THE NORTHERN HOSPITAL

BRUCELLOSIS

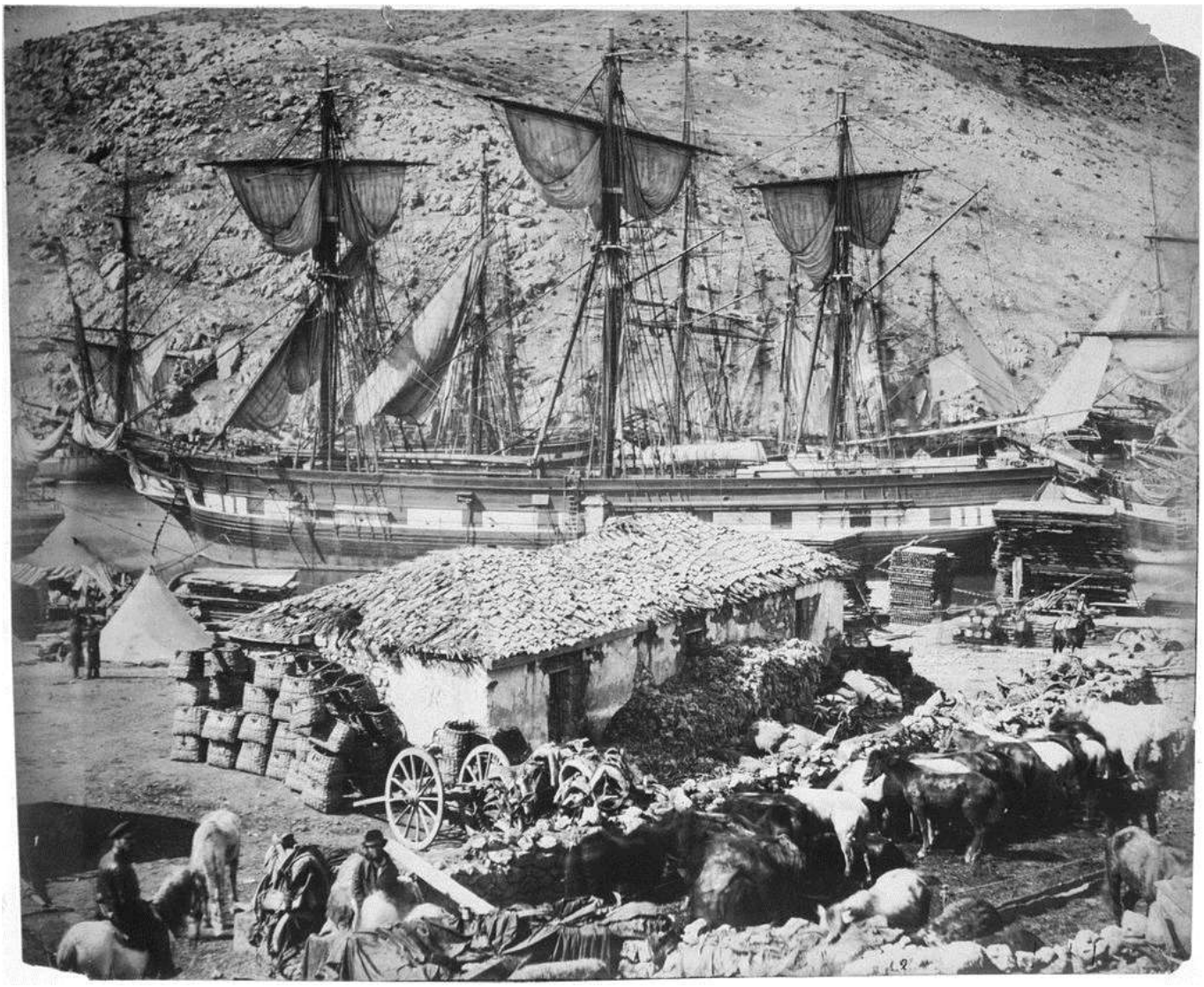
"Embarkation of the Sick at Balaclava", lithographic print, 1855, William Simpson, Published by Paul & Dominic Colnaghi & Co., publishers to Her Majesty, Pall Mall East

"The most important practical lesson that can be given to nurses is to teach them what to observe - how to observe - what symptoms indicate improvement - what the reverse - which are of importance - which are of none - which are the evidence of neglect - and of what kind of neglect.....

It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm....”

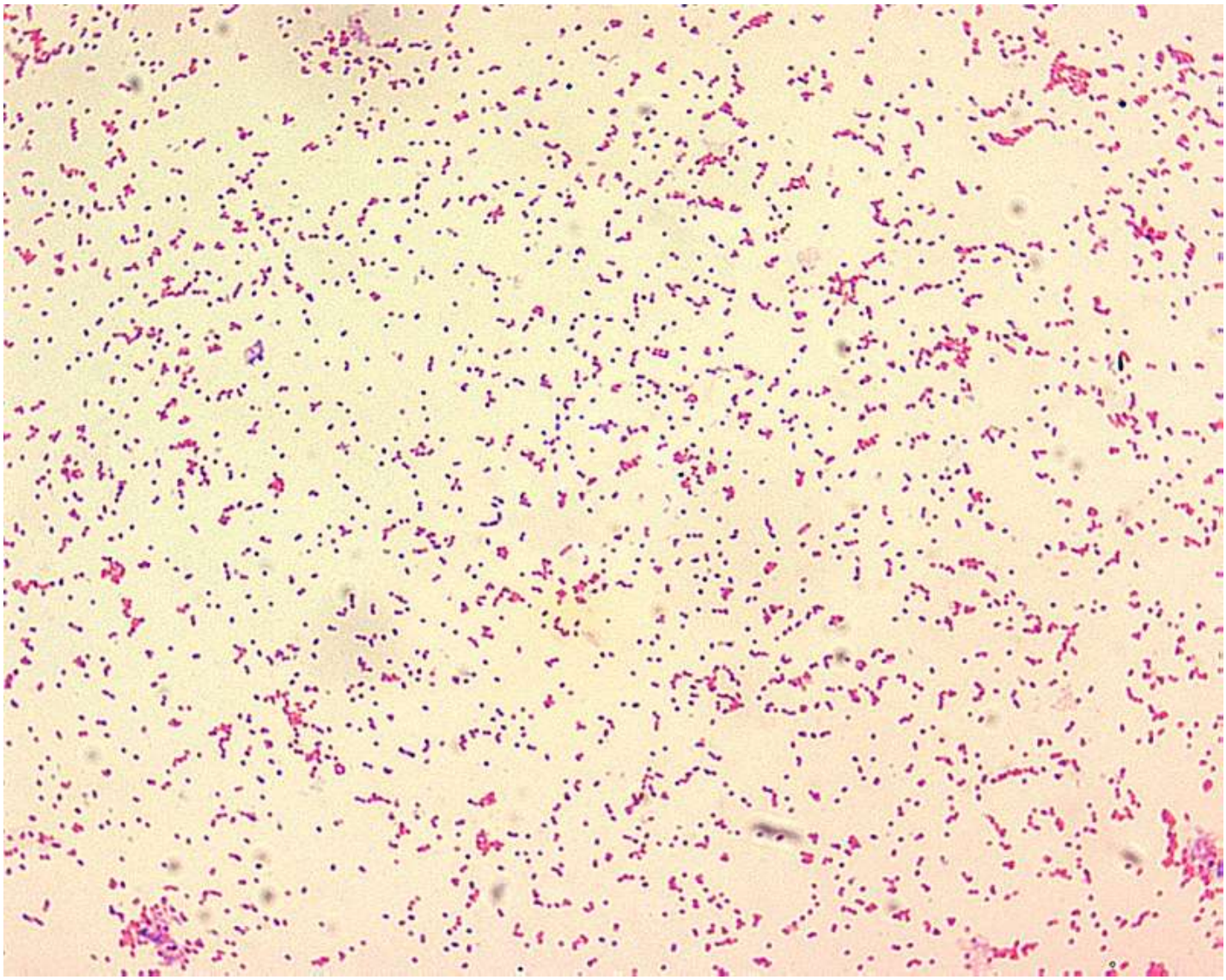
Florence Nightingale

Of all combatant deaths on both sides during the Crimean War, (1853-56) by far the greatest number were due to infectious disease. Thousands of British and French sick were evacuated from the port of Balaclava to Malta, where at that time, the best military hospitals in the world were located. Men and animals were in constant close contact. Huge numbers of horses and cattle were sent on transports for the supply of the British Army. It was at Maltese Hospitals during the Crimean War, that the disease, Brucellosis was recognized for the first time. Two generations later, the brilliant Maltese polymath Sir Themistocles Zammit made the historic breakthrough in Brucellosis research, when he identified ***unpasteurized milk*** *as the major infective source of the disease.*



Cattle Pier at Balaclava, Crimean War, 1855, photographed by Roger Fenton, (Library of Congress).

BRUCELLOSIS



Photomicrograph showing the presence of numerous small (0.5-0.7 x 0.6-1.5 µm) intracellular Gram-negative, coccobacilli. Under the microscope they appear as "fine sand", (CDC, Public Health Image Library).

Introduction

Brucellosis is a **worldwide** zoonotic (i.e transmitted by an animal) bacterial disease.

Notifications of brucellosis in Victoria are now rare.

It is usually seen in recent immigrants and travelers from endemic areas and in hunters of feral pigs.

It is also known as **Undulant fever.**

History

Brucellosis was first recognized during the Crimean War (1853 - 56). It was described by British medical officers treating wounded and ill soldiers from the Crimea in military hospitals in Malta.

The Melbourne born, Scottish pathologist and microbiologist **Major - General Sir David Bruce** (1855 - 1931) recognized that the disease was caused by an infectious agent.

In 1897, the Danish veterinarian **Bernhard Bang** (1848 - 1932) isolated B. abortus as the causative agent, and for a period the disease became known as "Bang's disease".

In 1905 the Maltese polymath, (scientist, historian and archaeologist) **Sir Themistocles Zammit** (1864 - 19350 made a major breakthrough when he identified **unpasteurized milk** as the major infective source of the organism.

During the course of the 20th century, the name brucellosis (after Brucella, named for Bruce), gradually replaced the 19th century name of Malta fever.

As *Brucella* species survive well in aerosols and resists drying, the organism was researched during the 1950s as a possible biological weapon. In 1971-72 however, all biological weapons in the U.S. arsenal were destroyed by order of President Richard Nixon.

Epidemiology

B. abortus was successfully **eradicated** from Australian cattle herds during the national eradication campaign between 1970 and 1989.

B. suis is still isolated occasionally from feral pigs in Queensland and represents a risk to people who hunt and butcher feral pigs.

Notifications of brucellosis in Victoria are now rare and generally represent imported infections or undiagnosed chronic infections.

Brucellosis occurs worldwide. The sources of infection and the responsible organism vary according to geographical area. Affected regions include the Mediterranean countries, North and East Africa, Western Africa, the Middle East, India and Central and South America.

Pathology

Organism:

Brucellosis caused by the bacterial genus *Brucella.*

The organisms are small aerobic intracellular coccobacilli.

Known infectious species include:

- Brucella abortus (biovars 1 - 6 and 9) in cattle.
- Brucella melitensis (biovars 1 - 3) in goats.
- Brucella suis (biovars 1 - 5) in pigs.
- Brucella canis in dogs.
- B. ceti - seals
- B. pinnepedialis - whales, dolphins and porpoises.

B. suis is the only species occurring in Australia that can cause human disease.

Transmission

- Brucellosis is transmitted by the ingestion of **raw** or **unpasteurised** milk dairy products from infected animals.
- It can also be transmitted by contact with infected tissues, blood, urine, vaginal discharges, of infected animals or aborted animal fetuses and placentae.
- **Outbreaks** are generally attributed to:
    - ♥ Inhalation of aerosols which may occur in animal pens and stables, abattoirs and laboratories
    - ♥ Ingestion of unpasteurized milk products.
- A small number of cases have occurred following accidental self-inoculation of the strain 19 animal Brucella vaccine.
- Aerosol dispersion represents a potential means for a weapon of biological warfare.

Incubation Period

- The incubation period is highly variable.
- It is most commonly 1 - 2 months but can ranges from 5 - 60 days.

Reservoir

- The most important reservoirs for human infection are cattle, swine and goats.

- In Australia, feral pigs in Queensland account for most newly acquired infections.

Period of Communicability

- There is no evidence of direct communicability from person to person.

Susceptibility and Resistance

- Everyone is susceptible to infection.
- Severity and duration of clinical illness are subject to wide variation.
- Duration of acquired immunity is uncertain.

Clinical Features

Brucellosis is a *systemic* disease with acute or insidious onset.

Subclinical and unrecognized infections are common.

Those infected with brucellosis usually recover, but disability can be significant and relapses may occur.

Acute and chronic (a year or more) illness may occur.

Clinical features include:

1. Fever:
    - Fever is the most common symptom, it may be intermittent, (hence the term “undulant” fever)

5. Non-specific constitutional symptoms may include:
    - Lethargy/ malaise
    - Headache
    - Anorexia/ nausea / vomiting
    - Myalgias

6. Localized suppurative infections may occur.

7. Complications:
    - Osteoarticular complications (relatively common),

Less commonly:

- Osteomyelitis
- Orchitis / epididymitis
- Endocarditis, (rare).
    - ♥ The case-fatality rate in **untreated** brucellosis is approximately 2% and this is mostly due to endocarditis from B. melitensis infections.

Investigations

1. Microscopy & culture:

    - Laboratory confirmation of the diagnosis is made by isolating the infectious agent from blood, bone marrow, other tissues or discharges of the patient.

2. Serology:

    - Serological testing for Brucella is useful but often difficult to interpret.

      A confirmed case requires IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre in Brucella agglutination titres or complement fixation titres between acute and convalescent phase serum samples.

      Where possible, these tests should be conducted in parallel at the same laboratory.

Management

Prevention:

Educate the public, particularly travellers, against drinking **unpasteurized** milk or eating dairy products produced from such milk.

Simple boiling milk is effective in killing the organisms when pasteurization is not available.

Educate farmers and handlers of potentially infected animals such as feral pigs to reduce exposure and exercise care in handling placentae, discharges and fetuses.

Search for and investigate livestock at risk of infection.

Treatment:

1. Supportive as indicated.

2. Antibiotics [2]

For **adults and children aged more than 8** years, use:

- Doxycycline (6 weeks)

And

- Gentamycin (7 days)

For **children aged 1 month to 8 years** use:

- Trimethoprim & sulfamethoxazole (6 weeks)

And

- Gentamycin (7 days)

Initial aminoglycoside therapy decreases treatment failure and relapse of brucellosis.

Use of gentamicin should be carefully monitored for toxicity and adequacy of dosing, with both plasma gentamicin concentrations and daily clinical assessment

If gentamicin is contraindicated rifampicin can be substituted and continued with the doxycycline or trimethoprim + sulfamethoxazole for the duration of therapy.

Clinical relapse can be expected in up to 10% of cases treated for 6 weeks. Relapsed cases, bone and neurological brucellosis and brucella endocarditis require a longer duration of therapy and consideration of alternative combination regimens - expert advice should be sought in these cases.

See latest edition of Antibiotic Therapeutic Guidelines for full dosing and prescribing details.

Control of Contacts

- Although there is no person-to-person transmission of brucellosis, contact tracing is done as part of the case investigation to identify those people who have potentially been exposed to the same implicated source of Brucella infection as the case.

Those people are advised of the early signs and symptoms of brucellosis to aid early diagnosis and treatment.

- Laboratory exposures should be assessed for risk and those potentially exposed may be advised to take chemoprophylaxis.

School Exclusion

- School exclusion is not required.

Notification

- Brucellosis (Group B disease) must be notified in writing within 5 days of diagnosis.

  This is a Victorian statutory requirement.

- The Department of Environment, Land, Water and Planning is notified of any new, non-imported case of brucellosis so that appropriate animal investigations and control measures can commence.

Additional Sources of Information

Australian Quarantine and Inspection Service:

Website: www.aqis.gov.au

Victorian Department of Primary Industries:

Website: www.dpi.vic.gov.au

The laboratory in Castellania, Valletta, Malta in which Sir Themistocles Zammit and his team carried out their historic research on brucellosis from 1904 to 1906.

References

1. The Blue Book Website, Accessed November 2017.

2. eTG - July 2017

Dr J. Hayes
Reviewed 3 December 2017