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Original Research Article

A Comparative Evaluation of the Use and Non-Use of Preventive Antibiotics for Severe Acute Pancreatitis

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Abstract

Background: Acute pancreatitis is a common condition with a 10-30% fatality rate. The administration of prophylactic antibiotics has been a component of the treatment of severe acute pancreatitis in the hopes of preventing infectious complications and lowering mortality.

Objective: to determine whether or not prophylactic antibiotics have any effect on complications, the need for an ICU bed, or mortality in cases of severe acute pancreatitis.

Methods: A simple randomized randomized clinical trial was carried out; this was a preliminary report containing 53% of the entire estimated sample. Between August 2021 to May 2022, the medicine department team evaluated and treated patients with SAP. The sample size is 150 patients per group with a power of 80% and a 95% statistical significance level. In the trial, 150 patients were put into two randomized groups: group 1 (antibiotic prophylaxis use) had 75 patients, while group 2 (antibiotic prophylaxis use) had 75 patients.

Results: The average age of the entire group (N=150) was 59.218 years; in groups 1 and 2, it was 58 years and 60 years, respectively (p=0.11). Gender distribution revealed that women made up 64% (N=123) of the entire group, with group 1 having 64% (N=48) and group 2 having 63% (N=47) (p=0.27). With lithiasis/stones accounting for 84% of the overall group and a similar distribution in the two groups (84% and 81%, respectively), this was the primary cause but it was not statistically significant. 10 patients from the group receiving no antibiotics and 12 patients from the group receiving antibiotics each required a bed in the ICU (16%) (p=0.11). All patients spent an average of 11–15.4 days in the ICU.

Conclusions: It has not been demonstrated that using preventive antibiotics for severe acute pancreatitis reduces complications, the requirement for an intensive care unit bed, or mortality.

Keywords: Acute pancreatitis, Antibiotic prophylaxis, randomized clinical trial, pain abdomen, mortality, Lithiasis.

Introduction

One of the leading medical conditions that send people with abdominal pain to the hospital is acute pancreatitis (AP), which is a common pathology. [1] Since it typically develops as an uncomplicated condition, without infectious episodes, and without needing intense therapy, about 80% of patients totally recover in 1 week [2]. However, with a mortality rate of 10% to 30%, 20% of patients have either local or systemic problems. [3,4] According to the Atlanta Consensus, severe acute pancreatitis (SAP) is characterized morphologically by extensive necrosis of the pancreatic tissue (>30%), infection brought on by necrosis or abscess formation, and/or the presence of retroperitoneal necrosis of extrapancreatic tissue. The existence of systemic organ problems, such as pulmonary, renal, or hepatic failure, as well as cardiac dysfunction, is much more significant in identifying SAP (shock). [5,6]

While other evaluations have not revealed a substantial therapeutic advantage of the use of prophylactic antibiotics, many systematic reviews of randomized clinical trials (RCT) have shown the clinical usefulness of prophylactic antibiotics in pancreatitis that lower mortality and incidence of infection. [7]

Antibiotics are now routinely given as a preventative measure in our setting to treat SAP in order to theoretically prevent infection complications and lower mortality [8]. The study's goal was to show that prophylactic antibiotics do not lower mortality, complications, or the need for an intensive care unit bed in cases of severe acute pancreatitis.

Materials and Methods

A simple randomized randomised clinical trial was carried out; this was a preliminary report containing 53% of the entire estimated sample. Between August 2021 and May 2022, the medical staff at the hospital evaluated, treated, and saw patients with SAP.

Based on the Japanese meta-analysis of Ukai et al., the sample size was estimated using SPSS. This meta-analysis revealed that the infection rate owing to necrosis in the group that did not use antibiotics was 25%, demonstrating a reduction of 10% in the antibiotic-using group[9] The sample size is 150 patients per group with a power of 80% and a 95% statistical significance level. 150 patients participated in the trial, and they were randomly assigned to one of two groups: group 1 (non-use of prophylactic antibiotics)

Inclusion criteria:

All the patients with SAP admitted to the HHHA and treated by the hepatobiliary surgery team were included in the study.

Exclusion criteria:

Patients with following criteria were excluded- (a) mild acute pancreatitis (MAP); (b) who began antibiotic for infection suspicion, since the concept of infection treatment is different from the concept of prophylaxis; (c) who had undergone another antibiotic therapy for another non-pancreatic infected site.

Methodology

The severity score from APACHE II and the CRP value were used to group patients who had been diagnosed with AP and were admitted. SAP patients were those with an APACHE II 8, CRP 150 (normal value 10 mg/dl), or multiorgan dysfunction. The study coordinators performed randomization when the SAP diagnosis was established using a straightforward computational table.

In the group that took preventative antibiotics, ciprofloxacin and metronidazole were administered. The best way to utilize them was orally or by nasogastric intubation: 500 mg of metronidazole (metropast, Pasteur) and

500 mg of ciprofloxacin (ciprofloxacin, Ascend) every 12 and 8 hours, respectively. Metronidazole and ciprofloxacin were only administered intravenously to individuals who were unable to tolerate taking antibiotics orally or through nasogastric intubation, such as those with ileus. 400 mg of ciprofloxacin (Ciprolife®, Aculife®) and 500 mg of metronidazole (Apiroflex®, Biosano®) were administered intravenously every 12 and 8 hours, respectively. The biliopancreatic surgery team determined the duration of the antibiotic prophylaxis, which was established at 7 days.

Statistical Analysis

Analysis of data was done by using SPSS software ver. 22. Data were statistically described in terms of mean (±SD), frequencies (number of cases) and percentages when appropriate. Comparison of quantitative variables between the study groups was done using Student t test for independent samples if normally distributed. For comparing categorical data, Chi square test was performed. A probability value (p value) less than 0.05 was considered statistically significant.

Results

Table 1: Demographic profile and General characteristics of Both Groups

Variables	Group 1 (N=75)	Group 2 (N=75)	p-value
Age (Mean±SD)	58±19.4	60±17.8	0.11
Gender Males	27 (36)	28 (37)	0.27
Females	48 (64)	47 (63)	
Stones	63 (84)	60 (81)	0.17

According to Table 1, the overall group's average age (N=150) was 59.218 years; groups 1 and 2 had average ages of 5819.4 and 6017.8, respectively (p=0.11). Gender distribution revealed that women made up 64% (N=123) of the entire group, with group 1 having 64% (N=48) and group 2 having 63% (N=47) (p=0.27). With lithiasis/stones accounting for 84% of the overall group and a similar distribution in the two groups (84% and 81%, respectively), this was the primary cause but it was not statistically significant.

Table 2: Prognostic and Diagnostic indicators comparison in both groups

Indicators	Group 1	Group 2	p-value
APACHE II at admission	7.2±4.2	8.2±5.4	0.55
APACHE II at 48 hours	7.2±4.4	8±5.2	0.28
CRP at admission	194±110	150±106	0.18
CRP at 48 hours	162±109	194±109	0.11

According to table 2, the average CRP (mg/dl) for all patients was 176118 at admission. It was 194110 in group 1 and 150106 in group 2 (p=0.18). At 48 hours, the CRP was 176110 on average. It was 162 109 in group 1 and 194 109 in group 2, respectively (p=0.11), but it was not statistically significant (p>0.05). All of the patients' average APACHE II scores at admission were 7.54.2. It was 7.24.2 in group 1 and 8.25.4 in group 2 (p=0.55). At 48 hours, the APACHE II average was 85. It was 7.24.4 in group 1 and 85.2 in group 2 (p=0.28).

Table 3: Comparison of Outcome variables in both groups

Indicators	Group 1	Group 2	p-value
Days of Hospital stay	15.4±8	16.4±8.2	0.16
ICU stay	10	12	0.26
Complications	02	09	0.11
Mortality	00	02	0.71

In accordance with Table 3, 22 patients (16%), including 12 patients who received antibiotics and 10 patients who did not (p=0.11). All patients spent an average of 11–15.4 days in the ICU. Two patients in group 1 and nine patients in group 2 (p=0.11) each had eleven patients (6.6%) with some sort of SAP-related problem. All of the patients spent a total of 16.2–14.2 days in the hospital on average. It was 15.48 days in group 1 and 16.48.2 days in group 2 (p=0.16). Two patients (2% of the total study population) died during the investigation; both were in group 2 (p=0.71).

Discussion

Since infectious complications are clearly linked to mortality in severe acute pancreatitis, preventive antibiotic medication has long been a part of SAP management. However, the lack of solid proof means that the debate still rages on. [3,4]

The antibiotics used in SAP prophylaxis must meet two requirements: they must adequately enter the pancreatic tissue and cover the most prevalent bacteria linked to infected necrosis and local sequelae in SAP patients. Gram-negative and anaerobic bacteria, including Escherichia coli, Klebsiella pneumoniae, Proteus, and Bacteroides, are the most often involved pathogens. [2,3]

In a 2018 study, ciprofloxacin and metronidazole were used as antibiotic prophylaxis in patients with acute pancreatitis. However, the study found no significant clinical improvement when compared to the group that did not get antibiotic prophylaxis.[10]

Recent research has suggested that the prophylactic use of antibiotics in SAP may increase the risk of invasive pancreatic candidiasis and did not show any reduction in complications. [11] Antibiotic treatment should only be used for patients with local infections or sepsis, according to other studies that have found that using antibiotics prophylactically has no appreciable clinical benefits and may even increase the risk of intrahospital infections. [12,13] These figures support our study's findings, which showed that the group that took antibiotic prophylaxis experienced more local problems than the group who did not (p=0.01).

The value of preventive antibiotics with carbapenems in SAP patients has only been demonstrated in one RCT (5). The financial expense and the long-term effects of a particular antibiotic medication, which can strain the ecosystem and increase microorganisms resistant to certain antibiotics, are among the issues regarding the use of preventive antibiotics in SAP. We have noticed and reported an increase in the number of multidrug-resistant bacteria in recent years in the cultures of pancreatic infections in patients with SAP. We are unsure if this is a cause or consequence, or if it is just coincidence. [14,15]

Conclusion

The requirement for an ICU bed, mortality, or local and/or systemic infection complications are not decreased by the administration of prophylactic antibiotics in SAP. To prevent the critical use of antibiotics, more research must be done on this topic.

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