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Impact of Early Versus Late Approach on the Management of Acute Cholangitis in an Ecuadorian Level-4 Health Center

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Abstract **Original Research Article**

Introduction: Acute cholangitis is a bile duct inflammation and infection resulting from complete or partial obstruction due to different etiologies, including gallstones, malignant occlusion, etc. Clinical presentation includes intermittent fever with chills, right upper quadrant pain, and jaundice. With advances in minimally invasive techniques such as endoscopic techniques, the prognosis has improved in the last 30 years with a current mortality of 2.7 to 10%. ***Objective:*** compare the impact of the early versus late approach in the management of acute cholangitis according to the TG in patients admitted to the General Surgery Department of Luis Vernaza Hospital during 2018 to 2020. ***Methodology:*** Observational, retrospective, comparative and analytical study. Data was obtained from electronic medical records, organized using Microsoft Excel ®, and analyzed using SPSS 25.0 ®. Chi-square or Fisher's test were applied to compare the clinical characteristics by type of approach or severity scale. Statistical significance was established for p- value <0.05. ***Results:*** Ninety-eight patients were included, female: 54.08%. Grade II (moderate) cholangitis was the most frequent (64.29%). The main approach for biliary drainage was endoscopic (ERCP) (57.14%). A late approach (> 48 hours since hospital admission) was seen in 69.4%. Mortality by type of approach presented significant differences (p = 0.029): 0% with early approach vs. 14.71% with the late approach. ***Discussion:*** Patients with acute cholangitis were mainly approached late for biliary decompression; a worrying fact since it demonstrates non- compliance of fundamental TG recommendations were early or urgent bile duct decompression is described as a mainstay in acute cholangitis. ***Conclusions:*** Hospital stay was directly proportional to the type of approach (early or late). Mortality was higher in patients who underwent a late approach, and directly proportional to the severity. An early approach should always be preferred. Management of acute cholangitis should be protocolized in Ecuador to reduce morbidity and mortality.

Keywords: Cholangitis, bile duct diseases, biliary tract, biliary tract surgical procedures.

INTRODUCTION

Under physiological conditions, there are various mechanisms that are involved in maintaining the bile sterility, which has bacteriostatic properties [1]. The Oddi sphincter controls the direction of bile flow and acts as a barrier between the sterile bile duct and the duodenum [1]. Anatomically, the biliary system is affected by the high pressure inside its duct and tends to be more permeable to bacterial translocation and toxins [2]. Acute cholangitis, described in 1877 by Jean Marie Charcot as "hepatic fever", is a bile duct inflammation and infection resulting from complete or partial obstruction due to different etiologies, including: gallstones, inflammatory factors (i.e., sclerosing

cholangitis), malignant occlusion (i.e., bile duct, gallbladder, ampullary, pancreatic, duodenal tumors), cysts, duodenal diverticula, congenital abnormalities, papilla fibrosis, pancreatitis, external pressure, postoperative factors (i.e., damaged bile duct, bile duct-jejunum anastomosis, drain syndrome due to the presence of debris after a biliodigestive anastomosis); neoplasms, iatrogenic factors (i.e., Mirizzi syndrome, which is stricture of the common bile duct caused by pressure or inflammatory changes caused by stones in the neck of the gallbladder and cystic duct; Lemmel syndrome, which is a parapapillary diverticulum of the duodenum that compresses the common exit orifice of the bile duct or pancreatic duct and obstructs the passage of bile, thus causing cholestasis, jaundice, cholangitis and pancreatitis), occlusion of biliary stents or parasites such as choledochal ascariasis [2, 3], being associated with bacteremia or septic shock, and, therefore, increasing morbidity and mortality [1].

Choledocholithiasis is the most frequent cause of cholangitis (accounting for more than 50% of cases), with the highest incidence in people over 70 years of age, with a prevalence of 2 cases per 1000 patients admitted for hospital treatment in the United States. Acute cholangitis of lithiasic origin predominates in the female gender, while acute malignant (tumoral) obstructive cholangitis does not show a predilection for either sex.

Cholelithiasis is also a frequent cause of obstruction, reaching a 10 to 15% general population prevalence in the United States. In Ecuador, cholelithiasis is the main cause of morbidity in the general population according to INEC (National Institute of Statistics and Censuses) data; by 2014, it represented 17% of all diseases, with an incidence of 22.5 per 100,000 inhabitants [3, 4]. A study conducted at Teodoro Maldonado Carbo Hospital reported a cholangitis prevalence of 39% for patients with an average age of 54 years, with cholelithiasis being the main cause (54%) and a 13% mortality rate [5].

The typical signs and symptoms of acute cholangitis (intermittent fever with chills, right upper quadrant pain, and jaundice) are known as Charcot's triad [2]. The Reynolds pentad adds mental confusion and shock to the previous three and was defined in acute obstructive cholangitis by Reynolds and Dargan in 1959, indicating that emergency surgical biliary decompression was the only effective procedure to treat acute obstructive cholangitis [2].

According to Longmire's classification, acute cholangitis may be suppurative, if there is intermittent fever accompanied by chills, right upper quadrant abdominal pain and jaundice; or obstructive, if there is lethargy or mental confusion and shock along with the triad, in agreement with what was described by Reynolds [2].

With advances in minimally invasive techniques such as endoscopic techniques, the prognosis has improved in the last 30 years. Before 1980 the mortality rate was greater than 50%. The occurrence of new cases of severe acute cholangitis is approximately 12.3%, with a current mortality of 2.7 to 10% [3].

The Tokyo guidelines (TG) classify the severity of acute cholangitis to know the prognosis, establish a therapeutic strategy and identify patients who require early biliary drainage; being: grade III (severe), if there is organic dysfunction; grade II (moderate), with risk of increased severity if early biliary drainage is not performed, and grade I (mild).

In a large multicenter study conducted in Japan and Taiwan, where these criteria were applied, 30-day mortality was found to be significantly higher in patients with greater severity, although such correlation was not observed in patients with acute cholangitis caused by malignant tumors [6].

Other scales such as the Charlson Comorbidity Index (CCI) and the American Society of Anesthesiologists (ASA) physical status (PS) classification are useful for assessing the general condition of the patient [7].

Acute cholangitis must be evaluated in the first 6 to 12 hours, and subsequently every 24 to 48 hours to determine its severity and establish an adequate treatment, with biliary drainage and antimicrobial therapy being the mainstay. Initial management includes: NPO (nothing per oral), intravenous (IV) fluid therapy, IV antibiotics (after taking blood cultures) and analgesic medication in conjunction with strict vital signs monitoring such as blood pressure, heart rate, respiratory rate, temperature, oxygen saturation, level of consciousness and diuresis [8].

It is mandatory to reassess the clinical status of the patient for a reclassification of severity based on the response to the initial management; furthermore, if the patient is in shock, initial treatment should be started without waiting for a definitive diagnosis [2].

For patients with grade I (mild) acute cholangitis, initial medical treatment in addition to antimicrobial therapy may be sufficient, without requiring biliary drainage in most cases. Drainage will be considered for those who do not respond to initial medical treatment, whether endoscopic, percutaneous, or surgical, and the sample should be sent for culture. Ocasionally, treatment of the etiology of cholangitis could be performed simultaneously with biliary drainage, as in the case of cholangitis resulting from choledocholithiasis in patients undergoing ERCP sphincterotomy [9]. If cholangitis occurs after this

intervention, antimicrobial therapy must be continued without the need to undergo a new intervention.

When cholangitis is grade II (moderate), it is not serious but requires early biliary drainage [2]: endoscopic or percutaneous, or even emergency surgical drainage with a T-tube. The definitive procedure to eliminate the cause will be performed after the general condition of the patient has improved.

Finally, patients with grade III (severe) acute cholangitis require appropriate organ support such as ventilatory/circulatory management (non-invasive/invasive, positive pressure ventilation and use of vasopressors, etc.). It is imperative that they undergo urgent biliary drainage once they have been stabilized with initial medical treatment and organ support. Endoscopic or percutaneous transhepatic drainage is preferable, but emergency surgery with bile duct decompression with a T-tube may be offered as a last resort [2, 10].

If a hospital does not have the capacity to perform procedures that allow biliary drainage or does not have an intensive care unit, patients with moderate or severe cholangitis should be transferred to a highly specialized institution [11].

In TG, biliary drainage is recommended for acute cholangitis regardless of severity category, except in some cases of mild acute cholangitis where antibiotics and general supportive care are effective [12].

Endoscopic transpapillary biliary drainage is the prefered procedure, regardless of whether the pathology is benign or malignant, since it is minimally invasive; it can be endoscopic nasobiliary stenting (ENBD) for external drainage, or endoscopic biliary stenting (EBS) for internal drainage, and both can be performed for all types of cholangitis [13].

Statistically, there is no difference between them in terms of success rate, so patient tolerance to transnasal tube placement, age (elderly) or presence of mental disorders must be considered to choose one.

EBS is an internal drainage technique that does not cause discomfort or liquid or electrolyte loss, being very advantageous for therapeutic purposes. On the other hand, ENBD is an external drainage technique that allows bile to be monitored or washed through a transnasal tube, especially when the bile is highly purulent [13, 14].

On the other hand, endoscopic ultrasound (EUS)-guided bile duct drainage has 3 approaches: first, EUS-guided intrahepatic bile duct drainage using the transgastric or transjejunal approach; second, EUS-guided extrahepatic bile duct drainage using a transduodenal or transgastric approach; and last, EUS-guided antegrade stent placement. The choice of drainage method and route depends on the presence of gastric outlet obstruction and the site of bile duct stenosis [13]. Drainage of the intrahepatic and extrahepatic bile ducts has shown a technical success rate of 95%, with clinical response rates of 93% to 100%. Meanwhile the technical success rate of antegrade stent placement is 77% due to the difficulty of wire introduction and insertion of the stent delivery system through the bile duct. Theoretically, the intrahepatic and extrahepatic bile ducts, do not attach to the gastrointestinal tract, therefore, bile leakage may occur during the procedure, triggering biliary peritonitis [15].

Endoscopic sphincterotomy (EST) is another alternative, which has two main advantages for biliary drainage: it separates the bile duct and the pancreatic duct by preventing occlusion of the pancreatic duct orifice by placing a large- bore plastic or metal biliary stent self-expanding; and, allows stone extraction from the bile duct in a single session. The efficacy and safety of EST in patients with acute cholangitis remains controversial due to post-procedure complications such as bleeding [28]. Therefore, in the TG it has been established that the addition of EST is not necessary in acute cholangitis since the pathology itself becomes one of the risk factors for post-EST bleeding, especially in patients with severe cholangitis complicated by coagulopathy or the administration of antithrombotic agents [16].

Endoscopic papillary balloon dilation (EPBD) aims to preserve Oddi sphincter function and is an alternative to EST for removal of bile duct stones, although with lower success rates, higher rates of use of mechanical lithotripsy, and consequently an increased risk of pancreatitis, despite lower bleeding rates [17].

In contrast, endoscopic papillary large balloon dilation (EPLBD) was developed for the removal of large or difficult stones with or without endoscopic sphincterotomy. EPLBD stone removal has been shown to have a higher success rate and could reduce the need for mechanical lithotripsy and procedure time without increasing the risk of severe pancreatitis or bile duct perforation [18].

TG suggest that removal of bile duct stones after EST in a single session may be considered in patients with mild or moderate acute cholangitis, except in patients on anticoagulant therapy, with coagulopathy or presenting with severe acute cholangitis, however, they recommend removal of bile duct stones in two sessions after drainage in patients with a large stone or multiple stones if EPLBD is required [19].

The placement of biliary stents is recommended in patients with acute cholangitis who

present with coagulopathy; anyway, the approach to patients with acute cholangitis receiving antithrombotic agents should always be selected according to bleeding and thromboembolism risks [18, 19].

Bile duct drainage can also be performed by a stereoscopically assisted balloon (BE-ERCP); this procedure is recommended for patients with acute cholangitis and surgically altered anatomy, emphasizing that it should be performed by experienced endoscopists skilled in both balloon enteroscopy and endoscopic retrograde cholangiopancreatography (ERCP). If the procedure proves to be difficult, transhepatic drainage or echoendoscopic drainage can be considered as alternative methods, including referral to a highly specialized institution [20].

Percutaneous transhepatic cholangial drainage consists in a safe needle puncture guided by ultrasound to avoid blood vessels [2].

Finally, surgical drainage is extremely rare since currently there are less invasive and hemorrhage-propense procedures such as percutaneous or endoscopic drainage, although it also allows decompression of the bile duct. When performing surgical drainage in critically ill patients with bile duct stones, lengthy surgeries should be avoided, recommending simple procedures [2].

Another important milestone is antimicrobial therapy. TG defines empirical therapy as the one administered until culture results are available. Once the causative microorganisms and the susceptibility results are known, antimicrobial therapy should be tailored to specific antimicrobial agents for those microorganisms. This process is called de-escalation microbial therapy [21].

The objective of this study was to compare the impact of the early versus late approach in the management of acute cholangitis according to the TG in patients admitted to the General Surgery Department of Luis Vernaza Hospital during 2018 to 2020.

MATERIALS AND METHODS

This was an observational, retrospective, comparative and analytical study.

All patients admitted and hospitalized at Luis Vernaza Hospital from December 2018 to September 2020, who met the inclusion and exclusion criteria, were included, estimating a sample size with a 95% confidence interval (CI) and 5% error.

Inclusion Criteria

- Patient's ≥18 years.
- Patients with a diagnosis of acute cholangitis who were managed by General Surgery Department.
- Patients whose surgical, endoscopic or percutaneous procedure was performed at Luis Vernaza Hospital.
- Complete data from medical history.

Exclusion Criteria

- Patients who did not agree with the proposed treatment and requested hospital discharge.
- Pregnancy.
- Patients diagnosed with liver cancer.

Data was obtained from the electronic medical records of the patients and organized using Microsoft Excel ®, later they were analyzed using SPSS 25.0 ®.

A descriptive report of the clinical-demographic characteristics was made. The qualitative variables were described through frequencies and percentages and the quantitative variables with percentages and central tendency measures.

The Chi-square or exact Fisher's test were applied, as necessary, to compare the clinical characteristics by type of approach or severity scale. Statistical significance was established for p-value <0.05.

RESULTS

A hundred-seventeen patients were included; 19 patients were excluded because they did not meet the inclusion criteria, with a total sample of 98 patients.

Female patients accounted for 54.08% (n = 53) and 45.92% (n = 45) were male; 52.04% (n = 51) were >50 years old, 31.63% (n = 31) between 31 and 50 years old, and 16.33% (n = 16) between 18 and 30 years old; 37.76% (n = 37) presented comorbidities.

Ethiology

The most frequent etiology for patients with acute cholangitis was of biliary origin, reaching 61.22% (n = 60), while only 5.1% (n = 5) was caused by Mirizzi Syndrome.

Table 1: Ethiology of accute colangitis

Ethiology	Frequency (n)	Percentage (%)
Biliary origin	60	61.22
Malignacy	16	16.33
Post-operative	12	12.24
Mirizzi syndrome	5	5.10
Others	5	5.10
Total	**98**	**100.00**

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Severity

Grade II (moderate) cholangitis was the most frequent, reaching 64.29% (n = 63), followed by mild cholangitis with 20.41% (n = 20) and finally, by severe cholangitis with 15.31% (n = 15).

Table 2: Clinical-demographic characteristics according to severity

Clinical-demographic characteristics	Severity			p-value
	Mild	Moderate	Severe	
	n (%)	n (%)	n (%)	
Comorbidities				
Yes	5 (20.83)	28 (42.42)	10 (55.56)	0.059
No	19 (79.17)	38 (57.58)	8 (44.44)	
Ethiology				
Biliary origin	18 (75)	36 (54.55)	11 (61.11)	0.269
Malignacy	2 (8.33)	14 (21.21)	4 (22.22)	
Post-operative	4 (16.67)	8 (12.12)	1 (5.56)	
Mirizzi syndrome	0 (0)	5 (7.58)	0 (0)	
Others	0 (0)	3 (4.55)	2 (11.11)	
Approach				
Endoscopic	17 (80.95)	32 (50)	8 (53.33)	0.083
Percutaneous	1 (4.76)	17 (26.56)	2 (13.33)	
Surgical	3 (14.29)	15 (23.44)	5 (33.33)	
Resolution				
Single time	18 (91.3)	30 (66.67)	8 (61.54)	0.037*
2 times	2 (8.7)	16 (33.33)	5 (38.46)	
Cause solved	20 (95.83)	47 (71.21)	13 (61.11)	0.019*
Complications	4 (16.67)	21 (31.82)	5 (27.78)	0.365
Pancreatitis	2 (50)	14(66,67)	3 (60)	0.181
Surgical site infection	2 (50)	2 (9.52)	2 (40)	
Reintervention	0 (0)	5 (23.81)	0 (0)	
Hospital stay (<7 days)	6 (25)	4 (6.06)	1 (5.56)	0.020*

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*Significant differences in proportions p-value <0.05, based on Chi-squared or exact Fisher's test

Approach

The main approach in patients diagnosed with acute cholangitis was endoscopic (ERCP) (57.14%; n = 56).

Table 3: Approach for bile duct decompression

Approach	Frequency	Percentage
Endoscopic	56	57.14
Percutaneous	19	19.39
Surgical	23	23.47
Total	**98**	**100.00**

Made by the authors

A late approach (after > 48 hours of hospital admission) was seen in 69.4% (n = 68) of patients, while 30.60% (n = 30) were approached early.

Resolution of the cause that triggered the mentioned pathology was achieved in 80.61% (n = 79) of patients, in the remaining 19.39% (n = 19) it was not. Of the first, 70.89% (n = 56) resolution was performed

in a single time intervention, that is, during the decompression of the bile duct the etiology of the pathology in question was solved, and 29.11% (n = 23) had a 2-time resolution.

Hospital-stay

Hospital-stay was <7 days in 9.18% (n = 9) of patients, 7 to 15 days in 34.69% (n = 34), 16 to 30 days in 44.90% (n = 44) and >30 days in 11.22% (n = 11).

Complications

The main complication related to the procedure in patients with acute cholangitis was pancreatitis (63.33%; n = 19).

Table 4: Complications associated with biliary drainage procedures

Complication	**Frequency**	**Percentage**
Yes	30	30.61
No	68	69.39
Total	**98**	**100.0**
Type		
Pancreatitis	19	63.33
Surgical site infection	6	20.00
Reintervention	5	16.67
Total	**30**	**100.0**

Made by the authors

Survival

Patients who survived the disease accounted for 89.80% (n = 88); 10.20% (n = 10) did not. There was no statistically significant relationship between age and sex and early or late approach.

Table 5: Demographic characteristics according to the type of approach

Clinical-demographic characteristics	**Approach**		***p*-value**
	Early	**Late**	
	n (%)	**n (%)**	
Sex			
Masculine	14 (46.67)	31 (45.59)	0.921
Femenine	16 (53.33)	37 (54.41)	
Age (years)			
18-30	4 (13.33)	12 (17.65)	0.254
31-50	13 (43.33)	18 (26.47)	
>50	13 (43.33)	38 (55.88)	

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Mortality and Comorbidities

Mortality by type of approach presented significant differences (p = 0.029): it was 0% for the early approach vs. 14.71% (n = 10) for the late approach.

Mortality presented significant differences by severity scale (p = 0.006): it was 0% in mild cholangitis, 12.10% for moderate and 33.30% for severe cholangitis.

There was no statistically significant difference between the presence or absence of comorbidities, the etiology, approach, resolution, or presence of complications, comparing early to late approach.

Mortality presented significant differences by approach for the severe cholangitis (p = 0.038); where mortality was 0% for early approach vs 42.86% (3 patients) with the late approach.

When comparing mortality by severity scale according to etiology, no significant differences were observed; however, for the different etiologies, it was observed that as severity increases, mortality also increases.

Table 6: Clinical characteristics according to the approach

Clinical-demographic characteristics	Approach		p-value
	Early	Late	
	n (%)	n (%)	
Comorbidities			
Yes	9 (30)	28 (41.18)	0.368
No	21 (70)	40 (58.82)	
Ethiology			
Biliary origin	21 (70)	39 (57.35)	0.689
Malignacy	3 (10)	13 (19.12)	
Post-operative	3 (10)	9 (13.24)	
Mirizzi syndrome	2 (6.67)	3 (4.41)	
Other	1 (3.33)	4 (5.88)	
Severity			
Mild	1 (3.33)	19 (27.94)	0.007*
Moderate	21 (70)	42 (61.76)	
Severe	8 (26.67)	7 (10.29)	
Approach			
Endoscopic	17 (56.67)	39 (57.35)	0.448
Percutaneous	4 (13.33)	15 (22.06)	
Surgical	9 (30)	14 (20.59)	
Resolution			
Single time	15 (60)	41 (75.93)	0.147
2 times	10 (40)	13 (24.07)	
Cause solved	24 (80)	52 (76.47)	0.700
Complications	8 (26.67)	22 (32.35)	0.573
Pancreatitis	4 (50)	15 (68.18)	0.352
Surgical site infection	3 (37.5)	3 (13.64)	
Reintervention	1 (12.5)	4 (18.18)	
Hospital-stay (days)			
<7	4 (13.33)	5 (7.35)	0.022*
7-15	16 (53.33)	18 (26.47)	
16-30	9 (30)	35 (51.47)	
>30	1 (3.33)	10 (14.71)	
Mortality	0 (0)	10 (14.71)	0.029*

Made by the authors

*Significant differences in proportions p-value <0.05, based on Chi-squared or exact Fisher's test

DISCUSSION

In 2007, a systematic review was conducted based in an international consensus in Tokyo, Japan, which resulted in the development of the Tokyo guidelines for the management of cholangitis and cholecystitis. Last updated in 2018, it provides greater diagnostic specificity and sensitivity, although, in our setting, its practice is not yet standardized for the evaluation of patients with cholangitis [1, 2].

In Chile in 2013, an experimental study conducted at the Military Hospital of Santiago for 6 years concluded that with early intervention on the bile duct, cholangitis achieved a lower lethality, but with greater use of intensive resources [12].

In 2014 in Cuba, a study at the "Hermanos Ameijeiras" Surgical Clinical Hospital about experiences with emergency percutaneous biliary drainage in the management of acute cholangitis as a procedure to achieve biliary decompression concluded that ultrasound-guided percutaneous biliary drainage was a useful tool for emergency treatment of cholangitis [22]. In Nicaragua, in 2017, a study was carried out at the Antonio Lenin Fonseca Hospital, where they evaluated the level of compliance with the Tokyo 2013 guidelines in the management of patients with acute cholangitis, concluding that the guidelines were not met, despite this, demonstrated a 10% mortality rate [3].

In Ecuador there are still no studies on acute cholangitis, remarking the importance of this work, with future application to achieve a lower mortality rate and hospital-stay due to a timely and early treatment.

According to the information obtained in this study, patients with acute cholangitis mainly received a late biliary decompression, even though TG describes an urgent or early bile duct decompression as the preferred treatment. Another statement is that a

definitive procedure should be performed to eliminate the cause of acute cholangitis after the patient's general condition has improved; this also has not been accomplished.

Patients with acute cholangitis required prolonged hospitalization, between 16 to 30 days, and only 9% of the cases had a >7-day hospital-stay. The longer the hospital-stay, the greater the risk of contracting an associated health care disease; and morbidity, mortality, and institutional spending increases.

State of the art suggests that with endoscopic techniques, mortality reaches 2.7 to 10%, similar to that reported in this study, where it reached 10.20%. However, this percentage could decrease if the TG and the recommendation for an early approach were followed, in contrast to the patients studied, who mostly received a late decompression of the bile duct [23].

The severe form of cholangitis was mostly addressed after 48 hours, differing from international recommendations for the performance of an approach as soon as the patient's hemodynamic stability is achieved, generally within the first 12 to 24 hours. Although the objective of this study was about the impact of the approach on patient evolution, it was observed that some of the causes of the delay in the approach were due to the delay in the categorization of severity, and the need for ICU admission, where stabilization delayed endoscopic biliary decompression as suggested by the guidelines [24].

Also, the 2018 TG recommends that patients with moderate or severe cholangitis undergo an endoscopic (preferred), percutaneous, or surgical procedure to achieve decompression of the bile duct after patient stabilization: organic support, antibiotic therapy, hydration, etc., and subsequently be offered a definitive resolution of the etiology that triggered the disease. In other words, they recommend a 2-stage treatment [12]. In the present study, these recommendations have not been fully complied since single stage resolution predominated for all severity types. It was also observed that the effectiveness of resolving the cause of acute cholangitis decreased as the severity of the symptoms increased; resulting in a late approach to biliary decompression, and the failure to consider adequate times of resolution.

Most patients with mild acute cholangitis had a hospital stay between 7 to 15 days, since they presented an adequate response to the initial medical management. While for those patients with grade II and III cholangitis, hospital stay was > 15 days; These patients required a much longer treatment as they did not respond to initial medical management, particularly those with grade III acute cholangitis, where there was a need to implement organ support measures, i.e., vascular, pulmonary, or renal.

Also, most patients who presented acute cholangitis were female, according with what has been described in other studies, with reported prevalence from 59.6% to 76% for the female sex [25]. These data could be related to the fact that women are more frequently diagnosed with cholelithiasis, one of the complications of the latter being choledocholithiasis, which, in turn, is the leading cause of acute cholangitis.

Likewise, patients > 50 years had the highest presentation of acute cholangitis, according to what has been described in the literature, where most patients suffering from acute cholangitis are > 70 years old. In a retrospective study of approximately 400 patients with acute cholangitis managed surgically or endoscopically, where age was related to the presence of mortality, it was observed that 54% of the population was >60 years [1, 26].

The main etiology of acute cholangitis in this cohort was choledocholithiasis (n = 61), as described in several studies worldwide. Also, it was observed that Grade II (moderate) was predominant; although, as the severity increased, prevalence decreased. This can be explained due to the latest advances in healthcare that allow a faster diagnosis and preventing this disease from progressing in its severity. A German study established a model for predicting the risk of mortality in patients with acute cholangitis based on the TG, which concluded that applying the guidelines and 22 other predictors' incidence of severe cholangitis may be reduced [24].

The main approach in this cohort was the endoscopic (ERCP). Currently ERCP is the gold standard, due to its lower mortality compared to the surgical approach; For example, a 43-month prospective study, with 82 patients with severe cholangitis who were randomly assigned to surgical or endoscopic biliary decompression, analyzed hospital mortality, concluding that mortality reached 76.5% in surgically treated patients [27].

In another important retrospective study with a 5-year follow-up, conducted at the Hospital de Basurto, Bilbao, with a sample of 200 patients diagnosed with cholangitis who randomly underwent surgical or endoscopic management, an overall mortality rate of 27% was observed; those who underwent ERCP reached 8%, and surgical ones reached 19% [28].

Patients with acute cholangitis were mainly approached late for biliary decompression; a worrying fact since it is associated with non-compliance of fundamental aspects of the established protocols. It is important to emphasize that, in the guidelines on the management of acute cholangitis; early or urgent bile

duct decompression is described as a mainstay for cholangitis management [2].

The data from this study are similar to one carried out at the Ramiro Prialé-Huancayo National Hospital, from 2011 to 2013, retrospectively, with 106 patients, where the impact of the surgical approach on acute cholangitis was evaluated; concluding that about 43.6% of the population had a >14 day hospital-stay, with Grade III acute cholangitis being the one that presented the longest hospital stay, related to a greater number of complications, greater antibiotic administration and a greater need for ICU [29].

CONCLUSION

Most patients were treated with the late approach rather than the early one. In the first group, mild acute cholangitis stood out and in the second, grade III (severe). There was no difference in the approach for moderate cholangitis.

Hospital stay was directly proportional to the type of approach (early or late), regardless of if it was endoscopic, percutaneous, or surgical; in other words, the later the approach of a patient with acute cholangitis in its moderate and severe degrees, the longer the hospital stays.

Mortality was higher in patients who underwent a late approach for decompression of the bile duct, and it also was found to be directly proportional to the severity.

An early approach should always be preferred. Management of acute cholangitis should be protocolized in Ecuador to reduce morbidity and mortality at all health-care levels.

ETHICS

This work was constructed based on the Helsinki Declaration.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FINANCE

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