Role of Prophylactic Antibiotics in Clean Contaminated Surgical Operations

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Objectives: To evaluate the role of antibiotics in clean contaminated surgical operations. To comparison of their with reference to the hospital stay. **Study design::** This is qusi-experimental study. **Place & duration of study:** Jinnah Hospital Lahore Jan, 2002 to Dec, 2002. **Material and methods:** One hundred (100) patients were included in the study. The patients included in the study were evaluated and prepared for the surgery under spinal / general anaesthesia. Cases were operated upon by the consultants and the trainee doctors. The first dose of the suitable antibiotic was given at the time of induction of anaesthesia and next two doses with interval of 8 hours postoperatively **Results:** Data from 100 patients was analyzed for following observations. **Conclusion:** Prophylactic administration of antibiotics can reduce the incidence of postoperative wound infection in clean contaminated surgical procedures.
Key words: Clean contaminated, infection, antibiotics, prophylaxis.

All surgeons encounter infection by the nature of their craft, they invariably impair the first line of the host defence, the cutaneous or mucosal barrier.

The entrance of the microbes into the host tissues is the initial requirement for the infection[1]. Infection remains the major threat to the surgical patients and prevention of infection should be the main concern for any surgical team. Despite the improvement in surgical techniques and postoperative care, sepsis continues to be a main cause of delayed recovery, wastage of health resources, prolonged morbidity, and even increased mortality[2,3].

Introduction of antibiotics was the major step in the treatment of infection. Although antibiotics therapy was a monumental advance in the treatment of infections, for patients with surgical infection it constitutes only a part of treatment. Antibiotics prophylaxis in surgery refers to administration of antibiotics to patients without evidence of established infection with the objective of reducing postoperative infection and its complications[4].

Prophylaxis has shown in many randomized clinical trials to reduce the incidence of postoperative wound infection[5,6]. Overall surgical wound infection rate is around 3%[7]. Surgical wound is a wound produced in the patient intentionally or accidentally for surgical treatment of pathological conditions. Surgical wounds are of the following types:

Clean wounds: Wounds made on the non infected tissue and without microorganisms in the vicinity of the wound e.g. Hernia and Breast lump etc.

Clean contaminated: Wounds which are made on clean and non infected tissue which carry microorganisms in the vicinity of wound but not in the wound itself e.g. surgical wound for the gall bladder, prostate and ureter etc. the risk of postoperative wound infection is three times more as compared with clean wounds[19]. In these wounds the prophylactic antibiotics help to prevent the postoperative wound infection.

Contaminated: Wounds are those in which gross spillage from the GI tract, or incision in which acute, nonpurulant inflammation is encountered, or open fresh accidental wounds. Infection is five times more than clean wounds[19].

Septic/dirty infected: Wounds with all the features of the inflammation and presence of pus, e.g. surgery for GI perforations, peritonitis .Risk for wound infection is six times is more than clean wounds[7,8].

Currently prophylactic antibiotics are recommended for the clean contaminated and those clean operations where prosthesis are used e.g. mesh repair of hernia, hip replacement etc. The effectiveness of prophylactic antibiotics depends to a great extent on appropriate time of administration[9]. Parentral antibiotics in sufficient dose should be given at the time of induction of anaesthesia. Patients who receive prophylactic antibiotics more than three hours of the skin incision have five time more chances for infection than those who receive within two hours[10]. Only three doses should be given, for continued administration may increase the risk of bacterial resistance, drug toxicity and bacterial super infection.

The ideal agent should be effective against all the pathogens commonly encountered, free from toxic side effects, inexpensive and convenient to administer[11,12]. The present study is designed to find out the benefits of short course chemoprophylaxis in clean contaminated operations.

Material and methods:

Study Design. This is quasi-experimental study.

Study population and Place of study. This study was done in Surgical Unirt-1 Jinnah Hospital Lahore from Jan, 2002 to Dec,2002. Patients were collected randomly from the surgical out-patient and emergency departments. One hundred (100) patients were included in the study.

The patients included in the study were evaluated and prepared for surgery. Cases were operated upon by the consultants and the trainee doctors. The first dose of the suitable antibiotic was given at the time of induction of anaesthesia and next two doses with interval of 8 hours postoperatively. First dressing was changed after 48 hours

and then on daily basis. The wound infection was graded as below.

GRADE— 1, Slight redness of the edges and no discharge
GRADE— 2, Marked redness of the edges no discharge
GRADE— 3, Definite wound infection with oozing or purulent discharge.

Inclusion criteria:

1. Patients of all age groups and both sexes.
2. Both elective and emergency operations.
3. Clean contaminated cases only.

Exclusion criteria:

1. Clean wounds
2. Contaminated wounds
3. Clean contaminated wounds in immuno-compromised patients
4. Clean contaminated wounds in uraemic patients

Methodology: All the patients included in the study were evaluated for the presence of perioperative risk factors by taking detailed history thorough physical examination and using following laboratory parameters, complete blood count, blood glucose level, renal profile, serum proteins and any other relevant investigation.

Chemoprophylaxis: Three doses of the 2nd generation cephalosporins antibiotics were used with following protocol

1st dose at the time of induction of anaesthesia
2nd dose after 8 hour of surgery
3rd dose after 16hour of surgery.

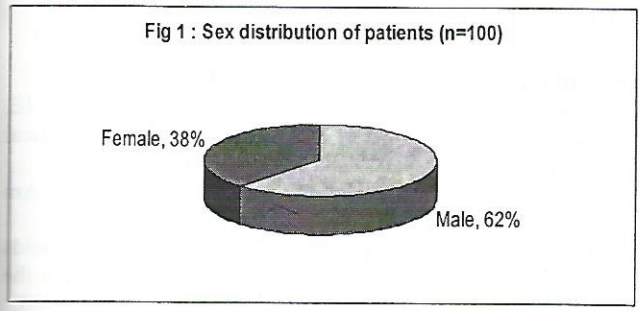
Dressings: First dressing was changed 48 hours after operation later on daily dressings were done and wounds were examined for any sings of inflammation.

Follow up: Patients with healthy wounds were followed in the surgical OPD for two weeks time while patients with infected wounds were followed till their wounds healed.

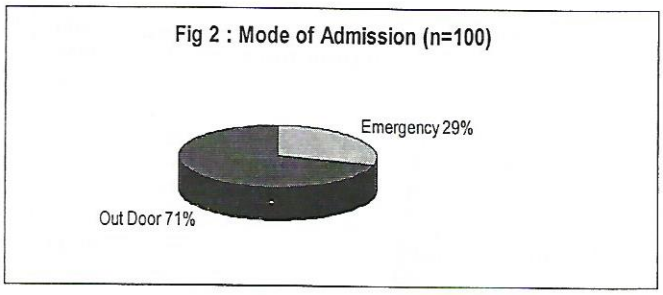
Results:

Data from 100 patients was analyzed for following observations.

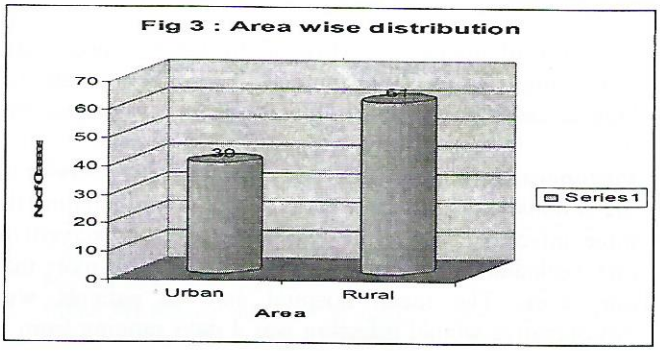
Age and sex: Sixty two patients were male and 38 were female. Male to female ratio was 1.66:1(Fig.1) Majority of the patients presented in the age of 30-50 years. Mean age was34.60+/- 1.5 years.



Mode of admission: Patients admitted through outdoor 71(71%) and emergency 29(29%).(Fig.2)



Population area: 61 Patients belong to rural area and 39 to urban area. (Fig.3)



Presenting complaints: Majority of the patients presented with pain right iliac fossa 60(60%), pain right hypochondrium 24(24%), vomiting 36(36%) and pain lower abdomen 5 (5%) patients.

Presenting Complaints

Complaints	n=	%age
Pain Right Iliac Fossa	65	65
Pain Right Hypochondrium	24	24
Vomiting	36	36

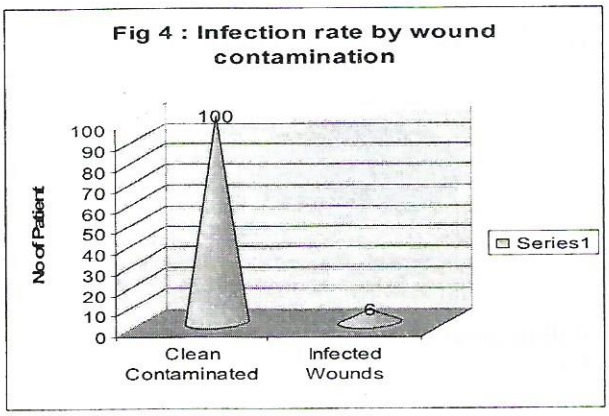
Diagnosis: Acute appendicits was diagnosed in 65 patients, cholelithiasis in 30 patients and choledocolithiasis in 5 patients.

Diagnosis

Diagnosis	n=	%age
Acute appendicitis	65	65
Cholelithiasis	30	30
Choledocholitheasis	5	5

Peroperative spillage: Peroperative spillage occurred in 40(40%) patients, out of these in 80% there was minimal spillage, and gross spillage in only 20% cases.

Wound conditions: In the present study out of 6 infected wounds 3(50%) were detected during the first post operative week, while 5(83.3%) were diagnosed in the 2nd postoperative week). By the study definition 6 surgical wounds became infected resulting in an overall infection rate of 6 %.(Fig.4)



Duration of operation: Most of the surgical procedures were completed in 30-90 minutes. The infection rate was high in cases in which the operation time was more than this.

Postoperative hospital stay: The postoperative stay of all these study patients was less than three days including the three infected cases while two infected cases stayed for one week and one patient remained admitted for more than one week. The mean hospital stay in patients with postoperative wound infection was 4 days ranging from 3-10 days.

Pus culture and sensitivity: Commonest isolates were E. Coli (50%), Pseudomonas aerugunosa 33.3%, Staph aureus,Klebsiella pneumoniae and Streptococcus pyogenes were 16.70%.

Discussion:

Prophylactic antibiotics are usually recommended in clean contaminated wounds and it leads to reduction in wound infection up to 41%[17, 18, 19]. Prophylactic antibiotics are in use for the last thirty years with the idea that drugs which can cure infections can also prevent them.

Although the initial studies were not showing the satisfactory results but later the research established the efficacy of these drugs[20].Currently the chemoprophylaxis is the major factor for prevention of the wound infection in the surgical patients[21, 22]. The selection of the antibiotic is on the empirical basis for the potential pathogens cannot be confirmed. Multiple drugs and drugs with toxic side effects are reserved for the established wound infections[23,24, 25].

Cephalosporins have been used most extensively for prophylaxis due to its low toxicity[23, 25]. There are many factors which should be considered for selecting a drug for the prophylaxis e.g. side effects of the drug, metabolism, cost effectiveness, its availability in different forms, and consideration should also be given to patients hepatic and renal functions, immune status, pregnancy, and laction[26].

For effective prophylaxis the adequate level of the drug should be in the serum, tissues and in the coagulum formed in the wound. So the timing dose and route of administration of the drug is very important[27, 28]. This is possible by giving maximum possible dose of the drug 30 minutes before skin incision.

Keeping in view all these factors I selected the 2nd generation cephalosporins for the current study because it is available for both oral and parentral use and is less toxic and is also cost effective. Different studies show infection rate from 1.8% to 12.6%.[29, 30, 31].

The acceptable postoperative wound infection rates in clean contaminated surgery are 10.0%[28]. In the present study the infection rate in 6%.

Risk of wound infection has repeatedly been shown in literature to be proportional to the length of operation[14, 15, 16]. In the present study a higher incidence of wound infection (22.22%) was observed when the duration of operation was more than 150 minutes.

Curse and Ford in their study in the Foothill Hospital found an increase in wound infections with longer duration roughly doubling with every hour of procedure[15].

Regarding the time of presentation of wound infection, various studies show that 50% cases present during the first week postoperatively while 80-90% are diagnosed in the 2nd week[30, 31].

Staph aures is the most common isolate seen as mentioned in the literature[29,30,32] while in my study E Coli was the commonest (42.8%).Pseudomonas aureginosa, Klebsiella, Staph aures, streptococcus pyogenes (14.2%).E Coli were sensitive to the 2nd generation cephalosporins.

Surgical wound infection delays the recovery of the patients and increases the hospital stay by average of one week[13, 34]. In our study the mean hospital stay was 4 days ranging from 3-5 days. In our study out of seven suspected cases in 6 pt microorganisms were isolated (85.71%) while it was 87% in a study by Arura et al in 1990[35], so the results of the study are comparable

Antibiotics are amongst the most misused drugs in the clinical practice. Misuse of these drugs not only increases the cost of treatment but is also causing the drug resistance. An over zealous use of the prophylactic antibiotics is a misuse of the antibiotics[36].

Conclusion:

Prophylactic administration of antibiotics can reduce the incidence of postoperative wound infection in clean contaminated surgical procedures.

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