Septic Shock

Essay

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By

Dr. Hamdi M. Taha

M.B., B. ch.

Supervised by

Prof. Dr. Alaa Abd-Allah Masoud

Professor of General Surgery

Ain Shams University

Dr. Hisham H. Wagdy

Lecturer of General Surgery

Ain Shams University

FACULTY OF MEDICINE

Ain Shams University

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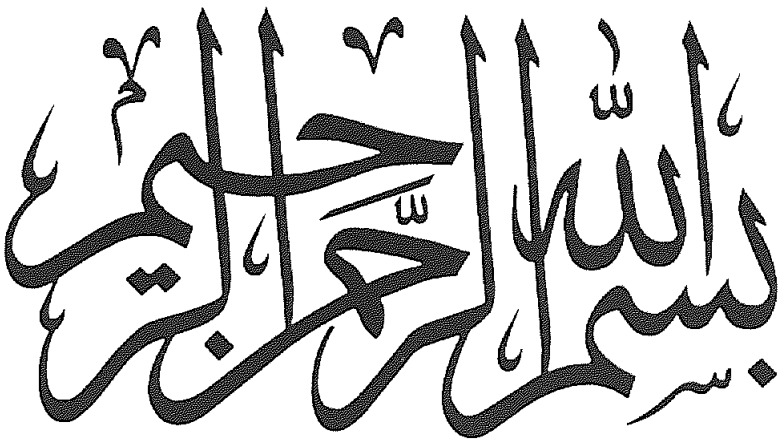
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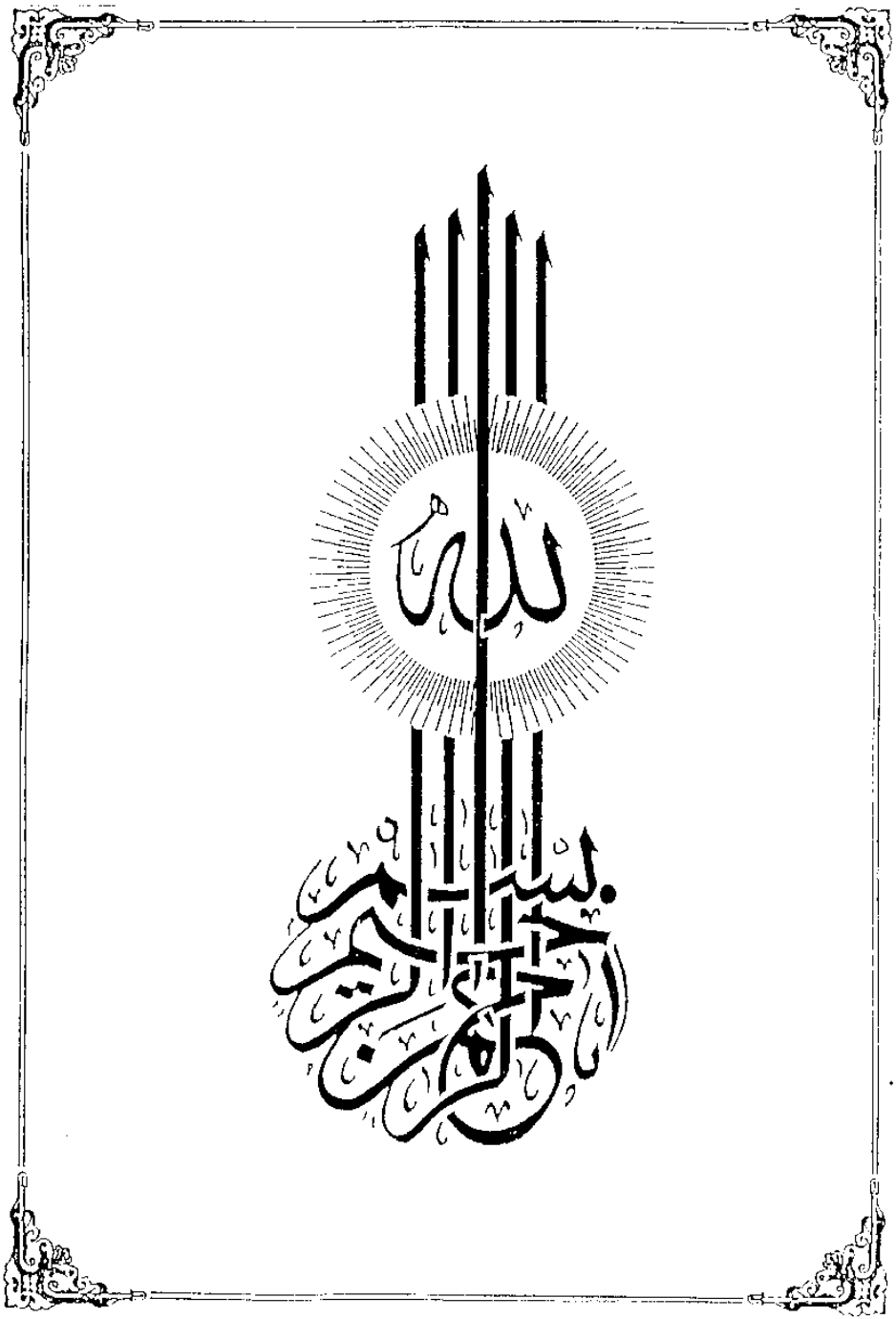


To My parents
&
My Dear Wife
جامعة عين شمس
AIN SHAMS UNIVERSITY

Acknowledgment

Thanks a lot to Allah for awarding me the chance to participate in this up to date subject which is badly needed in our life.

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Hamdi Taha.

Contents

Introduction :-

Septic shock is a form of circulatory shock that usually develops as a complication of an overwhelming infection.

(Maddaus & Cerra, 1989).

Septic shock is a state of inadequate blood flow to vital organs or inability of the body cell mass to metabolize nutrients normally. So, this definition focuses on two primary pathologic processes inadequate blood flow and, or a defect in cellular metabolism.

(Maddaus & Cerra, 1989).

Septic shock is the commonest type of severe shock seen in the general surgical practice.

(Carmona, et al., 1984).

Septic shock can be caused by any severe bacterial infection such as cholangitis, pyelonephritis, peritonitis, meningitis, abscesses or soft tissue infection.

(Holcroft & Blaisdell, 1991).

The clinical picture depends upon past medical history, underlying disease, amount and source of septic innoculum and the ability to mount an immune response.

(Bersten & Sibbald, 1989).

The major approach in management is to minimize direct cell injury and optimize perfusion and limit ischaemia.

(Demling, et al., 1994).

Aim of the work :-

The occurrence of serious infections in hospitalized patients has been increasingly recognized and investigated despite the administration of antimicrobial agents. So, the aim of the work is to focus on micro-organisms which are commonly a cause of septic shock, the pathophysiologic sequale; with highlight on clinical criteria in order to determine optimal means of early diagnosis and early management to reduce the morbidity and mortality rate from septic shock

BACTERIOLOGY

There are two major categories of surgical infections, localized infection characterized by incisional wound colonization and abscess formation and systemic infection characterized by sepsis.

(Gerald, 1990).

Sepsis may result from direct inoculation of bacteria into the blood stream during surgery, dissemination from a wound infection or abscess or colonization of indwelling foreign bodies with subsequent seeding of the circulatory system.

(Gerald, 1990).

The incidence of infection in surgical patients is influenced by a variety of endogenous and exogenous factors. Endogenous factors include the immunologic status and endogenous flora of the patient; Exogenous factors include environmental cleanliness and the staff-to-patient ration which affects care of wounds.

(Gerald, 1990).

There are several factors that predispose to sepsis including underlying neoplastic disease, diabetes mellitus, old age, indwelling urinary and intravascular catheters, cancer chemotherapy, liver cirrhosis, tracheostomy, and radiation therapy.

(Anderson & wisnes, 1983).

Pugin-J 1994 found that the commonest sources of infection were intravascular catheters (35.1%), lower respiratory tract (9.9%), and intra-abdominal (9.0%). The source could not be identified in (27.0%) of cases. The micro-organisms involved are coagulase-negative staphylococci (21.0%), staphylococcus aureus (16.0%), Enterococcus (6.0%), other gram-positive rodes (6.0%), Pseudomonas aeruginosa (16.0%), Escherichia coli

(8.0%), other gram-negative bacilli (17.0%), Polymicrobial episodes were also relatively common (11.0%), Anaerobes (4.0%), and Fungi (6.0%).

(Pugin-J, 1994).

The following table shows the source of infection and organisms involved and percentage for each source of infection and percentage of cases who died from the source.

Source of infection	Total No., (%)[a]	No., died (%)[a]	CNS	S. s	Entero-coccus	other GPR	P-aureginousa	E-coli	other GNB	poly-microbial	e	fungi
Intravascular catheters	35.1	23	18	4	1	2	4	-	4	6	-	-
Surgical wounds	8.1	0	1	5	-	1	1	-	-	1	-	-
Urinary tract	3.6	0	-	-	-	-	1	2	-	1	-	-
others	7.2	37.5	2	2	-	-	-	1	-	1	2	-
intra-abdominal	9.0	80	-	-	-	1	3	1	2	1	-	2
lower respiratory	9.9	45.4	-	2	-	-	2	-	3	1	-	3
unknown	27	33.3	-	3	5	2	5	4	8	-	2	1
Total	100	31.5	21	16	6	6	16	8	17	11	4	6

- CNS : Coagulase negative-staphylococci, GPR : Gram-positive rodes, GNB : Gram-negative bacilli.

a : Percentage for each source of infection.

(Pugin - J, 1994)

Blood culture is the single most important procedure to detect systemic infection due to bacteria. It provides valuable information for the management of febrile, acutely ill-patients with or without localizing symptoms and sings. In addition to its diagnostic significance, recovery of an infectious agent from the blood provides invaluable aid in determining antimicrobial therapy .

(Ernest, etal., 1987)

Septic shock may be caused by both gram - positive organisms and by a large number of gram - negative organisms.

The chief difference between these two groups of bacteria lies in the structure and the nature of the bacterial wall.

(Smiddy, 1991).

In Gram-positive organisms, the wall is relatively simple and the basic structure upon which its strength depends is composed of a mucopeptide comprising N-acetylglucosamine and N-acetylmuramic acid molecules linked alternatively in a chain. Other components such as muramic acid and glycine are also present. (Smiddy, 1991)

In Gram-negative organisms, the bacterial wall is a more complex structure made up of lipid, polysaccharide, protein, and lipopolysaccharide. Where as the toxins from Gram-Positive organisms are contained within the cytoplasm and are secreted by actively dividing bacteria; The toxins of the Gram-negative organisms is the lipopolysaccharide component of the wall of the organism which is liberated only when the bacillus dies.

(Smiddy, 1991).

The chief differentiating features between an exotoxin and an endo-toxin are that the latter is :

1. An integral part of the outer layer of bacteria wall.
2. Heat stable.
3. Less specific in their cytotoxic effects than are exotoxins.
4. Not convertible to toxoids.
5. Not rendered non-toxic when combined with the homologous antibody.

(Smiddy, 1991).

A hint on the common micro-organisms which cause septic shock.

Gram-Positive bacteria :-

The more common Gram-positive bacteria, staphylococci and streptococci, rarely cause massive sepsis. The toxic shock syndrome is one exception. This occurs in women using vaginal tampons and has typical clinical features : high fever, erythematous rash followed by desquamation and hypotension. The causative organism is a penicillin-resistant toxigenic staphylococcus-aureus " TSST-1 exotoxin ".

(Chan, 1994).

Staphylococci are the bacteria most commonly recovered from cultures of blood. They are either coagulase-negative or coagulase-positive.

(Dalton & Nottebart, 1986).

Coagulase is an enzyme like protein that clots oxalated or citrated plasma in presence of a factor contained in many Sera. The serum factor reacts with coagulase to generate both esterase and clotting activities, in a manner similar to the activation of prothrombin to thrombin.

(Ernest, et al., 1987).

Pugin-J 1994 found that coagulose-negative staphylococci are responsible for (21.0%) of cases in Septic shock. Their source of infection from intravascular catheter (18.0%), surgical wounds (1.0%), and others (2.0%).

(Pugin-J, 1994).

Only (6.0%) of coagulase-negative staphylococci (Staphylococcus epidermidis) meets the criteria for true septicemia. The infecting bacteria are usually hospital-acquired and resistant to multiple antibiotics including the semisynthetic penicillinase-resistant penicillins.

(Dalton & Nottebart, 1986).

Staphylococcus epidermidis are members of the normal flora of the human skin and respiratory and gastro-intestinal tract.

(Ernest, 1987).

Staphylococcus aureus (S.aureus).

S-aureus is a coagulase-positive bacteria. Hospitalized patients with indwelling intravenous catheters or shunts are particularly prone to S-aureus bacteraemia but appear to have less morbidity and mortality than patients with community acquired-bacteraemia is likely to result in metastatic foci of infection or infective endocarditis and therefore prolonged antimicrobial with bactericidal antibiotics is recommended.

(Dalton & Nottebart, 1986).

S.aureus infection at any body site can result in staphylococcal bacteraemia. S.aureus bacteraemia is virtually always symptomatic, high-grade fever and potentially lethal. S-aureus bacteraemia has its highest frequency in the very young and the very old with serious underlying disease. Because there has been an increase in the incidence of methicillin-resistant S-aureus infections. Clinical microbiology laboratories in the hospitals should be alert for these isolates.

(Dalton &Nottebart, 1986).

Enterococci are streptococcus faecalis and other group D-streptococci. They most frequently are found in mixed infections with Gram-negative enteric rodes. They cause severe infection and sepsis alone or more frequently with other bacteria.

(Gerald, 1990).

Gram-negative bacteria.

Surgical wound infections caused by Gram-negative enteric rodes primarily are seen in debilitated elderly patients.

(Gerald, 1990).

Gram-negative sepsis and endotoxaemia are favoured by factors that impair host resistance and reticuloendothelial system function such as severe illness, diabetes, steroids and immunosuppressive therapy.

(Chan, 1994).

Infection with Gram-negative organisms occur 1-2 weeks after surgery- The causative organisms are Eschirchia-coli, Enterobacter, Kelbsiella, proteus, and Psendomonas species. Cryptogenic fever, tachycardia and other systemic symptomatology of sepsis generally develop in untreated or undiagnosed cases.

Persistent systemic symptomatology following chemotherapy may indicate deeper subfascial abscess or intra-abdominal source of infection.

(Gerald, 1990).

Pseudomonas aeruginosa.

Pseudomonas aeruginosa septicaemia was uncommon before the wide use of antibiotics. The type of patients generally affected are those with