Welcome.I am Ruella D’Souza.

Today we will be covering Unit3 respiratory diseases.

Under which we shall be studying pneumonia

caused byStreptococcus pneumoniae. Module 23.

The outline we will be studying the mode of

transmission pathogenesis symptoms, chemotherapy, and

prophylaxis, of pneumonia caused by Streptococcus

pneumoniae.

At the conclusion of this presentation, the student will

have a comprehensive knowledge of bacterial pneumonia.

And we understand the factors involved with regard to its

mode of transmission, pathogenesis, symptoms,

chemotherapy, and prophylaxis.

A brief introduction.

Streptococcus pneumoniae is a gram positive small, slightly

elongated coccus with a lanceolate appearance which

means that it has a wider base and a arrow tip.

It is also known as pneumococci

or pneumococcus. It occurs in pairs and is a part of the normal

flora of the respiratory tract.

It is sensitive to most antibiotics.

Streptococcus pneumoniae is capsulated non motile and non sporing requires oxygen and is facultative. It grows on enriched media, for example, chocolate blood Agar and requires a pH of 7. 8.

Colonies display Alpha hemolysis on blood Agar, which is the partial breakdown of RBC;s leading to a greenish coloration around the colony.

Streptococcus ferments inulin and is soluble in bile and is very sensitive to optochin.

Opticon is a chemical that isused as an antibiotic. It's given name is Ethel Hydro cuprine hydrochloride and it is used to detect presumptively pneumococci in samples. Optochin inhibits ATP's function.

The mode of transmission, the source of Streptococcus is usually the respiratory tract of carriers and less often of patients. It is transmitted by inhaling contaminated droplets.

What we call droplet nuclei.These are aerosolized particles one to 10 micrometres in diameter.

The spread of this disease is facilitated by crowding in confined spaces, and is especially common during the winter months.

Streptococcus may also be transmitted via fomites which are inanimate objects capable of harboring the pathogen.

Pathogenesis those most at risk for Streptococcus pneumoniae infection, are include those who smoke, consume large amounts of alcohol, and are malnourished,perhaps have recently recovered from influenza. Have an immune system that is weakened or impaired, for example due to HIV or anyone suffering from underlying conditions affecting the kidneys, heart or lungs.

Streptococcus pneumoniae affects all age groups and causes both lobar pneumonia and bronchopneumonia. Lobar pneumonia is inflammation exudate in the alveolar space, which affects the lobe of the lung,while bronchial pneumonia is the inflammation of the alveoli or the air sac.

Trachaeobronchitis. Is the inflammation of the windpipe and its branches. Empyema is the accumulation of pus in the pleural cavity. It is common to see bacteremia in the early stages of infection and the capsular polysaccharide is responsible for toxemia in the blood and tissues.

Conditions like chronic bronchitis, and pneumococcal meningitis are also seen in advanced cases.

Meningitis is the inflammation of the meninges that is.

The membranes of the brain.

Sequelae are basically after effects of a disease.

Streptococcus pneumoniae is responsible for causing acute

rheumatic fever, which affects the heart and acute glomerular

nephritis, which affects the blood vessels of the kidney.

It has been observed that middle ear infections and.

Inflammation of the abdominal cavity membranes along with

arthritis are seen in patients suffering from post streptococcal

sequelae. Ocular infections have also been observed.

The reason why Streptococcus pneumonia could do all of this

is threefold. The first is capsular polysaccharide which is

hydrophilic and prevents phagocytosis by the immune

cells. Pneomolysin is an exotoxin that damages the membrane of cells.

autolysins are responsible for the release

of bacterial components in the infected tissues.

The symptoms would persist after one to three days of

incubation. Includes fever,

chills. Fast heartbeat that is tachycardia weakness and

it is important to note that characteristically bloody or

rusty colored sputum is observed.

How can you diagnoseStreptococcus pneumonia in the

lab? The first step is to obtain a sample which maybe sputum or

blood used to culture.

Collection of sputum is noninvasive and is best collected

in the morning before food.

It is important to note that sputum is not saliva.

Samples are then taken for

microscopic examination. For example, a gram staining

procedure may be carried out by a solubility testing to

determine if the bacteria is lysed in bile and the third

thing that may be carried out is the quellung reaction. The quellung

reaction basically involves incubating the colony with a polyvalent antiserum.

This will react with the capsule causing it to swell and appear larger when viewed

under a microscope.

This enables rapid identification and typing, of

streptococcus pneumoniae .Further, just imaging using

techniques like X Ray, CT or MRI scans may be carried out.

Blood Agar plates are incubated in carbon dioxide. When streaked

with the sample.

Also, the antigen may be detected via agglutination using

antibody coated latex particles and further using PCR as

a type of molecular method.

Chemotherapy treatment in cases of Streptococcus pneumoniae. Infection is penicillin, while amoxicillin is used in milder cases.

Cases developing resistance are usually treated with Vancomycin, an long-term administration of penicillin prevents heart damage in children in cases of rheumatic fever.

Prophylactically , there exist two vaccines to combat this disease. The pneumococcal conjugate vaccine, or PREVNAR, is the pneumococcal conjugate vaccine 13. PCV 13 is administered to infants below 2 years of age,and the pneumococcal polysaccharide vaccine or pneumovax which is administered to children five years and above and to those at risk which includes the elderly above 65 years of age and smokers.

To summarize this topic, we have studied Streptococcus pneumoniae which is a gram positive, capsulated diplococci. It is spread via airborne means of transmission and can cause sequelae like acute rheumatic fever. The symptoms include sharp, pleural pain, fast heartbeat, and weakness with rusty colored sputum.

Diagnosis is enabled by microscopic examination and

scans of the chest.

Treatment is using penicillin or vancomycin or vaccine of choice.

The references for the above are listed below.

Thank you.