Prophylactic Antibiotics in Obstetrics and Gynecology

THESIS

Submitted in partial fulfilment for the Master Degree in Gynecology and Obstetrics

BY

MEDHAT ZAKI HANNA

M.B.B.CH.

under the supervision of

Prof.Dr. **KHALIL ELLAMIE**

Dr. **ABBAS GHAZI**

Faculty of Medicine

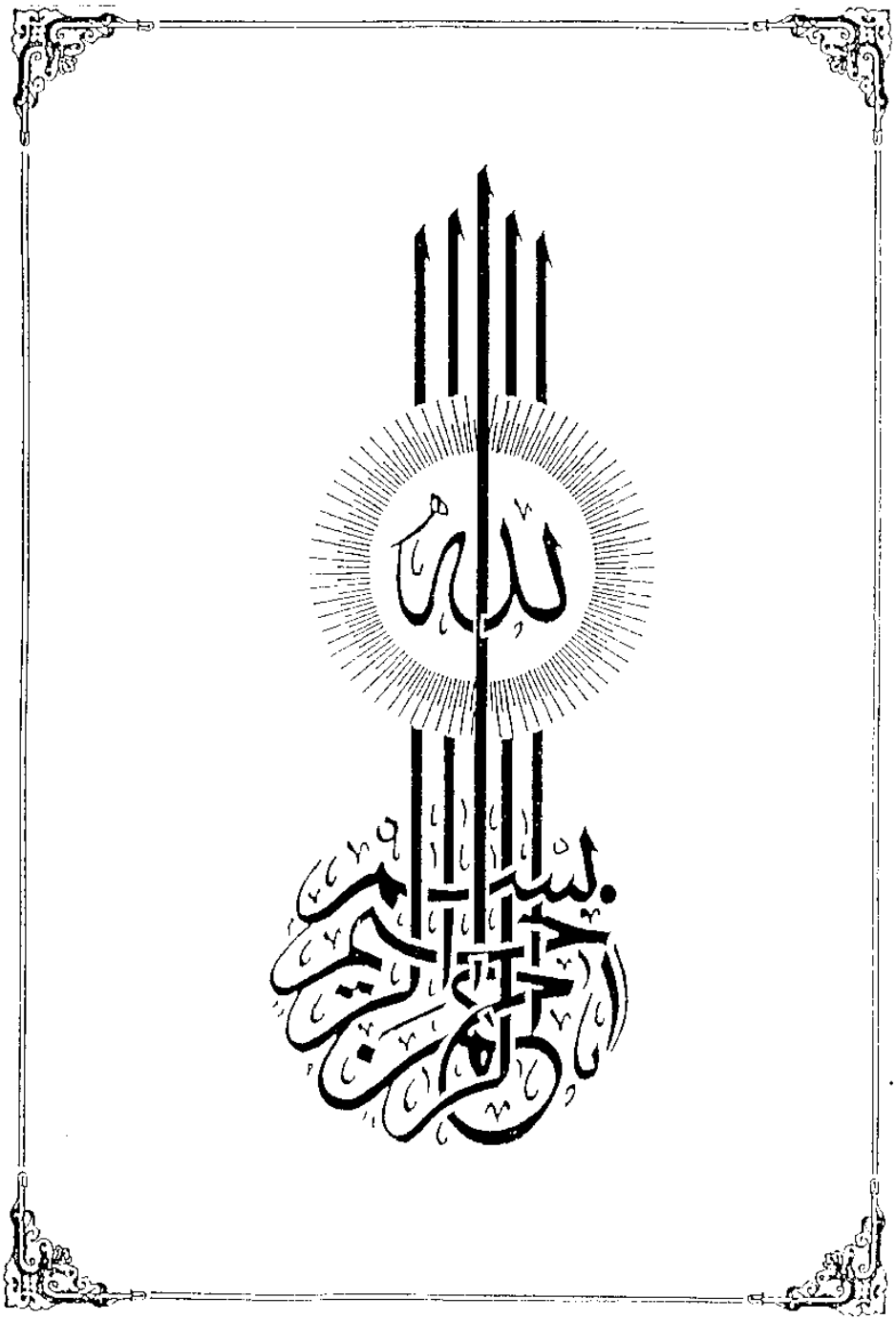
Ein Shams University

ACKNOWLEDGEMENT

I would like to express my gratitude , thankfullness and deepest appreciation to Prof. KHALIL ELLAMIE , prof. of Gynaecology and Obstetrics , Faculty of Medicine , Ain Shams University for his kind guidance in settling up the plan of this work and taking the trouble of reading and revising the whole thesis .

I am very greatful to Dr. ABBAS GHAZI Lecturer of Gynaecology and Obstetrics , Faculty of Medicine , Ain Shams University , for his kind help and valuable suggestions and the great assistance in following up this work .

M. Z. HANNA.



I N D E X

INTRODUCTION

INTRODUCTION

Infection following gynaecological and obstetrical operations still remains the major cause of postoperative morbidity .

Although major advances have been achieved in the fields of antibiotic , anaesthetics , blood transfusion , medical and nursing skills , yet hospital infection remains a problem .

With the increased demands for hospital admission on limited hospital beds and increased cost of medical care .

Every effort should be made to achieve a significant reduction in the infective postoperative morbidity .

Even as a medical student each one of us was reminded by our teachers of the doom and gloom of antibiotic misuse . It is commonly believed that well designed wards and theatre suite , adequate aseptic technique , skilled tissue handling during surgery and above all surgical skill of the operators are the most important factors in controlling infection .(Ledger 1972 ; Maclean 1975) .

Attempted prevention of postoperative infection with antibiotics is a controversial therapeutic practice that dates back to the early years of antibiotic availability . However , evidence soon emerged that antimicrobials could not prevent all postoperative infectious complications and that they had significant adverse effects . Of special concern were the emergence of resistant bacteria , the occurence of enterocolitis associated with bacterial

overgrowth , superinfection and metabolic and toxic side effects .

In the late 1950s and early 1960s , many reports appeared in the general surgical literature describing ineffectiveness and hazards of chemoprophylaxis , and the practice fell into general disfavor .

In recent years the experimental work performed by Alexander et al 1960 and Burke 1961 has been rediscovered and has become the scientific basis for an interest in prophylactic antibiotic therapy . These investigators demonstrated that , for antibiotics to be effective , they must be distributed in the surgical wound tissue at the time of operation , because it is then that inoculation of the wound with endogenous or exogenous bacteria , or both , occurs . These workers and others also demonstrated that antimicrobial therapy need not be extended beyond the immediate perioperative period . (Polk , Schoenbaum 1979) .

Post surgical sepsis is one of the most frequent causes of postoperative morbidity . Complications include wound sepsis , intra-abdominal or pelvic abscess , and septicaemia . The consequences of these potentially preventable and sometimes fatal complications include thromboembolism , malnutrition , anastomotic dehiscence , wound disruption , and disseminated intravascular coagulation .

Prophylactic antibiotics should only be used either when there is high risk of sepsis or where sepsis , although rare , is associated with life-threatening consequences .

Prophylaxis must be carefully distinguished from antibiotic therapy . The term prophylaxis is only appropriate when there has been no preoperative contamination or established infection . For this reason antibiotics used in the treatment of traumatic wounds and acute disease cannot be considered to have been prophylactic .

The aim of this work is not only to define when prophylactic antibiotics should be used but also to suggest the best choice of available drugs . Although antiseptics are important for skin preparation (Lowbury etal , 1974) , for the prevention of burn sepsis (Cason and Lowbury ,1968), and for minimizing catheter-acquired infections (Gillespie etal , 1967) their place as an alternative to systemic chemotherapy in intestinal operations has been disappointing (Pollock etal, 1978) . The role of antiseptics in surgical practice has been well reviewed elsewhere . (Gilmore , 1977) .

It would appear that the decision to use prophylactic antibiotics might be based on the risk of side effects balanced against the possibility of therapeutic effectiveness . (Burke , 1975) .

* General Principles

Resistance to bacterial infection depends almost entirely on the efficiency of the host's natural defense mechanisms . If the host's natural defenses are intact , they provide adequate protection in almost all situations , but natural resistance to bacterial invasion varies according

to the surgical field and the physiologic state of the patient . Just as deficiency in the defense mechanism in patients with agammaglobulinemia can be temporarily remedied by the use of immune globulin so also in a patient undergoing surgery can maximum antibacterial efficacy be a combination of natural defense mechanisms and an antibiotic .

As already stated , the natural resistance of the patient is by far the major component in defense and depends upon normal physiologic function . Thus , such general supportive measures as blood transfusion , fluid and electrolyte therapy and an adequate supply of calories and nitrogen are factors of major importance in preventing and combating infection .

As much information as possible concerning bacterial and host factors should be gathered in order to establish a guide to preoperative antibiotic therapy aimed at preventing bacterial infection . Whereas in medical conditions the exact onset of infection and physiologic disturbance is impossible to predict , during surgical procedures the time of induction of anaesthesia and the time of incision are known exactly , and the onset and duration of the circumstances that result in bacterial infection are also accurately known .

The circumstances involve the type and quantity of bacteria present and the tissue resistance to these bacteria . Studies of staphylococci in human volunteers have demonstrated that an enormous inoculum must be injected into the skin of a normal individual in order to produce a bacterial lesion (Elek , 1956) .

In 1963 Burke demonstrated that all wounds contain viable bacteria at the end of a surgical procedure, and that almost all (92 %) contain coagulase-positive staphylococci. This study also demonstrated that the number of bacteria contaminating a clean wound at the end of surgical procedure varies from tens to hundreds and thus is far less than the millions required to create an infection in a normal individual. Despite the small inoculum, however, a number of surgical patients with this low level of contamination develop postoperative infections. It appears, therefore, that there is a decrease in the level of host resistance during a surgical procedure.

Reduced resistance to bacterial infection can be an overall systemic condition such as hypovolemic shock or a very limited local reduction in tissue perfusion such as that following the injection of a vasoconstrictor substance. Areas of tissue necrosis result in areas of minimal resistance to bacteria from the surrounding tissues. Thus, the best defense against postoperative infection is good operative technique, the avoidance of vasoconstrictors locally and the maintenance of the normal physiologic state of the patient.

However, in any group of patients exposed to the same level of bacterial contamination, infection will be most likely to develop in those whose host resistance is below the level needed to deal with the inoculum.

It is important to keep in mind the differences between the effect of antibiotics on bacteria in the process of invading tissue and their effect on bacteria in an already established infected lesion.

The comments wich follow refer to preventing bacterial invasion and not to treatment of established lesions .

Experimental data indicate that the host reacts to bacteria immediately upon their arrival . If epinephrine is injected into tissue at intervals up to 5 hours after the introduction of bacteria , the most marked increase in the size of the lesion , reflecting the most marked decrease in host resistance by the local ischaemia , occurs when the ischaemia is produced at the same time as the bacteria are introduced . (In the light of this information , the injection of vasoconstrictor substances into the vaginal wall at the time of colporrhaphy or vaginal hysterectomy would appear to be most unwise .)

If the onset of ischaemia begins 3 hours after the bacteria have been introduced , the lesion is not significantly different from that obtained in controls .

The same time relationships can be shown for the effects of hypovolemic shock or for the effects of blocking circulating antibacterial substances such as the complement system .

The effect of antibiotics on host lesions which are 1 to 6 hours old is exactly opposite to the effect produced by blocking host resistance with a local vasoconstrictor substance . Maximum suppression reflecting the most extensive increase in host resistance , as the result of supplementing with antibiotics , is obtained if the antibiotic is in the tissue when the bacteria arrive .

The effect of antibiotics decreases in proportion to the length of time the organisms have been in the tissue before the antibiotic was given . Antibiotics have virtually no effect in preventing infection if they are given after the bacteria have been in the tissue for 3 hours . This does not mean that antibiotics given later than 3 hours following inoculation of bacteria will have no effect on secondary spreads from primary tissues , but antibiotic support of the tissue defense system must be provided during the surgical procedure , at which time host defense will be at a minimum .

* Definition of Prophylaxis .

By definition , prophylaxis implies therapy prior to the initiation of infection , and some investigators believe that therapy should be maintained only for a brief period of time . Others use antibiotics prophylactically , but on a therapeutic dosage schedule . Opponents to the more intensive therapy argue that the increased amount of antibiotics in the environment predisposes to the selection of a more virulent hospital flora . Also , such therapy may predispose a patient , if infection supervenes , to a more virulent bacteria . A final argument states that such dosages are not necessary . On going studies of the microbial flora of patients in hospitals using prophylactic antibiotics are necessary to resolve these questions completely .

* The place of antiseptics in prevention of infection .

Doctors are rarely actively concerned to exercise personal choice from amongst the huge number of antiseptics and disinfectants . They generally

just want to be told which preparation has been found most suitable for each particular purpose .

As disciples of Bonney they graduated on a ritual of violet green routinely applied to the vagina and the abdomen . There is no question that it was both the most effective skin sterilizer and the most messy antiseptic invented at that time . It stained the bed clothes , nightdress and even the patient's hand and face , nor was the surgeon immune .

On reluctant apostasy is now complete , with the exception of applying the violet-green to the vaginal vault as a preliminary to total hysterectomy . They made this decision largely in the interest of the patient and nursing staff who found the replacement of stained garments and bedclothes an intolerable burden . More over such excellent antiseptic preperations as CTAB and chlorhexidine (Hibitane) or flavine in spirit will rapidly sterilize the required operation area .

For vaginal operations they now use local antiseptics in the ward except where a heavily infected vagina or cervix with a purulent discharge requires douching . The solution that recommend is hydrogen peroxide or eusol . With the exception of the infected case , the vulva and vagina are prepared in the theatre with the patient anaesthetized and in the lithotomy position .

They recommend first a liberal application of diluted savlon H.C. applied with a swab on a sponge holder . This application is followed by painting the operation area with a solution of chlorhexidine in alcohol .

A surgeon may use any solution he likes provided that it is not toxic to the patient , e.g. some patients are sensitive to iodine . The aim , is to work under complete aseptic condition , and to prevent postoperative complications.

* Surgical Technique .

In no circumstances should antimicrobial prophylaxis be considered as a substitute for poor surgical technique . Irrespective of the use of antibiotics an increased risk of sepsis is observed following prolonged operations, if there has been no adequate haemostasis , if non absorbable materials (particularly large sutures) have been left in the wound , if the blood supply has been compromised , and when open drains have been used (Davidson et al , 1971 ; Cruse , 1975) . Whenever possible , closed suction drains should be used ; if open drains are necessary they must be brought out through a separate incision .

There is no evidence that wound protection reduces the incidence of postoperative sepsis (Psaila et al , 1977) . Whenever a hollow viscus containing bacteria , e.g. the colon , is opened there is greater risk of infection . It is most important that the colon should have been efficiently cleared of faecal material before operation . Anastomotic dehiscence and therefore the risk of intra-abdominal or pelvic abscess are greatly increased if the colon has been inadequately prepared even though prophylactic antimicrobials may have been used (Irvin and Goligher , 1973) .

Antimicrobial prophylaxis is no substitute for inadequate preoperative preparation .

PRINCIPLES OF CHEMOPROPHYLAXIS