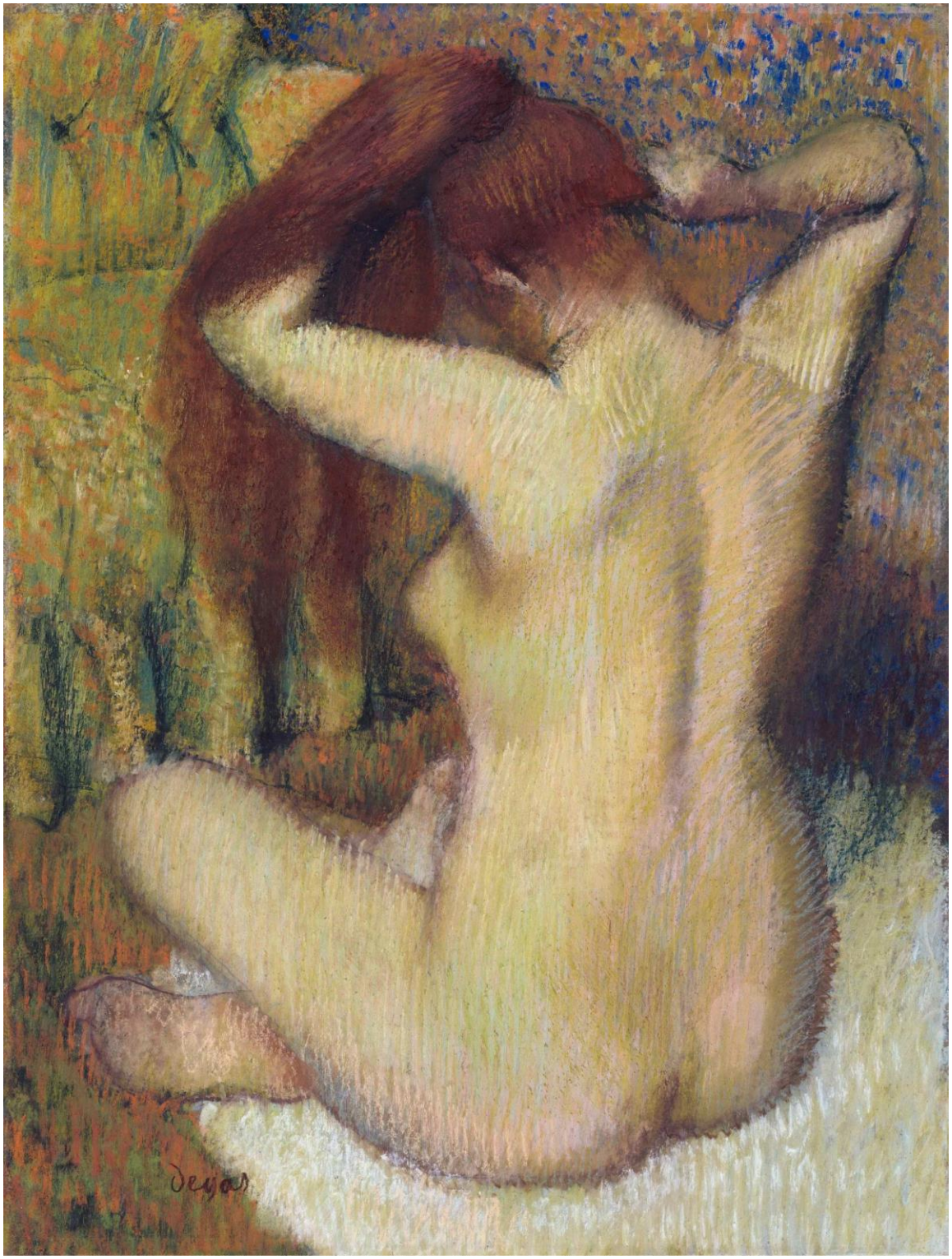
THE NORTHERN HOSPITAL

MYCOPLASMA PNEUMONIAE



"After the Bath, Woman Drying her Neck", pastel on mounted paper,
Edgar Degas Musee d'Orsay.

In the work of Monsieur Degas - and perhaps of no other - human skin lives its own expressive life. The lines drawn by this cruel and sagacious observer elucidate, through the tangles of his wildly elliptical abbreviations, the mechanism of a motile being's every movement.

They record not only the essential gesture but its most remote and minimal myological repercussions: hence the decisive unity of draughtsmanship. An art of realism, it does not proceed from direct vision: - no sooner does a being know itself than its native spontaneity no longer functions.

Therefore Degas does not copy from nature: he accumulates a host of sketches of a single subject, whence he derives the irrefragable veracity he bestows on his work; never have pictures so little suggested the painful image of the "model" who "poses".

Felix Feneon, "Les Impressionnistes",
La Vogue, 13-20 June, 1886.

Edgar's bathers by the mid 1880s were now well known, and notorious. But at least the critics, such as Felix Feneon, were now beginning to understand Edgar a little better.

Though Edgar claimed he was a Realist, he never painted directly from life, rather, "he accumulates a host of sketches of a single subject, whence he derives the irrefragable veracity he bestows on his work".

Accumulating sketches from life, was about the extent of Edgar's "realism" - after that he adjusted nature according to his own ideals - "For you, (i.e the "critics") natural life is necessary, for me artificial life!", he once explained, "Reproduce only what has struck you, that is, the essential, in that way your memories and imagination are liberated from the tyranny that nature holds over them"....hardly "realist" sentiments, and hardly "en plein air" Impressionism either! Edgars style in truth was unique.

He made use of the Impressionist style to convey his concept of reality, virtually anticipating the age of Art Nouveau, with its "wildly elliptical abbreviations". He caught the curves of a woman's body, and by his brilliance brought into sharp reality, a "motile being's every movement"

In his style of "keyhole voyeurism", he was accused of being a "cruel and sagacious observer", however to attain a depiction of reality, Edgar thought this to be imperative, and the results were stunning, "never have pictures so little suggested the painful image of the "model" who "poses"!

Though Edgar accumulated a vast "host of sketches of single subjects", we do not know who any of his bathing models were. They may have been dancers, or common prostitutes, but equally they may have been women of high society and renown, Edgar certainly moved in the right circles. Intriguingly the image of a woman with beautiful flowing flaming red hair is seen over, and over and over again., but we never see her face. Was this the same woman, or did Edgar simply have a passionate "thing" for red heads and in particular their backs, and more particular again the backs of their necks?

The mysterious redhead is not only seen in Edgar's bathers, she seems to appear again and again in his dancers as well. Though we do not know, and probably never will know unless new evidence comes to light, it seems quite possible indeed that the enigmatic redheaded bather was in fact a dancer at the Paris Opera.

In an age that lacked modern central heating the Parisian atelier in winter could be a bitterly ice cold place, just the thing for catching all manner of respiratory ailments! The atelier of Edgar Degas, however was always warm, inviting, intimate. With roaring fires, and gas heated water that filled his model's tubs he created quite the perfect boudoir setting for his most famous motif apart from his dancers, the "woman at her bath".

Both upper and lower respiratory tract infections, are about as common as redheads in a Degas painting, and yet the exact identity of the pathogen is never exactly established, often merely being labelled as "viral", no antibiotics required. However the matter of exact identity can be very important - in the case of mycoplasma pneumoniae for example antibiotics will be required!

Left: "The Dance Class" oil on canvas, c.1873-76, Edgar Degas. Right: "Repetition of the Dance", oil on canvas, 1877, Edgar Degas

MYCOPLASMA PNEUMONIAE

Introduction

Mycoplasma pneumoniae is a far more **common** cause of community-acquired pneumonia (CAP) in younger patients, than is generally appreciated.

M. pneumoniae most commonly causes **upper respiratory tract infections** but can also cause **lower respiratory tract infections (pneumonia**).

Many extra-pulmonary manifestations have been described, although a causal link for many of these is uncertain.

In the majority of cases the course is benign with most resolving without serious sequelae, however in a small number of cases serious illness can occur including **severe pneumonia** and other significant complications.

History

In 1938, **Reimann** probably described the first cases of mycoplasma pneumonia.

He coined the term "**atypical pneumonia**" after observing 7 patients in Philadelphia with marked constitutional symptoms, upper and lower respiratory tract symptoms, and a protracted course of infection with gradual resolution.

Mycoplasma was shown to be the causative agent in 1961.

Epidemiology

Mycoplasma pneumoniae infection occurs worldwide.

Epidemics of mycoplasma pneumonia tend to occur every 4 - 8 years in the general population. These tend to be more frequent within closed populations, such as in military and prison populations.

Mycoplasma pneumonia may be seen in all age groups; however, it is most common between **5 - 20 years.**

It is however rare in children under the age of 5 years.

Pathology

Organism:

- Mycoplasma pneumoniae belongs to the class **Mollicutes,** which are the smallest known *free living* microorganisms.

M. pneumoniae is a small organism, technically a bacterium, in the shape of a short rod, but it **lacks a typical bacterial cell wall**.

Like bacteria but unlike viruses, it does not need a host cell for replication.

It grows under both aerobic and anaerobic conditions

Pathogenicity:

The **prolonged paroxysmal cough** that can be seen in some patients is thought to be due to the inhibition of ciliary movement.

M pneumoniae has a remarkable gliding motility and specialized tip organelles that allows it to burrow between cilia within the respiratory epithelium, eventually causing damage and sloughing of respiratory epithelial cells.

The organism has two properties that seem to correlate well with its pathogenicity in humans:

- A selective affinity for respiratory epithelial cells
- The ability to produce hydrogen peroxide, which is thought to be responsible for:
  - ♥ Much of the initial cell disruption in the respiratory tract
  - ♥ Damage to erythrocyte membranes.

The pathogenicity of M pneumoniae has been linked to the activation of inflammatory mediators, including cytokines.

Reservoir

- Humans

Transmission

- This is by person-to-person contact with respiratory secretions.

Incubation Period

- The incubation period averages **3 weeks**, (in contrast to that of influenza and other viral pneumonias, which generally is a few days only).

Period of communicability

- This is uncertain, but is probably less than 20 days.

Susceptibility & resistance

- Immunity after infection with M pneumoniae is **not** long lasting.
- Recurrent infection can occur.

Clinical Features

Up to 20 % of infections are asymptomatic.

No clinical (or radiographic) features reliably distinguish mycoplasma pneumonia from pneumonia of any other etiology.

Features of symptomatic illness include:

1. Upper respiratory tract infection:
    - This occurs in around 75% of infections
    - Ear involvement may demonstrate an erythematous tympanic membrane.

      Bullous myringitis was once considered to be a typical manifestation of mycoplasma infection of the middle ear, however it is now thought that this condition is **rarely**, if ever caused by M. pneumoniae, and so absence of this sign should **not** dissuade one from a diagnosis of M. pneumoniae infection. [2]

2. Mycoplasma pneumonia:

    This may occur in about 5 % of infections.

    There is typically an insidious onset of symptoms from days to weeks.

    - Fever
    - Non-specific constitutional symptoms:
        - ♥ Malaise, lethargy, anorexia, headache, myalgias.
    - Lower respiratory tract symptoms:
        - ♥ Cough
        - ♥ Chest pain
        - ♥ Dyspnea
        - ♥ Wheezing: [2]

♥♥ M. pneumoniae infection may worsen asthma symptoms and can produce wheezing in children who do not have asthma.

A separate question, for which there has been some experimental and clinical evidence, is whether M. pneumoniae might have a pathogenic role in asthma.

Natural History:

Most cases of pneumonia due to M pneumoniae resolve after **several weeks**, although a protracted dry cough can persist for as long as a month.

Some patients can have a *protracted illness* lasting as long as 6 weeks.

Occasionally **significant complications** can arise as listed below.

Complications:

Mycoplasma pneumoniae has been identified with an increasing array of significant complications. These are probably autoimmune phenomena.

They include:

1. Dermatological:
    - Erythema multiforme
    - **Stevens-Johnson syndrome:**
        - **Mycoplasma may be the most common *infectious* agent associated with this syndrome.**
2. GIT:
    - Acute hepatitis
    - Acute pancreatitis
3. Hematological:
    - Immune thrombocytopenic purpura
    - Autoimmune hemolytic anemia:

- ♥ IgM antibodies to the I antigen on erythrocyte membranes appear during the course of infection and produce a cold agglutinin response in about 60 % of patients.

  Cross reaction between mycoplasma antigens and human ones is thought to promote the production of such autoantibodies. Although hemolysis may be severe, especially in patients with **sickle cell disease**, in most cases it is not clinically significant.

4. Neurological symptoms:

   CNS involvement occurs most frequently in children an may include:

   - Encephalitis, meningitis, transverse myelitis

5. Rheumatologic:

   - Arthralgias, reactive poly-arthritis
   - Raynaud's phenomenon may also be seen in M. pneumoniae infection, possibly secondary to cold agglutinin formation.

6. Cardiac:

   - Myocarditis

Investigations

Diagnosis of acute infections remains difficult; there being no quick and reliable tests currently available.

Therefore, early recognition of outbreaks has been problematic and diagnosis is often retrospective.

1. FBE

   - WCC may be elevated, but may be normal
   - A positive Coombs' test and an elevated reticulocyte count suggest hemolysis.

2. CRP/ ESR

   - Is usually elevated.

2. Serology:

   - IgM / IgG:

IgM:

- ♥ IgM antibodies rise earlier than IgG antibodies. IgM antibody titers begin to rise approximately 7-9 days after infection and peak at 3-4 weeks

IgG:

- ♥ Tests that demonstrate a 4 fold or greater increase in acute and convalescent IgG sera titers or a single IgG titer greater than or equal to 1:32 are diagnostic.

- Cold agglutinins: [2]

  The formation of cold agglutinins is a **non-specific early IgM reaction** against the erythrocyte I antigen.

  Cold agglutinins develop in approximately 50 - 75 % of all patients, one to two weeks after infection.

  The incidence of cold agglutinins is highest in children and decreases with age.

  Other bacterial, rickettsial, and viral (in particular, influenza) infections can also result in the production of cold agglutinins. Since it is neither sensitive nor specific, the utility of this test has been questioned; but it may have a place in the right clinical setting.

  Cross reaction between mycoplasma antigens and human ones is thought to promote the production of such autoantibodies. They can result in hemolysis. Although hemolysis may be severe, especially in patients with sickle cell disease, it is usually not clinically significant

3. **PCR:**

   - **Samples of respiratory secretions can be taken from the nose or throat for PCR testing.**

     This is the criterion standard confirmatory test for M. pneumoniae.

4. Culture:

   - Mycoplasma is difficult to culture, requiring not only specialized growth medium, but also long growth times (up to 21 days) and is only successful in approximately 50 % of cases.

     Note M. pneumoniae lacks a cell wall and so **cannot be Gram stained**.

CXR

Findings are **non- specific** and **non -diagnostic**, but may include:

- Bilateral pulmonary infiltrates, (alveolar or reticular)
- Peri-bronchial thickening.
- Regions of atelectasis
- Small pleural effusions
- Regions of consolidation, (less commonly)

Management

Hospitalized patients with pneumonia caused by Mycoplasma should be placed on droplet precautions.

Antibiotics:

Therapy is generally for 7 - 10 days, but prolonged treatment (14 days) may be necessary because of the organism's ability to reside intracellularly. [2]. Exact duration of therapy depends on clinical response.

Options include: [3]

- **Doxycycline** 100 mg orally, 12 hourly

  Child 8 years or older: 2 mg/kg (up to 100 mg)

Or macrolides:

- **Azithromycin** 500 mg orally or IV, daily

  Child: 10 mg/kg (up to 500 mg)

  Note that azithromycin, which may be used for just 3 - 5 days because it has a long *intracellular* half-life

Or

- **Clarithromycin** 500 mg orally, 12 hourly

  Child: 7.5 mg/kg (up to 500 mg)

Although a significant proportion of isolates worldwide remain susceptible to macrolides, alternative therapy should be considered in patients with severe or refractory disease, particularly in those who reside in areas where there is a substantial rate of macrolide resistance (such as China and Asia in general).

Fluoroquinolones such as levofloxacin or moxifloxacin are also effective.

Note that beta lactam antibiotics such as the penicillins and cephalosporins are *ineffective,* because the organism lacks a cell wall.

Vaccine:

There is no vaccine currently available for the prevention M. pneumoniae infection.

References

1. Michael Joseph Bono, Mycoplasma Pneumonia in eMedicine Website, 5 September 2014.

2. Stephen G Baum at al. Mycoplasma Pneumonia in Up to Date Website, 10 March 2016.

3. eTG - July 2018

Dr J. Hayes
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