BACTERIOLOGICAL STUDY OF POSTOPERATIVE WOUNDS INFECTION WITH SPECIAL EMPHASIS ON ANAEROBES

Thesis Submitted For Partial Fulfilment
of Master Degree In Clinical and Chemical Pathology

BY

Dr. FATMA ELSAYED METWALLY MOHAMED

Supervised By

Prof.Dr. RAGAA MAHMOUD LASHIN
Prof. of Clinical Pathology
Ain Shams University

Dr. IBRAHIM KHALIL ALY
Assist. Prof. of Clinical Pathology
Ain Shams University

FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY
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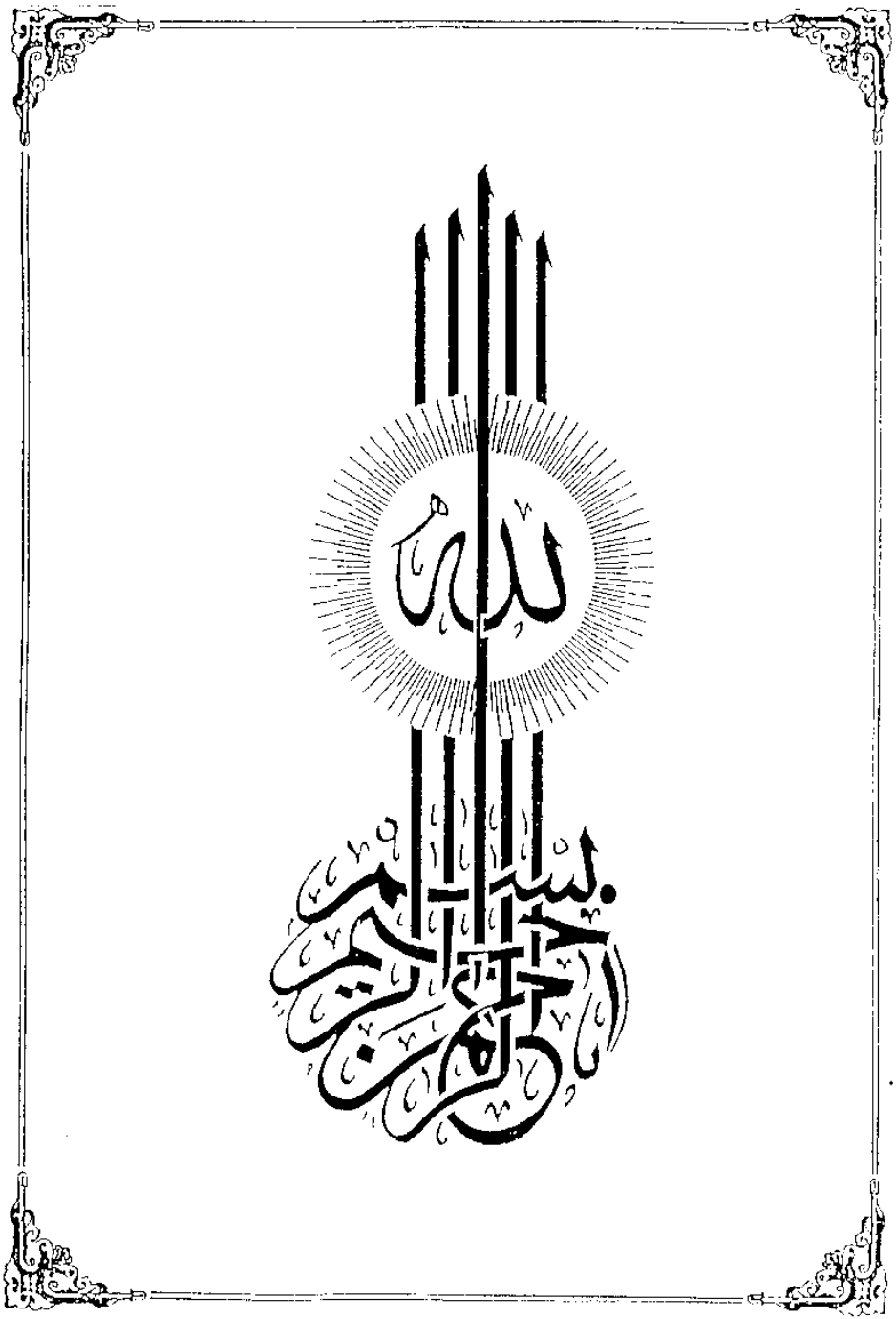

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INTRODUCTION

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Wound infection is known to be one of the main complications of surgical procedures. It may occur either due to bacterial or fungal contamination during surgery or post operative in the ward [Finegald, 1980].

Bacterial whether aerobic or anaerobic are normally rersident in our skin, mucous membrane and gastrointestinal tract. However under suitable circumstances, they may be potentially pathogenic causing wound infection. [Mc. Grown and Gorbach 1981] .

Anaerobic microorganisms, may play a role in any type of bacterial infection. In general, no organ or tissue of the body is immune to the effects of these organisms [Fine gold , 1980] .

These anaerobes can invade any site of the body giving rise to severe often fatal infections specially when the host defences either naturally or artificially have been so altered as to permit an over growth of these organisms. [Baranes, 1980].

The most common cousative organisms of anaerobic infections are clostridium species Bacteroides species and other anaerobic gram positive and gram negative microorganisms [**Hambraeus and Benediktsdottir 1980**].

Aim of the Work :

We aim to study the prevalence of aerobic and anaerobic bacterial infections in post operative clean elective surgery carried out on patients in Ain Shams University Hospitals.

REVIEW OF LITERATURE

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ANAEROBES

An anaerobe is a microbe that only grows under anaerobic conditions (Sbanson, 1982). Anaerobiosis was discovered in 1861 by Louis Pasteur, who introduced the terms aerobes and anaerobes. Within the following 30 years many types of anaerobic bacteria were isolated and described (Sonnenwirth, 1972).

Classification of anaerobes;

This is just grouping of organisms with similar properties together. The problem with anaerobes is always the difficulty of growing them under optimal conditions to establish their properties. (Baranes, 1980).

A simple classification which has clinical relevance is to divide anaerobes into two groups, the non sporing and spore forming anaerobes. Infection due to non sporing anaerobes are far more common today than infections due to spore/forming organisms.

I. Non sporing anaerobes:

They have no ability to form spores under unsuitable condition so they die quickly in an aerobic environment, and are also relatively easily killed by heat and chemical disinfectant.

A) Gram positive non-sporing anaerobes include:

1. Anaerobic cocci - peptococci and peptostreptococci
2. Anaerobic diphteroids / which are common skin contaminant a rare cause of infection after neurosurgery and heart valve operation.
3. Anaerobic gram positive bacillus:
   Actinomycetes Israelei, the cause of actinomycosis.

B) Gram negative non-sporing anaerobes include;

1. Veillonella: anaerobic gram negative cocci
2. Bacteroides fusobacterium Group and leptotrichia (Shanson, 1982)

The bacteroidaceae are a rather heterogenous family of strictly anaerobic non sporing Gram negative

bacilli or coccobacilli that have been variously sub-classified, particularly on a morphological basis.

An outline of some of the species and subspecies of clinical interest in the bacteroides fusobacterium and leptotrichia was described by Duguid et al., 1984.

The representative of the bacteroides group are extremely abundant as commensals in the lower intestinal tract of man, in mouth, oropharynx and may be present in the lower genitourinary tract in the female. They are potentially pathogenic. However, they are not highly invasive. under normal condition, they are present in large numbers. On alteration of the host's local or general resistance the bacteroides group and the fusobacterium have much potential for harm. Human infections with these organisms are commoner than is generally appreciated (Duguid et al., 1984).

II. Spore - forming anaerobes:

Spore forming anaerobes freqeuntly form spores in hostile environment and these spores may survive for

many years. The spores resist drying, many chemical disinfectants and are not always killed by boiling water at 100 ^{o}C. These spore formiing anaerobes consist of many species which include :

Clostridia: which are anaerobic gram positive bacilli spore froming (Shanson, 1982).

* Clostridia species include the following

  a - Clostridium tetani

  b - Clostridium causing gas gangrene :-

  which may be : Saccharolytic or proteolytc

1 - Saccharolytic : which grow rapidly and vigrously in carbohydrate media with the production of acid and abundant gas:

  - cl. perfringens (welchii)
  - cl. oedematiens
  - cl. septicum

2- Proteolytic : which digest protein and liquify gelatin and coagulated serum; -

  - cl. histolyticum
  - cl. sporogenes.

c - clostridium: botulinum

d - drug resistant clostridium difficile.

(Barbara and Madeline 1987)

a - Clostridium tetani :-

They are gram positive bacilli with terminal bulging spores giving drum stick appearance. They are non invasive like other clostridia species, but they produce two types of primary toxins which are tetanospasmin (neurotoixn) and tetanolysin (haemolytic toxin). Tetanospasmin is responsible for the clinical picture of tetanus. In addition the spores of clostridium tetani can enter the body through wide veriety of wounds contaminated by soil or faeces (Smith 1984, Duguid et al. 1984).

b - Clostridia Causing gas gangrene :-

- Clostridia Welchii : (Cl. Perfringens).

It is the most frequently isolated pathogenic species. It is divided into five types from A to E on the basis of major lethal toxins produced., These major

lethal toxins are the, alpha, beta, epsilon, iota and delta. These toxins have hemolytic lethal necratizing effect, which have the potential for causing extensive tissue damage. (Kruck shank. et al 1975).

- Clostridia Oedematiens and Septicum.

They share Clostriduim welchii in most of its criteria as regareds morphology and cultural characters but they have less pathogenic effects. (Duguid et al 1984).

C. Clostridium Botulinum :-

It is resposible for the paralysing disease, Botulism. This species is divided into eight types (A,B,C,alpha., beta,D,E,F and G) on the basis of serological specificity of toxins produced. Type A, B and E are most frequenttly associated with human infection. Neverthless type F could be isolated from several human infections (Sommabend et al 1981).

Three clinical forms of botulism may occur:

1 - food borne, which follow ingestion of preformed toxin in contaminated food.

2 - Infant botulism which is due to germination of Cl. botulinum spores ingested with the production of large amount of toxins, and.

3 - Wound botulism which follow production of toxin in traumatic wound (Smith,1984).

D. Clostridium difficile:-

Cl. difficile has been found in the faeces of approximately 2% to 3% of asymptomatic healthy adults or children over 2 years of age. They are normal inhabitants of colon in 25% to 60% of healthy children under 1 year of age. Cl. difficile, in association with antibiotic may be the cause of pseudomembranous colitis (AAPMC) (Bartlett, 1986), It is also responsible for most cases of antibiotic associted colitis without pseudomembrane formation and up to one third of cases of antibiotic associated diarrhea without colitis (Mcfarland and Stamm 1986).