Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 05, 2022

Original research article

POSTOPERATIVE WOUND INFECTIONS: MANAGEMENT AT A TERTIARY CARE HOSPITAL

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Abstract

In spite of number of advances in medical sciences, postoperative wound infection still causes significant morbidity and mortality. One such advance is the discovery of wide range of antibiotics. It is well documented that judicious use of antibiotics can prevent surgical wound infection. They are often lifesaving. However, extensive and indiscriminate use of antibiotics has caused development of drug resistant bacteria. In such cases these bacteria become more virulent. Group A comprising 49 patients who received a prophylactic single dose of ceftriaxone (broad-spectrum cephalosporin); Group B comprising of 51 patients and who received no such prophylactic antibiotic. The patients were split into two groups, taking considerations of the type of surgeries, the age of the patients and other associated medical problems, all of which were represented in both groups almost equally and a comparative clinical study was made. In group A, there were minor complications such as, serous or seropurulent discharge, redness or edema in only 3 cases as against 7 cases in group B. The p value being 0.205. In these cases appropriate antibiotics as per the culture and sensitivity report were initiated. On the day of suture removal (on postoperative 8th day) There was only one case of purulent collection in the wound, which required secondary suturing and appropriate antibiotic as per the culture and sensitivity report in group B.

Keywords: Postoperative wound infection, appropriate antibiotics, prophylactic antibiotic

Introduction

Postoperative wound infection is one of the common clinical conditions encountered by Surgeons. This condition has to be identified and treated effectively. Or else, complications could be very serious. The skin or mucosal barrier, through which the microbes enter the host, is the initial requirement for infection. Infection of the incised skin or soft tissue is common, but is also a potentially avoidable complication of any surgical procedure.

In spite of number of advances in medical sciences, postoperative wound infection still causes significant morbidity and mortality. One such advance is the discovery of wide range of antibiotics. It is well documented that judicious use of antibiotics can prevent

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surgical wound infection. They are often lifesaving. However, extensive and indiscriminate use of antibiotics has caused development of drug resistant bacteria. In such cases these bacteria become more virulent.

Hence, postoperative management of surgical wound infection not only depends on the hospital environment and the personnel who perform the surgery but also on judicious use of antibiotics [2].

By 19th century specific or differential staining of microorganisms by various dyes were discovered. In 1934, Ruska introduced electron microscope and subsequent refinements m electron microscopic techniques took place. Pasteur discovered vaccines for small pox, anthrax and rabies. Metchnikoff (1883) discovered the phenomenon of phagocytosis. Wright (1903) discovered opsonization in which antibodies and phagocytic cells act in conjunction against organisms [3].

Fleming (1929) made the accidental discovery that the fungus penicillium produces a substance, which destroys staphylococci. With this the antibiotic era began. In 1960, Burke administered a single dose of penicillin systemically at various times before and after inoculation of penicillin sensitive staphylococcus aureus in the dermis of guinea pigs. Administration of antibiotic either shortly before or after the inoculation of organisms resulted in lesions histologically identical to lesion induced by intradermal inoculation with killed organisms. Delaying the administration of antibiotics, by a little as 3 hours resulted in lesion identical to those in animals not receiving antibiotics [4].

The critical dependence of prophylactic efficiency, on time of administration was soundly established and subsequently shown to depend on presence of peak antibiotic levels in the tissue at a time when the local concentration of the microorganisms would be otherwise high.

As a surgeon of this era, one should be responsible in dealing with infections and m knowing about microbiological, immunological and pharmacological aspects. This helps m surgical skills. Basic understanding of how the body defends itself against infections is essential for the rational application of surgical and other therapeutic principles to the control of the same [5, 6].

Methodology

During this period 100 cases were selected at random for our study purpose, all of which were clean elective surgeries done with meticulous surgical technique.

Inclusion criteria

- All cases in the age group of 18 to 60 years including both sexes.
- All elective cases of surgery.
- All clean cases of surgery e.g. hernias, varicose veins etc.

Exclusion criteria

- Paediatric age group.
- Geriatric age group.
- All emergency surgeries.
- All clean-contaminated, contaminated and dirty cases, abscesses, hollow viscus perforation. e.g. intra-abdominal.

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 05, 2022

This work involved the study of 100 patients who underwent various surgeries. All the surgeries in the study were elective cases and all the patients subjected to this study were healthy individuals with a general work up.

The study group of 100 patients was randomly selected and split into two groups.

Group A comprising 49 patients who received a prophylactic single dose of ceftriaxone (broad-spectrum cephalosporin); Group B comprising of 51 patients and who received no such prophylactic antibiotic.

The patients were split into two groups, taking considerations of the type of surgeries, the age of the patients and other associated medical problems, all of which were represented in both groups almost equally and a comparative clinical study was made.

On admission to the hospital, a detailed proforma was completed, which included history taking, clinical examination, diagnosis, preoperative investigation, meticulous surgery and postoperative care. All the cases were followed up until suture removal and the data was entered in the proforma. Wound swabs were sent for culture and sensitivity in all the cases on postoperative 3rd day and the results were compared and studied.

A detailed history was ascertained and entered in the proforma. A detailed previous history was recorded. Past history of taking any drugs, antibiotics and any history of previous hospitalization, associated illness, habits and diet were recorded in detail. Any significant family history was also recorded.

Results

The commonest organism isolated was Staphylococcus Aureus. The other organism isolated was Klebsiella.

Table 1: Complications-Postoperative first dressing on 3rd day

Postoperative first dressing on 3rd day	Number (n=l00)	%
Clean	90	90.0
Infected	10	10.0

It was noticed on first postoperative dressing (3rd postoperative day) that 90% of the cases were clean and only 10% of the cases were infected at the surgical site.

Table 2: Complications-On suture removal

Complications-On suture removal	Number (n=100)	%
Clean	99	99.0
Infected	1	1.0

Sutures were removed on 8th postoperative day in most of the cases. It was healthy in 99% of cases. It was infected in only one case.

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 05, 2022

Table 3: Effect of administration of preoperative antibiotics on postoperative swab culture

Preoperative antibiotic administration	Postoperative Swab	
	Growth	No growth
Group A (n=49)	3 (6.1%)	46 (93.9%)
Group B (n=51)	8 (15.7%)	43 (84.3%)
Total (n=100)	11 (11.0%)	89 (89.0%)
Inference	Postoperative swab culture growth was 2.85 times more likely in patients Not taken antibiotics preoperatively with p=0.127.	

Preoperative prophylactic administration of antibiotics was given m group A (49 cases) and was not given in group B (51 cases). Swabs were taken for culture on 3rd postoperative day from the surgical site of all the cases. The culture and sensitivity report was collected after 48-72 hours.

There was growth only in 6.1% of cases in group A as compared to growth of 15.7% of cases in group B.

From both the groups, there were 1 1% of cases with growth. 89% of cases showed no growth.

The postoperative swab culture growth was 2.85 times more likely in patients who did not receive prophylactic antibiotic.

Table 4: Effect of administration of preoperative antibiotics on postoperative wound complications

Study characteristics	Preoperative antibiotics		p value
	Group A (49 cases)	Group B (51 cases)	
Preoperative antibiotics Administration	Given	Not given	-
Postoperative swab growth	3	8	0.127
Postoperative antibiotics administration	3	8	-
Complications-Postoperative first dressing on 3r day	3	7	0.205
Complications-On suture removal	-	1	0.999

On 3rd postoperative day

In group A, there were minor complications such as, serous or seropurulent discharge, redness or edema in only 3 cases as against 7 cases in group B. The p value being 0.205. In these cases appropriate antibiotics as per the culture and sensitivity report were initiated.

On the day of suture removal (on postoperative 8th day) There was only one case of

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purulent collection in the wound, which required secondary suturing and appropriate antibiotic as per the culture and sensitivity report in group B.
Group A had no such complications.

Table 5: Pre-operative antibiotics

Hospital stay in days	Preoperative antibiotics	
	Group A [Given) (n=49)	Group B [not given] (n=Sl)
Range	5-10	5-14
Mean ± SD	6.84 ± 1.11	7.61 ± 2.17
95% CI	6.52-7.15	7.00-8.22
Inference	Duration of hospital stay was significantly longer in patients not administered with preoperative antibiotic p=0.029.	

Table 6: Patient Condition at discharge

Patients condition at discharge	Preoperative antibiotics	
	Group A [Given) (n=49)	Group B (Not given) (n=51)
Excellent	5 (10.20%)	-
Good	14 (28.57%)	4 (7.84%)
Satisfactory	30 (61.22%)	47(92.16%)
Poor	-	-

Discussion

According to Indian Journal of Surgery, the average overall wound infection is 14%, ranging between 7% and 28% amongst different workers in different places. In our study, the overall infection was seen to be 11%.

In this study, even clean cases have show infection (6.1%). Hence, at this stage single dose prophylactic antibiotic is recommended in all clean cases until a definite proof is available against its usefulness.

In our study, a single dose of 1 gram of ceftriaxone half-an-hour before surgery was used in group A. In the group B, no prophylaxis was given. But cefatrixone 1 gm BD and metronidazole 100 ml tid was given for 5 days.

The route of administration of an antibiotic should be intravenous as a bolus dose as practiced in this study and so advised by other workers in order to achieve a rapid therapeutic levels. So the timing of single dose prophylaxis is very important. Basic aim in this type of prophylactic use is to achieve a therapeutic tissue concentration at the operative site to prevent bacterial growth [7].

The time schedule for administration of prophylactic antibiotic followed in this study has been found to be optimal [8].

The same observation has been made other workers also. Time of administration Percentage of infection. In the absence of infection postoperative pyrexia does not warrant any antibiotics.

As found in this study postoperative pyrexia did not require any treatment. However,

ISSN:0975 -3583,0976-2833 VOL13, ISSUE 05, 2022

when there is a wound infection with serous or purulent discharge showing positive culture growth, it requires appropriate antibiotic according to culture and sensitivity report. As shown in this study, 11% of patients who showed wound infection with positive culture growth, required antibiotic according to culture and sensitivity report [9].

The cost factor in surgery has been enlightened by a number of authors in most of their works. As compared to prolonged or multidose regimes a single dose of prophylactic antibiotic is much more cost effective. Reduction in wound infection rate also helps in reducing in the duration of hospital stay and hence the cost is also reduced [10].

Conclusion

- The incidence of wound infection in group-B was 15.7%, as compared to 6. 1% in group A. This difference in occurrence of postoperative wound infection between the two groups however was found to be non-significant p being 0.127. This was due to sample size and very small number of incidence of postoperative wound infection in group A.
- The study emphasizes that the preoperative antibiotic prophylaxis is far better than postoperative treatment. Preoperative antibiotic prophylaxis should be given at the right time taking into consideration ; the nature of surgery, the pathogen likely to cause infection and the drug resistance that the pathogen might exhibit in future if the antibiotics are used indiscriminately and without rational.

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Accepted on 10/01/2022