

This template must be used to answer the case study.

(Please type your answers within the box underneath each question)

1. Background of the case study (Total: 5 marks)

1.1 What is infectious conjunctivitis?

Conjunctiva is the thin, smooth and transparent mucous membrane lining eyelid and covering the white of the eye (bulbar part of the sclera). Inflammation of the conjunctiva caused by viruses/ bacteria is known as Infectious conjunctivitis. The symptoms include redness, tearing, irritation, burning, foreign body sensation or discharge from eyes with various degrees of severity. The microbes that infect the conjunctiva are virus particularly adenoviruses and bacterial infections are less common. Viral and bacterial conjunctivitis both are quite contagious and pass from one person to the other person or from one person's infected eye to other person's eye (Boustcha & Nicolle, 1995; Marieb & Hoehn, 2015).

1.2 Of the **four micro-organisms** listed below, justify which one is more likely to be the cause of Brian's eye infection. Indicate why the other micro-organisms from the list are least likely to cause the infection.

Legionella pneumophila

Yes or no, with reason:

No,
Legionella pneumophila is a gram-negative, human pathogenic bacterium and the causative organism of legionellosis or Legionnaires' disease which manifests as respiratory symptoms unlike the case discussed here (Lee & Bishop, 2014).

Plasmodium ovale

Yes or no, with reason:

No,
Plasmodium ovale is protozoan parasite which is known to be the cause of tertian malaria in humans which manifests as symptoms like fever etc. which is not the case in the discussed case study (Lee & Bishop, 2014).

Adenovirus

Yes or no, with reason:

Yes,

Viral conjunctivitis, is a common, eye infection typically caused by adenovirus. Adenovirus causes adenovirus conjunctivitis and manifest symptoms like redness of eye, itching, irritation etc. which is known to be contagious (Lee & Bishop, 2014).

Escherichia coli

Yes or no, with reason:

No,
Escherichia coli infection causes symptoms severe abdominal cramps, diarrhea which is known to typically turns bloody within around 24 hours, also accompanied by fever sometimes which is not seen in the discussed case study (Lee & Bishop, 2014).

2. Mechanism of action and adverse reactions (Total: 5 marks)

2.1 Describe the mechanism of action of gentamicin?

Gentamicin is a member of aminoglycosides class of antibiotics which primarily act by binding to the aminoacyl site of 16S ribosomal RNA (present within the 30S subunit of ribosomal). This leads to misreading of the genetic code and also inhibits translocation (Lehne et al., 2003). The steps required for peptide synthesis, like binding of mRNA and the interaction with the 50S ribosomal subunit, remain unaffected, but the protein elongation does not take place due to disruption of the mechanisms. This ensures accuracy of translation. The antimicrobial activity of gentamicin is bactericidal acting on aerobic gram-negative bacilli (Bullock & Manias, 1995).

2.2 Name two adverse reactions of this drug?

1. Neurotoxicity (vertigo, ataxia)
2. Gait instability

3. Mediators of Signs and Symptoms (Total: 10 marks)

a. sign/symptom 1:

Redness in eyes

Explanation of this phenomenon:

Redness is caused due to dilation and engorgement of the conjunctival vessels.

Vasodilation is reflex reaction mediated by neurogenic and inflammatory mediators. General mediators of inflammation include vasoactive amines.

Vasoactive Amines like histamine are stored in granules inside the mast cells.

These granules are released as a result of stimulation and account for arteriolar dilatation and increased permeability of venules in the immediate transient phase.

Histamine also exhibits chemotactic properties for eosinophils. Some other mediators released from mast cells include prostaglandin-2 and leukotrienes (Craft et al., 2015).

b. sign/symptom 2:

Discharge from eyes

Explanation of this phenomenon:

Conjunctival discharge is unusual production of external surface ocular secretion.

The discharge can be composed of tears, plasma components (including fibrosis), mucus, epithelial debris and inflammatory cells. Watery discharge can be seen as an initial sign of a viral infection resulting in conjunctivitis. The discharge contains important mediators of inflammation like IgE and mast cells together with other components. These mast cells and IgE components play an important role in mounting an immune response against the infection (Craft et al., 2015).

c. sign/symptom 3:

Increased tears from eyes

Explanation of this phenomenon:

Tears are the first line of defence, tear film defence activity is mediated by various

substance including lactoferrin, lysozyme, beta-lysin and secretory IgA.

Lactoferrin is synthesized and secreted by the lacrimal gland. Its defence action against bacteria is non-specific and mediated through its iron binding capacity.

Lysozyme accounts for up to 30% of the protein content of the tears. In the presence of complement, it enhances bacteriolysis, particularly of gram positive organisms (Craft et al., 2015).

4. Infection control issues (Total: 5 marks)

a. Issue 1:

Using unclean and non sterile pads for collecting eye swabs

Discussion as to why this is an issue:

Not using clean or sterile pads for taking the eye swabs can be a major problem with the high dependency aged care facilities that can contribute to the spread of conjunctivitis. Eye swab collection is an important step in determining the nature of the discharge coming out of the infected eye. If the eye swab pads are non-sterile this would lead to complications as it may aggravate the infection status of the patient. The healthcare provider must make sure that the pads or other things used for sample collection are completely fresh and not reused.

b. Issue 2:

Not using gloves or alcohol before eye swab collection or eye examination, not washing hands

Discussion as to why this is an issue:

This is due to the failure of the healthcare providers to use gloves along with the use of alcohol before collection of the sample using eye swab or before examining eyes of the patient. This causes the infective agents to stay over the hands of the healthcare professional and the same gets transmitted to the other patients eye when the healthcare provider person touches next patient's eyes. While

examination or swab collection. The route of transmission is direct contact of infectious agents from one person to another. This is a major issue in healthcare systems and the healthcare facilities at every level must train their professionals for hygiene, cleanliness before sample collection. Washing of hands is a very important practice to be followed by a health care provider or before any aseptic procedure, before and also after examining/handling any patient, after touching any item, before and also after eating or touching any food, on entering or leaving a clinic etc.

5. Transmission of infection (Total: 5 marks)

a. Describe transmission from Brian to Mary:

As per the case details it seems Mary received infection from Brian as a result of touching some infected items/direct contact with the infected person's infection towel etc. Mary may have visited Brian's room and interacted with him within 4 days. This may have resulted in her touching any infected items, towels, paper napkins, utensils etc. These items must have been touched by Brian with unclean hands (he might have wiped the eye tears/discharge and not washed hands afterwards). Not washing hands after touching the infected watery discharge from eyes in conjunctivitis results in direct transmission of infective agents from one person to another (Grossman & Porth, 2014)

6. Breaking the chain of infection (Total: 5 marks)

a. Identify procedure 1:

Conjunctivitis can be prevented in this case by taking some important precautions like washing hands frequently using antiseptic soap, alcoholic disinfectant, hand steriliser etc. The towels and others items of the infected person should be washed and cleaned separately, this prevents spreading of infection.

Describe how this effectively breaks the chain of infection:

Cleaning and washing hands effectively removes and kills the causative agents that may have got transferred to the hands while trying to wipe the discharge coming out of the eyes. Washing hands or even using separate paper or the regular towel for the patient decreases the chance of infection manifolds.

b. Identify procedure 2:

Infection by Conjunctivitis may be prevented by using a clean tissue/ towel to remove discharge from eyes.

Describe how this effectively breaks the chain of infection:

The conjunctival discharge is very infectious and may be a major factor in spreading the infection for Brain to Mary. The paper towel/ tissues used must be fresh and never used or touched by any person. The paper tissues must be sterile and never used before. The used tissue/towel should be discarded appropriately.

This would help in preventing spread of infection.

References: -

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