

Research Article

Single shot versus multiple shot antibiotic therapy in patients undergoing laparoscopic surgery: our experience

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ABSTRACT

The aim of our study was to see the effect of single dose regime versus multi dose regime of antibiotic in laparoscopic surgery; in terms of type of laparoscopic surgery done, type and dose of intravenous antibiotic given and the occurrence of post operative complications like wound gape, stitch abscess, local pain and discharge from the wound in both the groups. The present study was prospective, observational and longitudinal. Protocol of the procedure was formed along with Performa, Patient Information Sheet and Informed Consent Form. The present study was carried out in surgery department of C.U Shah medical college, Surendranagar; Gujarat state. The study was carried out from 1st October 2010 till 31st August 2012. A total of one hundred and twenty patients undergoing emergency and elective laparoscopic surgery were included in our study. Case records of patients was recorded in the Performa containing demographic details, chief complaints, provisional diagnosis, details of operative procedures and drug details during the hospital stay. Follow up of the patients was done after one and three weeks and any change of regime of antibiotics was noted in respect to the symptoms or clinical findings like pain, fever, discharge, stitch abscess, wound gape. Out of 120 patients enrolled mean age was 38.88±14.19. Out of 120 patients in the study; 63 (52.5%) were Male and 57 (47.5%) were Female. Intravenous antibiotics were used in single dose or multiple dose in the patients undergoing laparoscopic procedures. Single dose of antibiotic was given to 65 patients and multiple dosage of antibiotics was given to 48 patients while 7 patients were converted from single to multiple dosage regime of antibiotics. Choice of a dosage of an appropriate antibiotic is of utmost importance in the treatment of the patients and the post operative outcomes. The adverse effects of the used antibiotics must also be kept into consideration while choosing the antibiotics and its dosage. Thus based on our study we conclude that single and multiple dosages of antibiotic regimes can be used for laparoscopic surgeries. However, single dose of antibiotics are more patient compliant, cost effective, less adverse effects and prevents emergence of antibiotic resistance.

Keywords: Single shot antibiotic, Multiple shot antibiotic, Laparoscopic surgery

INTRODUCTION

In this era of minimal invasive surgery; laparoscopic surgery approach is gaining popularity among surgeons as well as patients. Laparoscopic surgery is preferable in

patients having obesity, athletes and patients concerned with cosmetics. Infection has always been a feature of human life and sepsis with the modern surgery continues to be a significant problem for healthcare practitioners across the globe. Surgical site infections (SSIs) are part

and parcel of postoperative complication and contribute considerably to morbidity and mortality.¹ Prevention of postoperative infection is an essential factor in improving the results of surgical procedures. Following the introduction of antibiotics and early clinical trials done in 1950; it has been reported that no benefit has been derived in terms of control of infection rate with antibiotic prophylaxis.²⁻⁵ 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.⁶

METHODS

The study was carried out in surgery department of C.U Shah Medical College, Surendranagar; Gujarat state from 1st October 2010 till 31st August 2012. The study was prospective, observational and longitudinal. Study protocol of the procedure was formed along with Proforma, Patient Information Sheet and Informed Consent Form. All those patients who attended Surgery department of C U Shah Medical College for laparoscopic surgery (elective and emergency) were included in our 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. For the patients who developed complications, either the antibiotic was changed or the regime of the antibiotic was changed.

RESULTS

A total of 120 cases were included in the study. As per the age distribution, it ranges from 10-66 years. Out of 120 patients enrolled, the mean age was 38.88±14.19. Majority of the patients in the present study come under the age group of 21-30 years. As per the gender distribution, out of 120 patients in the study, 63 (52.5%) were Male and 57 (47.5%) were Female. Out of 120 cases, following laparoscopic surgeries commonly were performed:

- Laparoscopic appendectomy 79 cases (65.83%).
- Laparoscopic cholecystectomy 25 cases (20.83%).
- Laparoscopic abdominal wall hernia 5 cases (4.17%).
- Diagnostic laparoscopy 11 cases (9.17%).

Out of 120 patients, 86 patients underwent Elective Surgery and 34 patients underwent Emergency surgery.

Different types of intravenous antibiotics used are as follows:

Table 1: Showing different types of intravenous antibiotics used.

Group of antibiotic	Generic name	No. of patients in single shot	No. of patients in multiple shot
Cephalosporin	Ceftriaxone	35	21
	Cefuroxime	12	12
	Cefotaxime	1	1
Aminoglycoside	Amikacin	10	5
Flouroquinolones	Ofloxacin	6	2
	Ciprofloxacin	1	1
Imidazoles	Metronidazole	-	2
	Ornidazole	-	2
Penicillins	Amoxicillin	4	2
	Ampicillin	1	-
	Piperacillin	2	-
Total		72	48

Intravenous antibiotics were used in single dose or multiple doses in the patients undergoing laparoscopic procedures.

Dose of antibiotic used	Total no. of cases
Single	65
Multiple	48
Single Converted to Multiple	7
Total	120

Patients undergoing laparoscopic surgery were called for follow up examination after discharge on 7th day and 21st day. Patients were observed for complains such as pain , fever , discharge from wound site, stitch abscess , wound gape , and any other complaints.

In 72 Patients who were treated with single dose of antibiotics, the observations are as follows:

Table 2: Follow up results of patients with single shot with one antibiotic.

Symptoms and clinical findings	Week one	Week three ()
1) Pain	3	1
2) Fever	1	-
3) Discharge from wound site	4	0
4) Stitch abscess	3	0
5) Wound gape	1	-
6) Any other	1	-

In 48 Patients who were treated with Multiple dose of antibiotics, the observations are as follows:

Table 3: Follow up of patients with multiple shot single antibiotic.

Symptoms and clinical findings	Week one () shows the follow up patients of single shot who were converted to multiple dose at one week follow up	Week three () shows the follow up patients of single shot who were converted to multiple dose at three week follow up
1) Pain	3	1
2) Fever	2	-
3) Discharge from wound site	2(4)	-(1)
4) Stitch abscess	1(3)	1(1)
5) Wound gape	0	-
6) Any other	3	-

Note: The patients who were receiving single shot antibiotics after one week follow up having complain of wound discharge and stitch abscess were converted in to multiple shot of single antibiotic drug, at third week follow up showed that one patient of discharge from wound site was still having a an ulcer at wound site and was being treated with daily dressings. One patient of stitch abscess was still having an ulcer with minimal slough and was being treated with daily dressings.

DISCUSSION

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.

Around 1% of patients undergoing clean surgery (e.g., breast, hernia) and 11% of patients undergoing clean-contaminated surgery (e.g., colorectal) surgery experience surgical site infections.⁷ 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.⁸ Most of the surgical site infections are superficial; even though they contribute greatly to the morbidity and mortality associated with surgery.^{9,10} Incidence of surgical site infections is higher in emergency procedures (13.1%) as compared to elective procedures (2.9%).¹¹

Single or multiple dosages of antibiotics are important to prevent surgical site infection. 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. A study of single-dose versus multiple dosage of antibiotics in which metronidazole was used showed that the incidence of incisional surgical site infection for the single-dose regimen was the same as that for the multiple-dose regimen.¹²⁻¹⁵

Our study comprised of 120 patients in which age varied from 10 years up to 66 years. Majority of the patients were from the age group 21-30. SSI rate was not significantly different with both gender, this findings are comparable to studies done by Culver and Gaynes.¹⁶ In our study 86 (71.66%) patients underwent elective surgery and 34 (28.34%) patients went emergency surgery and SSI rate was higher in emergency surgery as compared to elective surgery.¹⁷ All patients received antibiotics, in both the pre-operative and post-operative period, and no antibiotic was given in the intra-operative period. Most commonly used drug group for prophylaxis was third generation cephalosporin, followed by metronidazole and penicillin group.¹⁸ Out of 120 patients by random selection, 72 patients were given single dose of antibiotic and 48 patients were given multiple dose of antibiotic. 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 72 who received single shot antibiotic; in the first week of follow up, 59 (81.94%) were asymptomatic, whereas 13 (18.06%) patients presented with the complains like - pain in three (23.07%) patients, fever in one (7.69%) patient, discharge from wound site in four (30.76%) patients, stitch abscess in three (23.07%)

patients, wound gape in one (7.69%) and one patient (7.69%) had non specific complain of loss of appetite. Patients having pain, fever, wound gape and compliant of loss of appetite were treated symptomatically. Patient of wound gape was posted for secondary closure after seven days. These patients did not require further antibiotic therapy. Out of 48 who received multiple dosage of antibiotic; in the first week of follow up, 37 (77.08%) were asymptomatic while 11(22.92%) patients presented with complains like - pain in three (6.25%) patients, fever in two (4.16%) patients, discharge from wound site in two (4.16%) patients, stitch abscess in one (2.08%) patient and three patients (6.25%) had non specific complain of weakness , loss of appetite and gastritis respectively and were treated symptomatically.

Need for change of regime at one week: Some patients of both study groups developed complications such as stitch abscess and wound discharge at one week follow up so they were treated with further antibiotic therapy and supportive treatments like daily dressings.

The details are as follows:

- a) *Single dose antibiotics:* Patients having Discharge from wound site (four patients) and Stitch abscess (three patients) required further antibiotic therapy and daily dressings and hence were shown in follow up of multiple dose antibiotic therapy.
- b) *Multiple dose antibiotics:* Patients having complaints of discharge from wound site (2) and stitch abscess (1) on first week follow up were given further antibiotic therapy and treated with daily dressings.

At the third week of follow up most of the patients were relieved of their complains except for few:

- a) *Single dose antibiotics:* One patient of pain at stitch site of umbilical port had similar complaint on the third week of follow up he was given simple anti inflammatory drugs and no significant cause was ruled out.
- b) *Multiple dose antibiotics:* These patients on three weeks of follow up , one patient was still complaining of pain and was treated with anti inflammatory and analgesic drugs and one patient of wound discharge was converted in to healing ulcer and treated by daily dressings.

The patients who were receiving single shot antibiotics after one week follow up having complain of wound discharge and stitch abscess were converted in to multiple shot of single antibiotic drug, at third week follow up showed that one patient of discharge from wound site was still having a an ulcer at wound site and was being treated with daily dressings. One patient of stitch abscess

was still having an ulcer with minimal slough and was being treated with daily dressings.

CONCLUSION

The concept of antibiotic dosages has been advocated as a potential strategy for reducing the emergence of antimicrobial resistance. In our study we have used single and multiple dosages of antibiotic regimes for laparoscopic surgeries. Single dose of antibiotics are more patient compliant, cost effective, less 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. Hence we advocate the use of single dosage of antibiotics in laparoscopic surgery.

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