Original Research Article

Trend of antibiotics usage in acute biliary pancreatitis, single centre experience

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ABSTRACT

Background: Acute pancreatitis (AP) is associated with multiple morbidities and mortalities. The most common cause of AP cases in Bahrain are of biliary cause. At our institution, there is no clear data on the usage of antibiotics in AP. The clinical and financial impact of our practice is not fully understood. This research project aims at providing clear data to answer pivotal questions, such as; how often do we use antibiotics for ABP patients, what are the indications and what are the outcomes of such practice? It will also shed some light on the level of physicians' adherence to the recent guidelines.
Methods: This is a cross-sectional study. All cases admitted with ABP to the Salamaniya Medical Complex (SMC) during the years 2019 and 2020 were evaluated for relevant variables, data was then evaluated.
Results: The percentage of patients who received antibiotics during their admission for ABP was 60.8% (38 patients out of 64 received antibiotics).
Conclusions: The practice of using antibiotics in ABP is common at our institution. It is our observation that this practice is due to the over-diagnosis of acute cholecystitis during the same setting of ABP. Other explanations are the tendency of our surgeons to put patient who have significant co-morbidities on antibiotic therapy in anticipation of a severe disease. Further research is needed to explore this trend.

Keywords: Acute pancreatitis, Biliary pancreatitis, Antibiotic

INTRODUCTION

Acute pancreatitis (AP) occurs as a result of premature activation of pancreatic enzymes within the pancreatic tissues which leads to a wide range of inflammatory changes within the pancreas and then in the systemic circulation.

Causes of AP are variable. The main causes are gallstones, known as acute biliary pancreatitis (ABP), and alcohol pancreatitis.[1] Other less common causes of AP are metabolic abnormalities such as hypercalcemia and hypertriglyceridemia. Certain drugs such as steroids and other immunosuppressive drugs can also cause AP. Classic presentation of AP is epigastric pain that is often radiating to the back, and associated with multiple episodes of vomiting. These attacks can be severe enough to cause systemic effects in terms of severe inflammatory response such as tachycardia, fever and hypotension. Severe cases can progress rapidly to shock and multiorgan failure.

ABP accounts for 60% of AP cases.[2] The pathophysiology behind ABP is attributed to the migration of stones down the biliary ducts, which cause obstruction of the pancreatic duct with subsequent obstruction of its drainage, leading to premature activation of pancreatic enzymes.

Despite the lack of documented evidence in our institution, it is our observation that ABP is the major cause of admissions of AP locally. Hence, our study has focused on these cases as a reference to answer our research question.

Treatment of ABP starts with aggressive hydration and ends with definitive treatment of the main cause whether by endoscopic retrograde cholangiopancreatography (ERCP) or elective laparoscopic cholecystectomy. According to the world society of emergency surgery (WSES) guidelines of 2019, the use of prophylactic antibiotics in AP is not associated with a significant decrease in morbidity or mortality but it is always recommended in cases of infected pancreatic necrosis.[3]

The diagnosis of infected pancreatic necrosis is challenging, depending on variable clinical, radiological and laboratory variables. Thus, the physician's decision on the usage of antibiotics is variable. On the other hand, antibiotics might be given for other clinical reasons such as; other proven bacterial infection or severe pancreatitis.[4-6]

This research project aims at providing clear data to answer pivotal questions, such as; how often do we use antibiotics for AP patients, what are the indications and what are the outcomes of such practice? It will also shed some light on the level of physicians' adherence to the recent guidelines. The majority of admitted cases with AP at Salamaniya Medical Complex (SMC) are of biliary cause. Thus, we are choosing to address our questions with regards to the cases of acute biliary pancreatitis, in order to have a more unified picture and to provide homogenous results.

Aim

The aim of the study was to provide clear data on the trend of antibiotic use in cases of ABP in SMC.

METHODS

Study design

It was a cross sectional study.

Study population

All cases admitted with ABP to the SMC during the years 2019 and 2020 were included in the study. The study is limited to the recent two years to avoid conflicting trends with the previous practices.

Ethical approval

The study was discussed and approved by the research and ethics committee at the SMC, Manama, Bahrain.

Inclusion criteria

Patients with date of admission to SMC from 01 January 2019 to 31 December 2020, age 18 to 85 years, and with confirmed diagnosis of ABP by ultrasound or computed tomography (CT) abdomen were included in the study.

Exclusion criteria

Patients with age below 18 years, and the concomitant presence of other causes of AP, the presence of previously proven bacterial infection, or being on antibiotics prior to diagnosis with ABP were excluded.

Methodology

All surgical admissions were scanned to find the confirmed acute biliary pancreatitis during the specified time frame, through the ISEHA database (local database system). Data was retrieved regarding each case through ISEHA labs, progress notes, medications summary, and radiological images. Using a sample size calculator, we estimated that a sample size of 230 would be able to detect difference between the literature reported percentage of antibiotic usage in AP and our expected study percentage, to achieve a power of 80% and alpha level of confidence of 0.05.

Statistical analysis

Continuous variables were described as means and standard deviations while categorical variables were described as proportions. Version 22 of statistical package for the social sciences (SPSS) was used to run the statistical tests with the help of a specialized statistician.

RESULTS

Table 1 summarizes the baseline characteristics of our study subjects. The total number of cases admitted to our institution with ABP during the years 2019 and 2020 were 64, 35 of which were females and 29 males. The mean age was 44.6. Data regarding patient's comorbidities were documented, hypertension and diabetes mellitus were the most common comorbidities with a percentage of 21.6% and 18.8% respectively.

The striking result noted was the percentage of patients who received antibiotics during their admission for ABP. 38 patients out of 64 received antibiotics (60.8%). Analysis was made to compare the variables between the group that received antibiotics versus the group that did not receive antibiotics.

Table 2 summarizes the above-mentioned comparison, the numbers that were close to achieve a statistically significant difference between the two groups were the comorbidities, giving the impression that patient's with more severe pre-existing comorbidities were likely to receive antibiotics during the admission rather than those

with a severe ABP. There was no statistically significant difference between the two groups in terms of their initial presentation, necrosis or length of stay. The most used antibiotic was ceftriaxone followed by meropenem. Most patients received one type of antibiotics. Three patients received two types of antibiotics, and one patient received three types of antibiotics. Table 3 summarizes the types and duration of antibiotics used.

Table 1: Baseline characteristics of individuals admitted with ABP 2019 and 2020.

Variable	Numbers/percentage
Total cases of ABP (2020-2021)	64
Age (mean)	44.6
Females	35
Males	29
DM (%)	12 (18.8)
HTN (%)	14 (21.9)
Dyslipidemia (%)	8 (12.5)
IHD (%)	3 (4.7)
CKD (%)	1 (1.5)
HR on admission (mean)	84.9
CT on admission	35
Necrosis seen on CT scan	7
Pancreatic abscess	1
U/S on admission	10
Antibiotics received during admission (%)	38 (60.8)
Blood culture (done)	8
Urine culture (done)	3
DTA culture (done)	0
HDU/ICU admission	6
Hospital length of stay	3.1
Mortality	1

Table 2: Comparison between the group that received antibiotics vs the group that did not receive antibiotics during their admission with ABP 2019 and 2020.

Variable	Abx group (%)	No abx group (%)	P value
Number/percentage	38 (59.4)	26 (40.6)	
Age (years)	44.2 (SD 17.02)	43.8 (SD 15.17)	0.0786
Gender			0.6131
Male	16 (55.2)	13 (44.8)	
Female	22 (62.9)	13 (37.1)	
Comorbidities			
DM	10 (83.3)	2 (16.7)	0.060831
HTN	11 (78.6)	3 (21.4)	0.098007
Dyslipidemia	7 (87.5)	1 (12.5)	0.1277
IHD	2 (66.7)	1 (33.3)	0.792243
CKD	1 (100)	0	
Heart rate on admission (mean)	80.5 (SD 15.6)	85.7 (SD 16.42)	0.75479
Outcomes/complications			
Necrosis	4 (57.1)	3 (42.9)	0.898611
Pancreatic abscess	1 (100)	0	
HDU/ICU admission	4 (66.7)	2 (33.3)	0.702451
Positive blood culture	1	0	
Positive urine culture	1	0	
Positive DTA culture	0	0	
Hospital length of stay	4.6	3.2	0.67000
Mortality	1	0	

Table 3: Type and duration of antibiotics used during admission with ABP 2019 and 2020.

Type	Number	Percent-age (%)	Duration (mean)
Ceftriaxone	14	36.8	5.2
Meropenem	10	26.3	5.3
Piperacillin/tazobactam	8	21	4.9
Metronidazole	8	21	4.1
Clarithromycin	1	2.6	3
Ciprofloxacin	1	2.6	4
Cefuroxime	1	2.6	4

DISCUSSION

This is a cross-sectional study conducted on patients admitted to the largest hospital in Bahrain (SMC). We studied the cases admitted with ABP during the years 2019 and 2020. We chose to limit the study to cases admitted during the past two years to limit the variability in data due to the possible change in the local practices. We also chose to limit the study to the cases of biliary pancreatitis since they are the majority of admissions of AP.

Our results are in line with most of the reported studies about adherence to the international guidelines, a cohort study conducted on 111 patients in 2016 reported a 58.5% usage of antibiotics in acute pancreatitis admissions.[7] Similar percentage was observed in a larger retrospective study done in the United Kingdom (n=712), the reported percentage of antibiotics use was 62%.[8] As noted in these studies, there is large dissociation between the current guidelines and the current practice.

We also noticed that most of the previous studies did not show a clear distinction between the use of antibiotics whether it was prophylactic or therapeutic.[9] Similarly, our study failed to figure out the intension of our surgeons regarding the decision to use antibiotics. We noticed that the physician's decision to start antibiotics was not related to the presence of necrosis or infected necrosis as we might predict. Also, the use of antibiotics was not due to the presence of confirmed positive cultures; most patients did not have full septic workup done or a positive culture before commencing antibiotic therapy.

One potential explanation is the presence of possible acute cholecystitis on imaging whether it by a CT scan or ultrasound. Concomitant acute cholecystitis was found in a significant number of cases that were started on antibiotics. The problem here is, most patients with acute pancreatitis have free fluid around the gallbladder fossa as well as gallbladder wall thickening, which might be reactionary in nature, not due to an ongoing cholecystitis. We also noted that patients in the antibiotics group had more comorbidities mainly DM and hypertension.

Further research is needed to further explore the reasons and effects of such practice in order fully develop clear local guidelines regarding the use of antibiotics in cases of ABP, in order to minimize their adverse effects and potential antibiotic resistance.

Limitations

The sample size is the main limitation of the study, we did not meet the required sample size to achieve adequate power. This can be overcome by including more years in analysis and also including other causes of AP. A well-structured randomized controlled trial could overcome some of the limitations of the current study. The other main limitation to this study is that we suffered from plenty of missing data in our registry. Again, a prospective study would avoid such limitation.

CONCLUSION

This is a cross-sectional study on patients admitted with ABP during the year 2019 and 2020 to the SMC, Bahrain, to evaluate the trend of antibiotic use during their admission. The study found that 60.8% of cases included, received antibiotic therapy during their admission. This study comes in line with the previous literature that there is a large discrepancy between the current practice and guidelines. Further prospective studies are required to evaluate the rationale and effects of such practice.

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