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A Prospective Observational Study of Culture and Sensitivity of Intraoperative Peritoneal Irrigation Fluid for Prediction of Post Operative Complication in Elective And Emergency Abdominal Surgeries At A Tertiary Care Hospital

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: Surgical infection, particularly surgical site infection (SSI), has always been a major complication of surgery and trauma and has been documented for 4000–5000 years. There are various elective and emergency procedures for many abdominal pathologies like peritonitis, intestinal obstruction, anastomotic surgeries, bowel gangrene, appendicitis, cholecystitis, etc., For the reduction of post-operative complications like discharge from wound site, wound dehiscence, fever, anastomotic leaks and sepsis, intraoperatively peritoneum was irrigated with fluid like normal saline and send for microbial culture and sensitivity in order to provide specified antibiotic coverage to which the microbe is sensitive. For microbial culture and sensitivity of close cavities like blood cultures and sterile body fluids like CSF, peritoneal fluid BACTEC (Becton Dickinson Microbiology system) test is most appropriate for microbial culture and antibiotic sensitivity. It measures the production of CO2 by metabolizing organisms. Reduced resistance to infection has several causes, particularly those that impair the inflammatory response.

Host response is weakened by malnutrition, which can be recognised clinically, and most easily, as recent rapid weight loss that can be present even in the presence of obesity . Metabolic diseases such as diabetes mellitus, uremia and jaundice, disseminated malignancy and acquired immune deficiency syndrome (AIDS) are other contributors to infection and a poor healing response, as are iatrogenic causes including the immunosuppression caused by radiotherapy, chemotherapy or steroids When enteral feeding is suspended during the perioperative period, and particularly with underlying disease such as cancer, immunosuppression, shock or sepsis, bacteria (particularly aerobic gram-negative bacilli) tend to colonise the normally sterile upper gastrointestinal tract. A major SSI is defined as a wound that either discharges significant quantities of pus spontaneously or needs a secondary procedure to drain it. The patient may have systemic signs, such as tachycardia, pyrexia and a raised white count Minor wound infection may discharge pus or infected serous fluid but should not be associated with excessive discomfort, systemic signs or delay in return home. The differentiation between major and minor and the definition of SSI is important in audit or trials of antibiotic prophylaxis.

Aim: Culture and sensitivity of intraoperative peritoneal irrigation fluid for prediction of post-operative complication in elective and emergency abdominal surgeries.

Material And Methods: A prospective study was carried out in tertiary care center, a referral center, from 1st Jan 2021 to 31st June 2022 in patients undergoing elective and emergency abdominal surgeries .A written well informed consent was taken from all patients included in study. Preoperative tests like complete blood picture, bleeding time, clotting time, blood grouping and typing, Rbs, Fbs, PPbs, blood urea, serum creatinine, ECG, Chest X-Ray, Viral. serology (HIV, HBV.HCV), x-ray abdomen erect,USG abdomen and pelvis CT Abdomen +pelvis P/C were performed. For the prediction of post-operative complications in elective and emergency abdominal surgeries, intraoperatively the abdominal cavity will be washed with saline, 10ml of peritoneal irrigation Fluid will be aspirated under aseptic conditions and sent for microbial culture and antibiotic sensitivity. Following surgery patient were given routine postoperative care with intravenous fluids and antibiotics. Peritoneal fluid culture reports were followed up and the isolated organisms were tested for antimicrobial sensitivity and the culture reports will be obtained. Antibiotics were changed according to the sensitivity pattern of organism grown in the culture. The patients were followed up for post operative complications. Data analysis was done using SPSS 22nd version.

Descriptive statistics presentation including mean, SD, frequency and percentage.

Results: This study includes 100 patients with who were taken up for elective or emergency laparotomy. And various data like age, sex, history, clinical examination findings, investigations like routine urine and blood reports, Xray chest PA and abdomen erect view, ultrasonogram of abdomen and pelvis, preoperative diagnosis, intraoperative findings, peritoneal fluid culture and sensitivity report, details of postoperative outcomes in terms of complications like wound infection, gaping, burst abdomen, septicemia, lung infection, mortality, days of hospital stay and no. of cases taken up for secondary minor procedures like secondary suturing and tension wire banding of 100 patients are collected and consolidated .

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Conclusion: It is concluded that specific antibiotic administration according to intraoperative peritoneal fluid culture and sensitivity report rather than empirical antibiotic administration, will significantly reduce the postoperative outcomes in terms of complications like wound infections, wound gaping, burst abdomen, septicemia, lung infections, mortalities, prolonged hospital stay, increased frequency of secondary minor procedures like secondary suturing and tension wire banding .

Keywords: Culture and Sensitivity, Peritoneal, Post Operative, Abdominal, Antibiotics

Introduction

Surgical infection, particularly surgical site infection (SSI), has always been a major complication of surgery and trauma and has been documented for 4000–5000 years. There are various elective and emergency procedures for many abdominal pathologies like peritonitis, intestinal obstruction, anastomotic surgeries, bowel gangrene, appendicitis, cholecystitis, etc., For the reduction of post-operative complications like discharge from wound site, wound dehiscence, fever, anastomotic leaks and sepsis, intraoperatively peritoneum was irrigated with fluid like normal saline and send for microbial culture and sensitivity in order to provide specified antibiotic coverage to which the microbe is sensitive. For microbial culture and sensitivity of close cavities like blood cultures and sterile body fluids like CSF, peritoneal fluid BACTEC (Becton Dickinson Microbiology system) test is most appropriate for microbial culture and antibiotic sensitivity. It measures the production of CO2 by metabolizing organisms. Reduced resistance to infection has several causes, particularly those that impair the inflammatory response. Host response is weakened by malnutrition, which can be recognised clinically, and most easily, as recent rapid weight loss that can be present even in the presence of obesity. Metabolic diseases such as diabetes mellitus, uraemia and jaundice, disseminated malignancy and acquired immune deficiency syndrome (AIDS) are other contributors to infection and a poor healing response, as are iatrogenic causes including the immunosuppression caused by radiotherapy, chemotherapy or steroids When enteral feeding is suspended during the perioperative period, and particularly with underlying disease such as cancer, immunosuppression, shock or sepsis, bacteria (particularly aerobic gram-negative bacilli) tend to colonies the normally sterile upper gastrointestinal tract. A major SSI is defined as a wound that either discharges significant quantities of pus spontaneously or needs a secondary procedure to drain it. The patient may have systemic signs, such as tachycardia, pyrexia and a raised white count Minor wound infection may discharge pus or infected serous fluid but should not be associated with excessive discomfort, systemic signs or delay in return home. The differentiation between major and minor and the definition of SSI is important in audit or trials of antibiotic prophylaxis.[1]

Performative peritonitis is one of the most commonly encountered surgical acute abdominal emergencies in surgery causality. The importance of this study is to reduce the postoperative complications like septicemia, wound infection, burst abdomen, bronchopneumonia, long hospital stays etc., by identifying the inciting organisms and its sensitive antibiotics rather than using empirical antibiotic therapy which is followed at present, in immediate postoperative period. Among hollow viscus perforations duodenal perforation is the most common site. 17The organisms setting up the peritonitis features are diverse according to the location of

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perforation and time interval between disease onset & time of intervention. Most common organisms isolated in proximal bowel perforation are E.coli, klebsiella, lactobacilli, streptococci, candida . There is an increasing trend in isolating anaerobic organisms as the perforation occurs distally and the time interval between the disease onset and time of intervention increases. Many research studies reveal that increased postoperative complications are seen in peritonitis patient with polymicrobial isolates. Majority of rural patients present in surgical opd lately. Also, there is a direct relation between interval of disease onset & time of intervention and postoperative morbidity. In Laparotomies, proposed antibiotic coverage is against gram positive cocci and gram-negative enteric organisms.

Antibiotics sensitive are piperacillin + tazobactum, meropenem, cefaperazone + sulbactum, ceftriaxone, ciprofloxacin, amikacin etc. Administration of appropriate antibiotics in immediate postoperative period rather than empirical antibiotics, reduces poor postoperative outcome.

Material and Methods

Design of Study: Prospective Observational Study

Place of Study: Tertiary health care centre

Study Period: Jan 2021 to June 2022

Study Population: All patients who are undergoing elective and emergency abdominal surgeries in the tertiary care centre during the study period**.**

Sample size: 100

Inclusion criteria

The patients with all laprotomies, appendicitis, intestinal obstruction, volvulus, peritonitis, perforation, intestinal resection, anastomosis, cholecystectomy and gangrenous bowel were included in the study.

This includes patients of all age groups irrespective of gender, who underwent abdominal surgery during the study period**.**

Exclusion criteria

Patients with Hernia, Hydrocele, Head and neck, Thyroid surgeries and All laproscopic surgeries were excluded from the study.

Patients not willing to participate in study.

Methodology

A prospective study was carried out in tertiary care center, a referral center, from 1st Jan 2021 to 31st June 2022 in patients undergoing elective and emergency abdominal surgeries.

A written well-informed consent was taken from all patients included in study.

Preoperative tests like complete blood picture, bleeding time, clotting time, blood grouping and typing, Rbs, Fbs, PPbs, blood urea, serum creatinine, ECG, Chest X-Ray, Viral. serology (HIV, HBV.HCV), x-ray abdomen erect, USG abdomen and pelvis CT Abdomen +pelvis P/C were performed.

For the prediction of post-operative complications in elective and emergency abdominal surgeries, intraoperatively the abdominal cavity will be washed with saline, 10ml of peritoneal irrigation Fluid will be aspirated under aseptic conditions and sent for microbial culture and antibiotic sensitivity.

Following surgery patient were given routine postoperative care with intravenous fluids and antibiotics. Peritoneal fluid culture reports were followed up and the isolated organisms were tested for antimicrobial sensitivity and the culture reports will be obtained. Antibiotics were changed according to the sensitivity pattern of organism grown in the culture.

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The patients were followed up for post operative complications.

Data analysis was done using SPSS 22nd version.

Descriptive statistics presentation including mean, SD, frequency and percentage.

Observations And Results

This study includes 100 patients with who were taken up for elective or emergency laparotomy. And various data like age, sex, history, clinical examination findings, investigations like routine urine and blood reports, Xray chest PA and abdomen erect view, ultrasonogram of abdomen and pelvis, preoperative diagnosis, intraoperative findings, peritoneal fluid culture and sensitivity report, details of postoperative outcomes in terms of complications like wound infection, gaping, burst abdomen, septicemia, lung infection, mortality, days of

hospital stay and no. of cases taken up for secondary minor procedures like secondary suturing and tension wire banding of 100 patients are collected and consolidated.

Then age, sex distribution, the commonest organisms, their sensitive antibiotic pattern , among 100 patients fulfilling the eligibility criteria , are studied. Also comparison study is done between 60 patients(group I) who underwent emergency laparotomy and 40 patients(group II) who underwent elective procedure , in terms of post operative complications and incidence of postop secondary minor procedures as previously mentioned. The observations and results of the study is depicted in the following pages.

Age Distribution

In this study age is distributed in a pyramidal pattern. Peak of the pyramid denotes the age distribution in age interval between 41-50 yrs comprising about 27%. Next major age distribution is between 31-40 yrs includes 21% of study population. Age above 60 yrs constitutes 5 %

Table 1: Age Distribution

Age	Group 1	Group 2	Total
<20	3	5	8
21-30	7	7	14
31-40	12	10	22
41-50	17	16	33
51-60	9	6	15
61-70	3	1	4
>70	2	2	4
Total	50	50	100

Graph 1: Age Distribution

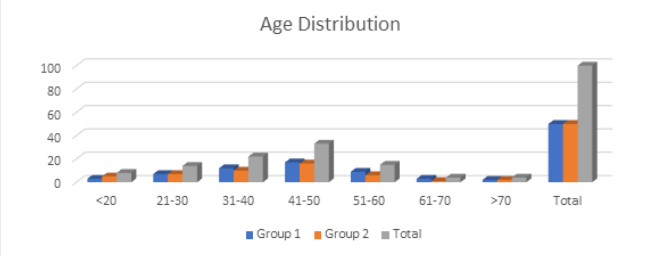

Table 2: Sex Distribution

Sex	Group I	Group II	Total
Male	34	36	70
Female	16	14	30
Total	50	50	100

Graph 2: Sex Distribution

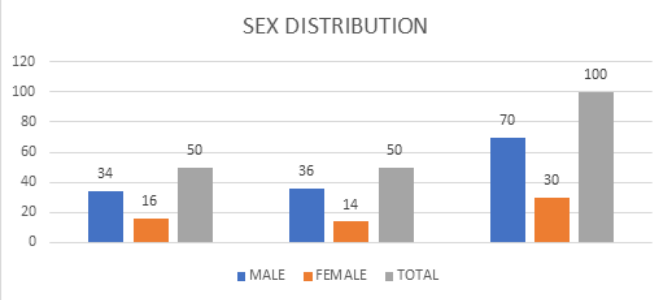

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Table 3: Isolated organism distribution

ISOLATED ORGANISMS.	Total
E.coli. .	53
Klebsiella .	23
Polymicrobial.	2
Pseudomonas.	5
Streptococci.	8
Staphylococci.	4
others	5

Graph 3: Isolated organism distribution

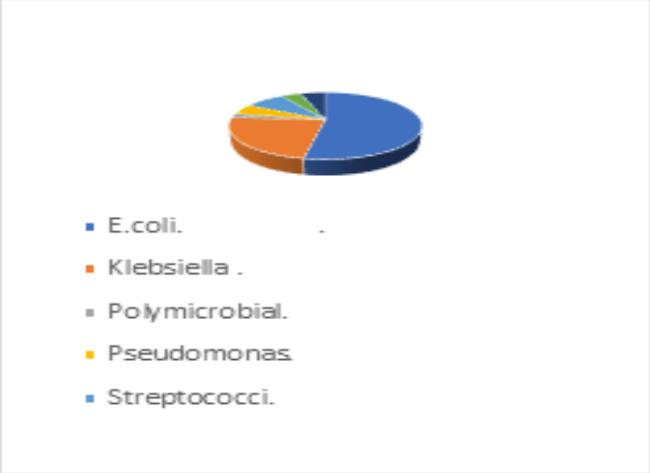

Table 4: Antibiotic profile

Antibiotics	Total
Piptaz	67
Meropenem	63
Cefosulbactam	22
Amoxiclav	34
Amikacin	40
Cefotaxim	11

Graph 4: Antibiotic profile

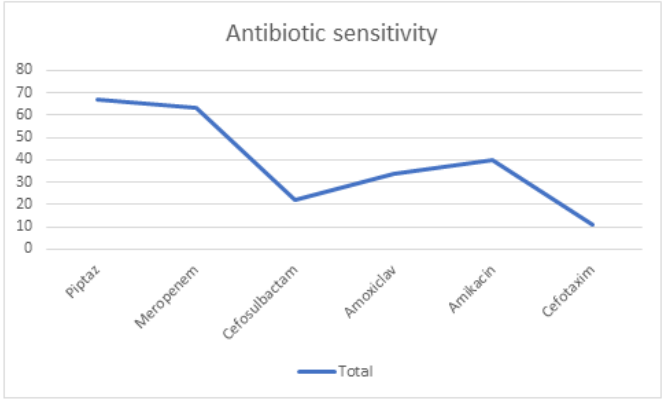

Table 5: Post operative complications

Complications	Group I	Group II
Wound Infection	39	22
Wound Gaping	18	14
Burst Abdomen	5	4
Septicaemia	9	5
Lung Infection	9	6
Mortality	7	3

Graph 5: Post operative complications

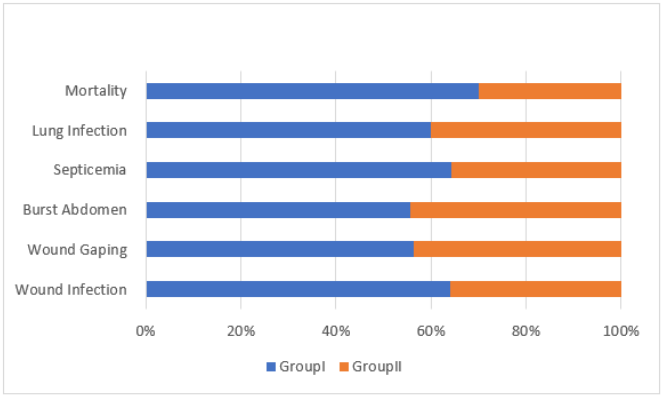

Table 6: Comparison of hospital stay

No of days of hospital stay	Group I	Group II
06 to 10	25	28
11 to 15	18	15
16to 20	6	5
21to 25	1	2
Total	50	50

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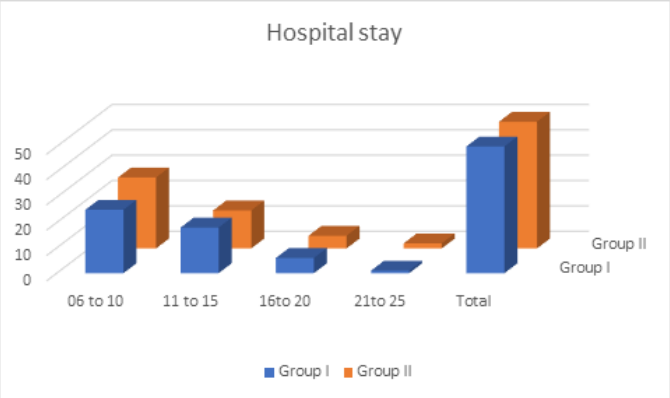
Graph 6: Comparison of hospital stay



Limitations

Single centre Study

Sample size small

Conclusion

It is concluded that specific antibiotic administration according to intraoperative peritoneal fluid culture and sensitivity report rather than empirical antibiotic administration, will significantly reduce the postoperative outcomes in terms of complications like wound infections, wound gaping, burst abdomen, septicemia, lung infections, mortalities, prolonged hospital stay, increased frequency of secondary minor procedures like secondary suturing and tension wire banding. It is noted that the incidence and severity of post operative complications is less in elective procedures as compared to emergency procedures.

The most common organism isolated in both elective and emergency Laparotomies under this study was Escherichia coli followed by Klebsiella Species.

Most of the bacterial flora isolated was found sensitive to Piperacilin + Tazobactum combination followed by Meropenem and Cefoperazone +sulbactum.

Since few studies are conducted regarding this aspect, many research works needed to be initiated pertaining to the aspect of administration of specific antibiotic therapy, in different high volume tertiary institutions to validate the use of specific antibiotic therapy rather than using empirical therapy.

Institutional ethics consent : Taken

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