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Original Article

A Prospective Randomized Trial for Role of Antibiotic Prophylaxis in Laparoscopic Surgery

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ABSTRACT

Objectives: Present study was conducted to observe the effect of single dose regime versus multi dose regime of antibiotic in laparoscopic surgery; in terms of type and dose of intravenous antibiotic given and the occurrence of post-operative complications.

Methodology: Present prospective study was carried out in Department of Surgery, Mata Gujri Memorial Medical College, Kishanganj, Bihar, India. All those patients who attended Department of surgery for laparoscopic surgery (elective and emergency) were included in our study. A total of 146 cases were included in the study. Patients were given single or multiple dosages of antibiotics on the basis of random selection. Follow-up of the patients was done for the post-operative complications at the end of one and third week after the date of discharge. Patients were observed for complains such as pain, fever, discharge from wound site, stitch abscess, wound gape, and any other complaints.

Results: Out of 146 patients enrolled, the mean age was 39.14±15.04. Out of 146 patients in the study, 94 (64.38%) were Male and 52 (35.62%) were Female. Out of 146 patients, 107 patients underwent Elective Surgery and 39 patients underwent Emergency surgery. Single dose of antibiotic was given to 92 patients and multiple dosage of antibiotics was given to 54 patients while 9 patients were converted from single to multiple dosage regime of antibiotics.

Conclusion: Single dose of antibiotics are more patient compliant, cost effective, less incidence of adverse effects, prevents emergence of antibiotic resistance and more rational than multiple dosages of antibiotics; as in laparoscopic surgery chances of gross contamination is less. As laparoscopic surgeries are more accepted then open conventional surgeries because of its following advantages: - decreased incision size and infection, less post-operative pain, short hospital stay, faster recovery, less post-operative complications and early return to activity. Hence we advise the use of single dosage of antibiotics in laparoscopic surgeries.

KEYWORDS: Antibiotics, Laparoscopic Surgery, Surgical Site Infections.

INTRODUCTION

Laparoscopic surgeries are now a days preferable to open surgery wherever possible among surgeons as well as patients. As well as in patients having obesity, athletes and patients concerned with cosmetics. Several factors works in close interplay that determines postoperative morbidity and mortality. Surgical site infections (SSIs) are part and parcel of postoperative complication and contribute considerably to morbidity and mortality. Surgical site infections are the third most common type of nosocomial infections and they account for approximately a quarter of all nosocomial infections.[1,2]

Pathogens that cause SSI are acquired either endogenously from the patient's own flora or exogenously from contact with operative room personnel or the environment. However, the period of greatest risk remains the time between opening and closing the operating site.[3-5]

Much work has been done in past to study the effect of prophylactic antibiotics in reducing infectious morbidity. A plethora of antibiotic types, dosing schedules, and routes of administration have been investigated. There is evidence to support the use of prophylactic antibiotics

for a number of surgical procedures. Unfortunately, few comparative trials have been conducted, leaving the clinician with uncertainty as to which regimen is superior.

The presence of antibiotic resistant organisms is a reality in health care facilities.[6] These organisms include methicillin resistant Staphylococcus aureus, vancomycin resistant Enterococcus, and extended-spectrum beta lactamase producing organisms etc.

Both morbidity and mortality are increased in infections involving these organisms, as they may be more virulent and are more difficult to treat because therapeutic options are limited. Antibiotic resistance development results mainly from the inappropriate use of antibiotics. Incomplete and improper courses of antibiotic therapies and the unnecessary use of broader spectrum regimens play a role.[7]

The purpose of antibiotic prophylaxis in surgical procedures is not to sterilize tissues but to reduce the colonization pressure of microorganisms introduced at the time of operation to a level that the patient's immune system is able to overcome.[1] Prophylaxis does not prevent infection caused by postoperative contamination. Prophylactic antibiotic use differs from treatment with antibiotics in that the former is intended to prevent infection, whereas the latter is intended to resolve an established infection, typically requiring a longer course of therapy. Before an agent can be considered, there must be evidence that it reduces postoperative infection. It must also be safe and inexpensive, and it must be effective against organisms likely to be encountered.[1]

Perioperative antimicrobial prophylaxis constitutes the bulk of antimicrobial consumption in any hospital. Usually, long courses (conventional course) of antibiotic prophylaxis are administered, which are often associated with increasing antimicrobial resistance, super infection with resistant pathogens, toxicity and unnecessary cost.[8] We need to adapt the policies that decrease the incidence of postoperative wound infection.

The antibiotic selected should be according to the activity of agent against the most common organism encountered during surgical procedure and the antibiotic should have a large volume of distribution with longer half-life and should be safe in terms of renal and hepatic toxicity. A single, effective and nontoxic drug is used to prevent infection by a specific microorganism or to eradicate an early infection. Single or multiple dosage regimes of antibiotics will be depending upon the patient resources, the surgical condition of the patient and the vulnerability of the patient for infection.[9]

Present study was conducted to observe the effect of single dose regime versus multi dose regime of antibiotic in laparoscopic surgery; in terms of type and dose of intravenous antibiotic given and the occurrence of post-operative complications.

MATERIALS & METHODS

Present prospective study was carried out in Department of surgery, Mata Gujri Memorial Medical College, Kishanganj, Bihar, India. All those patients who attended Department of surgery for laparoscopic surgery (elective and emergency) were included in our study. A total of 146 cases were included in the study. Patients were given single or multiple dosages of antibiotics on the basis of random selection. Patients with a documented allergy to any of the medications used in the trial were excluded. Follow-up of the patients was done for the post-operative complications at the end of one and third week after the date of discharge. Patients were observed for complains such as pain, fever, discharge from wound site, stitch abscess, wound gape, and any other complaints. For the patients who developed complications, either the antibiotic was changed or the regime of the antibiotic was changed.[10]

Table 1: Showing different types of Intravenous Antibiotics used.

Antibiotic Group	Generic Name	No. of Patients in Single Dose	No. of Patients in Multiple Dose
Cephalosporin	**Ceftriaxone**	42	23
	Cefuroxime	16	11
	Cefotaxime	2	2
Penicillins	**Amoxicillin**	5	3
	Ampicillin	2	-
	Piperacillin	3	-
Aminoglycoside	**Amikacin**	13	6
Flouroquinolones	**Ofloxacin**	7	3
	Ciprofloxacin	2	1
Imidazoles	**Metronidazole**	-	4
	Ornidazole	-	1
Total		92	54

Table 2: Doses of antibiotic used

Dose of Antibiotic Used	Total No. of Cases
Single	83
Multiple	54
Single Converted To Multiple	09
Total	146

Table 3: Follow Up results with Single dose with one Antibiotic

Symptoms and Clinical Findings	Week 1	Week 3
1) Pain	6	2
2) Fever	3	-
3) Discharge From Wound Site	5	0
4) Stitch Abscess	4	0
5) Wound Gape	2	-

Table 4: Follow Up results with Multiple dose single Antibiotic.

Symptoms and Clinical Findings	Week 1	Week 3
1) Pain	4	2
2) Fever	3	1
3) Discharge From Wound Site	3, 5*	1, 2*
4) Stitch Abscess	2, 4*	0, 1*
5) Wound Gape	1	0

*shows the follow up patients of single shot who were converted to multiple dose at one week follow up

RESULTS

As per the age distribution, it ranges from 12-65 years. Out of 146 patients enrolled, the mean age was 39.14±15.04. Majority of the patients in the present study come under the age group of 21-30 years. As per the gender distribution, out of 146 patients in the study, 94 (64.38%) were Male and 52 (35.62%) were Female. Out of 146 patients, 107 patients underwent Elective Surgery and 39 patients underwent Emergency surgery.

Out of 146 cases, following laparoscopic surgeries commonly were performed:

a) Laparoscopic appendectomy 89 cases (60.96%)
b) Laparoscopic cholecystectomy 32 cases (21.92%)
c) Diagnostic laparoscopy 16 cases (10.96%)
d) Laparoscopic abdominal wall hernia 9 cases (6.16%)

DISCUSSION

Present study comprised of 146 patients in which age varied from 12 years up to 65 years. Majority of the patients were from the age group 21-30. SSIs rate was not significantly different with both gender. Similar findings were observed by Culver and Gaynes.[11]

In our study 107 patients underwent elective surgery and 39 patients went emergency surgery. SSIs rate was higher in emergency surgery as compared to elective surgery. This finding was supported by Byrne DJ et al.[12] Safia Bibi et al. also found that incidence of surgical site infections is higher in emergency procedures (13.1%) as compared to elective procedures (2.9%).[13]

Lacy AM et al. (2002) stated that during laparoscopic surgeries the risk of infection starts when skin is incised and the first natural barrier is cut, but maximum risk of infection is at the time of handling the tissues which can also lead to post-operative infection. As the incision in laparoscopic surgery is shorter than that in conventional open surgery, the former is considered to have a lower incidence of incisional SSI.[14]

Single or multiple dosages of antibiotics are important to prevent SSIs. In addition to this pre-operative preparation of the patient, per operative aseptic technique and precautions and meticulous surgery are also equally important to prevent post-operative wound infection. A single, effective, nontoxic drug is used to prevent infection by a specific microorganism or to eradicate an early infection.[10]

Previous studies comparing single-dose versus multiple dosage of antibiotics in which metronidazole was used stated that the incidence of incisional surgical site infection for the single-dose regimen was the same as that for the multiple-dose regimen.[15,16]

Out of 146 patients by random selection, 92 patients were given single dose of antibiotic and 54 patients were given multiple doses of antibiotics. Follow up of the patients was done at first and third week to see for complaints such as pain, fever, discharge from wound site, stitch abscess and wound gape. Out of 92 who received single dose antibiotic; in the first week of follow up, 72 were asymptomatic, whereas 20 patients

presented with the complains like - pain 6 patients, fever in 3 patients, discharge from wound site in 5 patients, stitch abscess in 4 patients, wound gape in 2 patients.

The patients who were receiving single dose antibiotics after one week follow up having complain of wound discharge and stitch abscess were converted in to multiple dose regime of single antibiotic drug.

Out of 54 who received multiple dosage of antibiotics; in the first week of follow up, 41 were asymptomatic while 13 patients presented with complains like - pain in 4 patients, fever in 3 patients, discharge from wound site in 3 patients, stitch abscess in 2 patients and wound gape in 1 patient.

A single dose of antibiotics has been shown to be as effective as multiple doses in many trials that have compared a single-dose regimen with a multiple-dose regimen.[17] Although the 1999 Hospital Infection Control Practices Advisory Committee guidelines for prevention of surgical site infection (SSI)[2] recommend cefoxitin or some other second- generation cephalosporin, the efficacy of a single dose regimen of cephalosporin without metronidazole and oral antibiotics is not clear, because combination regimens, such as cephalosporin and metronidazole or cephalosporin and oral antibiotics, have been used in most studies of antibiotics dose.[17]

CONCLUSION

In present study we used single and multiple dosages of antibiotic regimes for laparoscopic surgeries. Single dose of antibiotics are more patient compliant, cost effective, less incidence of adverse effects, prevents emergence of antibiotic resistance and more rational than multiple dosages of antibiotics; as in laparoscopic surgery chances of gross contamination is less. As laparoscopic surgeries are more accepted then open conventional surgeries because of its following advantages: decreased incision size and infection, less post-operative pain, short hospital stay, faster recovery, less post-operative complications and early return to activity. Hence we advise the use of single dosage of antibiotics in laparoscopic surgeries.

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