Unit 3 - Transudates and exudates

Session 11
Identification, differentiation of transudates and exudates and different examples

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Introduction

• Effusions- fluids which accumulate in cavities

• Pleural, pericardial, and peritoneal cavities (ascites)

• Determine the reason for the accumulation of the fluid.

• All effusions are classified as exudates or a transudates
11.1 Definition and identification of transudates and exudates

- Classifying help clinicians to determine the disease process responsible for the accumulation of fluid.
- Thus, help in treating the disease with the idea of curing or minimizing complications depending on the disease involved.
- Outer linings of tissues and organs – protection
- Selective membrane permeability allows the transfer of fluids, proteins, and other metabolites that are important in continuing metabolic processes occur inside these organs
Transudates

• Malfunctioning membranes causes fluid accumulates in the body cavities.
• This fluid is referred to as a transudate.
• Regulation of amount of fluid in these cavities is done by the lymphatic system.
• Malfunctioning of membranes cause transudate formation due to a disease process in an organ or the lymphatic system.
• Mechanism- disrupt the balance between the formation and its uptake by the lymphatic system causing fluid accumulation in one side of the membrane.
• Examples of transudate formation-

1. Liver
2. Pancreas
3. Heart (e.g. congestive heart failure - A weakness of the heart that leads to a buildup of fluid in the lungs and surrounding body tissues).
Exudates

• An exudate is a fluid with a high content of protein and cellular debris which has escaped from blood vessels and has been deposited in tissues.

• Cellular material-tumour cells or foreign materials such as bacteria, viruses, parasites, fungi.

• Infection/cancer- inflammatory response recruit large number of white blood cells to the site.

• As a result exudate forms. Thus, cells (both leukocytes and foreign material) and their metabolites fill the cavity in the organ.
11.2 Differentiation of transudates and exudates by laboratory methods

• Clinical chemistry analytes and cytology

• Clinical chemistry tests- get baseline values from blood and these values are then compared with the values obtained by analyzing the fluid collected in order to compare and arrive at a conclusion - normal or abnormal.

• This comparison is of value as laboratories do not utilize reference values for the transudates and exudates.
Lab tests important to differentiate exudate from transudate

- Most important test - concentration of total protein

<table>
<thead>
<tr>
<th>Transudate</th>
<th>Exudate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less protein content than exudate &lt;3.0 g/dL</td>
<td>Higher than that of transudate &gt;3.0 g/dL</td>
</tr>
<tr>
<td>Total protein less than half the concentration of that in serum</td>
<td>Total protein greater than half the concentration of that in serum</td>
</tr>
<tr>
<td>Lactate dehydrogenase (LDH) () &lt;200 units/L</td>
<td>LDH levels &gt;200 units/L.</td>
</tr>
<tr>
<td>LDH in fluid: serum LDH &lt;0.6</td>
<td>LDH in fluid: serum LDH &gt;0.6</td>
</tr>
<tr>
<td>Transudate</td>
<td>Exudate</td>
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<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>appearance of the fluid</td>
<td>cloudy or turbid and they show a variety of colours depending on the constituents and their concentrations</td>
</tr>
<tr>
<td>Colour- clear and pale yellow (filtrates of plasma and contain only very little cellular material compared to an exudate)</td>
<td>Ex. yellow, brown, greenish, and even red( lot of red blood cells are present)</td>
</tr>
<tr>
<td></td>
<td>High fibrinogen content-presence of clot</td>
</tr>
<tr>
<td>differentiated cell count- monocytes and lymphocytes.</td>
<td>If due to malignancy- cancer cells in the differential count</td>
</tr>
<tr>
<td></td>
<td>Type of cell may indicate the type of cancer present</td>
</tr>
<tr>
<td>white cell count &lt; 1.0 X 10^9/L</td>
<td>red cell count &gt; 100 X 10^9/L</td>
</tr>
<tr>
<td></td>
<td>artificially increased if traumatic aspiration</td>
</tr>
<tr>
<td>red cell count &lt; 100 X 10^9/L</td>
<td>Exudates due to an infection may reveal bacteria in a stained sample (Wright’s stain or Gram stain)</td>
</tr>
</tbody>
</table>
• Lactate dehydrogenase- catalyses the reversible reaction between pyruvate and lactic acid and is involved in energy metabolism in cells
• It is always better to compare it with serum levels
Other tests done in Exudates and transudates

1. Glucose concentrations- NOT TO differentiate but to find cause for exudate
   - Ex. Bacterial infections, malignancies, rheumatoid arthritis, and tuberculosis - **decreased** glucose concentration
   - Plasma glucose > glucose concentration in the exudate

2. Amylase- find out the reason for exudate formation
   - **Ex.** pancreatitis, pancreatic malignancies and rupture of the oesophagus - **increase** in amylase
11.3 Types of transudates and exudates observed in effusions and their causes

Commonly aspired effusions

1. Ascitic fluid
   • Ascites is the abnormal accumulation of serous fluid in the peritoneal (abdominal) cavity and the fluid thus accumulated is referred to as ascetic fluid.
   • Ascitic fluid-
     • Cell count and differential count
     • LDH
     • Albumin and total protein
     • Gram's stain
     • Bacterial culture
• Cytology.
• Additional tests - culture or DNA analysis for tuberculosis or fungi, pH, amylase, lipase, glucose, triglycerides, lactate, and carcino embryonic antigen (CEA).

• Two types

1. Transudative ascites - Ex. hepatic cirrhosis, congestive heart failure, constrictive pericarditis, and nephrotic syndrome

2. Exudative ascites – Ex.noncirrhotic and may be due to defects in the permeability of peritoneal membrane as observed in malignancy, spontaneous bacterial peritonitis (SBP), or other infections (such as tuberculosis).
2. Pleural effusions

- A pleural effusion occurs when too much fluid collects in the pleural space i.e. the space between the two layers of the pleura.

- Analyzed for
  - LDH
  - Total protein
  - Cell count and differential
  - bacterial culture etc.
1. Pleural transudate – Ex. congestive heart failure end-stage liver disease, nephritic syndrome, protein-losing enteropathy, hypoproteinemia of any cause, superior vena cava syndrome and glomerulonephritis.

2. Exudative pleural effusions- Ex. pneumonia, malignancy, pulmonary tuberculosis, pancreatitis, collagen vascular disease, and pulmonary infarction.
3. Pericardial effusions

• Develops between the pericardium, the lining of the heart, and the heart itself.

• Analyzed for
  • cell count and differential
  • LDH
  • total protein
  • Additional tests- cultures, DNA testing and cytology depending on the clinical signs and symptoms.

• Pericardial transudates- Ex. cirrhosis and congestive heart failure

• Exudative pericardial effusion- infections, trauma and malignancies.
Thank you!!!!!