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CLINICAL DIAGNOSTIC APPROACH OF BACTERIAL INFECTIONS: A REVIEW

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ABSTRACT: The prevalence of bacterial infections is increasing day by day. Most common bacterial infections are tuberculosis, meningitis, respiratory tract infections, gastro enteritis, endocarditis, urinary tract infections, typhoid, cholera, syphilis, and gonorrhoea. The accurate diagnosis influence the treatment duration, cost, and quality of life of patient and treatment outcomes. Accurate diagnosis depends on the clinical presentations and laboratory parameters. In future new lab parameters will emerge which is a good sign for easy identification of infectious diseases.

KEYWORDS: Bacterial infections, Culture test, Widal test, Treatment outcomes.

TUBERCULOSIS

Tuberculosis is an infection caused by mycobacterium tuberculosis.[1] It's a contagious infection that effects the lungs. It can also spread to other parts of the body like spine and brain. Tuberculosis is curable or preventable. It mainly spread through inhaling tiny droplets of cough of an infected person.

Symptoms

1. Cough for 3 weeks, more productive cough.
2. Sputum usually mucopurulent.
3. Fever and haemoptysis may be present.
4. Tiredness, weight loss, anorexia, malaise are the common presentations.

Lab Investigations

1. Chest radiography and microscopy of sputum.
2. Microscopy of sputum.
3. Microbiological cultures.[2]
4. Tuberculin testing: Montoux test: statens serum institute tuberculin solution 0.1 ml is injected intradermal, usually on forearm, an induration of more than 15mm strongly suggest TB infection.[3]

Clinical Diagnosis: Tuberculosis.

Bacterial Meningitis

Meningitis is the inflammation of the membranes that surround your brain and spinal cord. Bacterial meningitis the most serious. If not treated, bacterial meningitis can cause paralysis, stroke, and even death.[4]

Symptoms

Head ache, neck stiffness, photophobia, fever and vomiting. Kernig's sign: resistance to extension of leg when the hip is flexed.

Lab Investigations

1. CSF is obtained by lumbar puncture. Organisms may be visualised in the smears of CSF. CSF should be cultured to confirm the identity of the causative organism.
2. Culture of nasopharyngeal swab.
3. Polymerase chain reaction.

Clinical Diagnosis: Meningitis

Bacterial Respiratory Tract Infections

Respiratory tract infections are any infectious disease of respiratory tract divided into 2 parts upper and lower respiratory tract infections. Most common upper respiratory tract infection is sinuses. Most common lower respiratory tract infection is pneumonia.[5]

Sinusitis: Inflammation of nasal sinus.

Symptoms

Facial pain or pressure (especially unilateral), Nasal congestion, Nasal drainage, Fever, Cough, Fatigue, Maxillary dental pain.[6]

Lab Investigations

1. **Nasal endoscopy:** A thin, flexible tube (endoscope) with a fiber-optic light inserted through your nose allows your doctor to visually inspect the inside of your sinuses.
2. **Imaging studies**: A CT scan or MRI can show details of your sinuses and nasal area.
3. **Nasal and sinus cultures**: Laboratory tests are generally unnecessary for diagnosing acute sinusitis.[7]

Clinical Diagnosis: Sinusitis

PNEMONIA: Bacterial pneumonia is mostly caused by gram-positive streptococci and staphylococci and gram-negative.

SYMPTOMS

Cough with phlegm, Tachypnea, tachycardia, chest pain, increased tactile fremitus, grunting respirations, Diminished breath sounds over affected area, and Inspiratory crackles during lung expansion.

Lab Investigations

1. Low oxygen saturation on arterial blood gas or pulse oximetry.
2. Leucocytosis with predominance of polymorph nuclear cells.
3. Sputum culture.[8]

Clinical Diagnosis: Pneumonia

Gastroenteritis

Gastro enteritis also known as infectious diarrhoea is an inflammation of stomach and intestine. The common bacteria that cause gastroenteritis are campylobacter, salmonella, shigella, escheria coli, staphylococcus, and clostridium.[9]

Symptoms

Bloody diarrhoea, abdominal pain, fever, haemolytic uremic syndrome, pseudomembranous enterocolitis.

Lab Investigations

1. Stool culture.
2. Sigmoidoscopy is used to diagnose pseudomembranous colitis.

Clinical diagnosis: gastroenteritis.

Endocarditis

Endocarditis is an infection of the inner lining of the heart and the mucosa that underlies it, but the term refers most commonly to an infection of a heart valve. The mural endocardium, papillary muscles, and chordae tendineae can be involved in the infection. Bacteria involved in casing endocarditis are streptococcus, staphylococcus and enterococci.[10]

Symptoms

Heart murmur, fever, embolic episodes, splenomegaly, skin manifestations (primarily petechiae), weakness, dyspnoea, night sweats, anorexia, weight loss, and malaise.

Lab Investigations

1. Transthoracic echocardiography.[11]
2. Transesophageal echocardiography.
3. Blood culture.

Clinical diagnosis: endocarditis.

Urinary Tract Infections

A urinary tract infection is a condition in which one or more parts of the urinary system (the kidneys, ureters, bladder, and urethra) become infected.[12] Bacteria that cause urinary tract infections are Escherichia coli, Klebsiella, Proteus, and Staphylococcus.

Symptoms

Dysuria, urgency, haematuria, abdominal pain, fever.

Lab Investigation

1. Dipstick test.
2. Microscopy.
3. Urine Culture.
4. Gram test.[13]

Clinical Diagnosis: Urinary Tract Infections

Typhoid

Typhoid fever is mainly caused by bacteria salmonella thyphi.

Symptoms

Fever, ill-feeling, and abdominal pain, Bloody stools, chills.

Lab Investigations

1. Complete blood count (CBC).
2. Widal test: 3-5 mL of blood sample was collected into a sterile test tube and centrifuged for 5 minutes. A drop of the serum (0.08mL) was pipette and dropped on a sterile slide in four different parts for Salmonella thyphi O and another for Salmonella parathyphi H antigens. Antigens O and H were shaken and dropped into the serum accordingly. It was then mixed and rocked gently for 2 seconds. The results were recorded as thus: depending on the gravity of the agglutination, 1/20 is negative while 1/80 – 1/360 is positive.[14]
3. Blood culture.
4. ELISA urine test.
5. Fluorescent antibody study.
6. Stool culture.

Clinical Diagnosis: Typhoid

Cholera

Symptoms

Watery diarrhoea along with nausea, vomiting and abdominal cramps.

Lab Investigations

1. Stool culture.[15]
2. Testing antibodies.
3. PCR.

Clinical Diagnosis: Cholera

Syphilis

Symptoms

Ulcers on skin, sores, vaginal discharge, or wart-like growths on genitals.

Lab Investigations

1. Blood tests.
2. Treponemal antibody tests include.
3. Immunoassays

Clinical diagnosis: syphilis

Gonorrhoea

Symptoms

Women: Bleeding between menstrual periods, abdominal pain, Painful intercourse, Painful and/or frequent urination, abnormal vaginal discharge.

Men: A white, yellow or greenish discharge from the penis, Pain or burning when urinating, Pain, tenderness, and swelling of the testicles.

Lab Investigations

1. Culture of discharges.
2. Antigen detection.
3. Detection of microbial metabolites.

Clinical diagnosis: gonorrhoea.

CONCLUSION

Now days laboratory parameters are most important for diagnosis of any disease or disorder. Without laboratory parameters we cannot identify the disease or any organism that cause the disease and we cannot proceed to treat any disease. Future developments of lab investigations are very important. New lab investigations are emerging in this world which is a good sign for easy identification of disease or disorder.

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