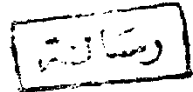


SEPTIC SHOCK

Essay
Submitted in Partial Fulfilment for
Master Degree
in
General Surgery



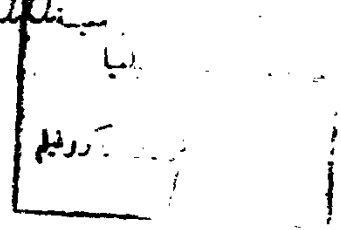
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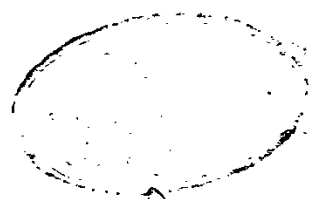
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INTRODUCTION

SEPTIC SHOCK

Introduction :-

Shock may be defined as the state in which profound and wide spread reduction of tissue perfusion leads first to reversible, and if prolonged, to irreversible, cellular injury.

[Harrison 1991]

The word "shock" was first used medically in 1743 by Henri Francoise Le Dran (A reflection from experiences with gun shot wounds). The word in English means "collapse" derived from Latin "collapsus". [Grolier I . Dictionary 1981]

Because of a large number of traumatic injuries that are seen in battle field, world war I and II have stimulated the interest in definition, investigation and treatment of "shock". Therefore the laborated efforts of Canon and Baulies 1919 created an important knowledge about traumatic shock, also Blalock 1930 and Parsons and Phennster 1930, working independently challenged the concept of generalized vascular injury and traumatic toxemia.

Since 1940 a large volume of haemo-dynamice and metabolic data has been collected from the patients with serious infections and septic shock was recognized.

[Anderson et al 1987]

Definition of septicaemia and septic shock :-

They are dramatic clinical syndromes and result from invasion of the blood stream by certain micro-organisms , or their toxic products . Fever, tachycardia, tachypnea and altered mentation are common acute manifestations of septicemia .

When hypotension and signs of inadequate organ perfusion develop , the condition is termed "septic shock" .

Even with appropriate antimicrobial and supportive care many patients die of septic shock , making strategies for prevention and more effective treatment of critical importance .

[Harrison 1991]

Septic or " endotoxic " shock :-

Septic shock is the commonest type of severe shock in general surgical practice . It is haemodynamic instability that may arise as a result of septicaemia .

[Carmona et al , 1986]

Aetiology :-

There are several factors that predispose to sepsis , including underlying neoplastic disease, diabetes, mellitus, old age, hypovolaemia, steroid therapy, immunosuppressive therapy, indwelling urinary or intravenous catheters, indiscriminate use of prophylactic antibiotic .Over confidence in the effectiveness of antibiotic agents, cancer chemotherapy, cirrhosis of the liver , tracheostomy and radiation therapy .

[Anderson et al 1987]

Recognition of these predisposing factors is specially important on surgical services where more complicated operations are being performed with increasing frequency on patients more likely to be affected by these factors .

[Mac Lean 1981]

Manifestations of septicaemia can be seen with severe systemic infections with all classes of organisms , however frank septic shock is most commonly caused by gram-negative bacteria (60-70 % of cases) . Staphylococci, pneumococci , streptococci and other gram-positive organisms are less frequent causes (20-40 % of cases) also opportunistic fungi (2-3 %) and rarely mycobacteria and certain viruses (e.g dengue-haemorrhagic fever and herpes viruses) or protozoans (e.g falciparum malaria) .

[Hagman et al 1987]

In septic shock , E-coli , klebsiella , enterobacter, proteus , pseudomonas and seratia are the most frequent blood culture isolates, followed by staphylococci and pneumococci .

[Root & sande 1985]

Gram-negative septicaemia is complicated by shock in about 40 % of patients . Shock is seen in 5 to 51 percentage of patients with acute bacteremias caused by pneumococci or staphylococci . In the setting of systemic purpura and meningitis Neisseria meningitidis is the most frequent isolate .

(Harrison . 1991)

Patients may develop manifestations of sepsis and frank septic shock with severe localized infection but without detectable organisms on blood culture .

The sepsis syndrome and shock are triggered by the interaction of various microbial products in blood , in particular gram-negative endotoxins with host mediator systems .

(Anderson et al ,1987)

Sepsis - predisposing factors

Factor	Mechanism
• Pre-existing disease - Diabetes - Alcoholism - Malnutrition - Uraemia - Liver disease	Impairment of immune function.
• Drug therapy - Steroids - Chemotherapeutic agents - Antibiotics	Impairment of immune function. Impairment of immune function. Alters gut flora, leading to colonization by pathogenic organisms
- Antacids and antihistamines	Predisposes to pathogenic colonization of gut.
• Invasive procedures - Instrumentation of urinary tract - Arterial and venous lines - Nasotracheal tubes - Enteral feeding	Breach host defence mechanisms. Breach host defence mechanisms Disrupt host defence mechanisms Upper intestinal colonization and lung aspiration.

(After Fisher and Raper, 1989).

EPIDEMIOLOGY :-

=====

In the 1970 the incidence of gram- negative rod bacteremia in the United States was estimated at between 100.000 and 300.000 cases per year , the incidence now may approach 300.000 to 500.000 cases per year .

About two-thirds of cases are seen in already hospitalized patients , most of whom have underlying diseases or procedures which render their blood stream susceptible to invasion . On the other hand gram-positive organisms accounted for less than 10% of cases of septic shock

[Harrison 1991]

PATHOGENESIS AND PATHOLOGY :-

=====

Most of bacteria causing gram -negative sepsis are normal commensals in the gastrointestinal tract . from there they may spread to contiguous structures as in peritonitis after appendiceal perforation or they may migrate from the perineum into the urethra or bladder. Gram-negative bacteraemia follows infection in a primary focus , usually the genito-urinary tract ,

biliary tree , gastrointestinal tract or lungs and less commonly , the skin , bones and joints .In burn patients and patients with leukemia, the skin or the lungs are often portals of entry .In about 30% of cases notably in patients with debilitating diseases, cirrhosis and cancer, no primary focus is apparent

Gram-positive bacteraemias usually cross from the skin or respiratory tract . Metastatic abscesses formation may complicate bacteremia , particularly that caused by gram-negative or anaerobic organisms .

More often , however, the autopsy findings in gram-negative sepsis reflect primarily the infection at the primary focus and show involvement of target organs: . pulmonary oedema, haemorrhage, hyaline membrane formation in the lungs , tubular or cortical necrosis of the kidney , patchy necrosis in the myocardium , superficial ulceration or even haemorrhagic necrosis in the gastrointestinal tract and leucocyte platelet or less commonly fibrin thrombi in the capillaries in many tissues .

[Shires et al, 1988][Harrison , 1991]

It has been shown that bacterial endotoxins are capable of producing shock by some type of sensitization that produces this pathology { Sanarelli phenomenon }

[Walter and Israel 1987]

CLASSIFICATION :- =====

Septic shock is classified into :-

1- High-output septic shock :- -----

This occurs in early or adequately treated sepsis . Systemic vascular resistance and arterial blood pressure fall but cardiac output increases because the left ventricle has little resistance to pump against. Cardiac output remains elevated as long as the blood volume is maintained . Early sepsis is manifested by fever and hypotension in a patient who appears pink and well perfused .

2- Low-output septic shock :- -----

Untreated or late systemic sepsis, from either gram-positive or gram-negative bacteria, can disrupt the micro vascular endothelium, prompt the loss of plasma into the interstitium . This allows systemic venules and small veins to collapse, decreases the driving pressure for return of blood to the heart and decreases cardiac output.

In addition in some patients, circulating plasma factors might depress myocardial contractility .

[Current 9th ed, 1990]

SCORING SYSTEMS TO ASSESS PATIENTS WITH SURGICAL SEPSIS

ACUTE PHYSIOLOGY SCORE

In 1982 Knaus and others proposed a scoring system to be used for classifying patients admitted to intensive care units . They recognized a need to describe accurately and to classify groups of patients on the basis of the severity of illness . In consultation with a larger number of intensive care specialists, they devised a two-part scale . It includes a physiological portion, the acute physiological score (APS), which examines abnormalities among 34 possible physiological measurements obtained during the first day of admission to the intensive care unit (Table below) . A number from 0 to 4 is assigned to each measurement according to how far from normal the measurement is . When multiple values for the same measurement are available, the worst is chosen . The final score which can range from 0 to 124, indicates how far from normal homeostasis a patient has strayed as a result of the acute illness .

The second part of the score is a chronic health evaluation (CH) . This examines the patient's preadmission health by reviewing the medical history for details concerning functional status , productivity , and the medical attention during the 6

Table 1. Source, frequency, and duration of the recorded vocalizations.

[illegible]

(Final survey) we respond to all provocative statements including concepts and trends that have not been previously mentioned. We also respond to statements indicating a compromised condition (e.g., "I feel that my health is declining") or a need for assistance (e.g., "I need help with my health").