



MICROBIOLOGY OF CHOLEDOCHAL BILE IN PATIENTS WITH CHOLEDOCHOLITHIASIS ADMITTED TO A TERTIARY HOSPITAL

General Surgery

Dr Akhil Mudgal	Junior Resident Department Of General Surgery, Mgm Medical College And Hospital, Navi Mumbai.
Dr Alauddin Tungekar	Assistant Professor Department Of General Surgery, Mgm Medical College And Hospital, Navi Mumbai.
Dr Vivek Kele	Junior Resident Department Of General Surgery, Mgm Medical College And Hospital, Navi Mumbai.
Dr Akshay Nagwani*	Senior Resident Department Of General Surgery, Mgm Medical College And Hospital, Navi Mumbai. *Corresponding Author

ABSTRACT

Introduction: Cholelithiasis, the presence of stones in the common bile duct, often results in biliary obstruction, cholangitis, and pancreatitis. Prompt diagnosis and treatment are crucial to avoid severe complications. This study examines the microbiology of choledochal bile in patients with choledocholithiasis to understand bacterial profiles and antibiotic resistance patterns for better management. **Methodology:** This prospective study at MGM Medical College and Hospital, Navi Mumbai, included 20 patients undergoing ERCP from September to November 2023. Bile samples were cultured and analyzed for bacterial growth and antibiotic sensitivity using standard microbiological techniques and the Kirby-Bauer Disc Diffusion method. Data were analyzed using IBM SPSS Statistics version 26.0. **Results:** The study involved 60.0% female patients, with a mean age of 52.85 years. Abdominal pain (85.0%) and fever (40.0%) were common symptoms. Positive bile cultures were found in 85.0% of cases, with 70.0% showing leucocytosis. The most prevalent microorganisms were Klebsiella (30.0%), Pseudomonas (25.0%), and Enterococcus (15.0%). Antibiotic sensitivity testing showed intermediate sensitivity in 45.0% of cases, full sensitivity in 30.0%, and resistance in 25.0%. **Conclusion:** The findings highlight the necessity of region-specific microbiological data to guide effective antibiotic therapy in choledocholithiasis. Ongoing surveillance and tailored antimicrobial strategies are essential for managing biliary tract infections and improving patient outcomes in tertiary care settings.

KEYWORDS

INTRODUCTION

Cholelithiasis, the presence of stones in the common bile duct, is a significant clinical problem that often leads to biliary obstruction, cholangitis, and pancreatitis. It necessitates prompt diagnosis and treatment to prevent severe complications. The microbiology of choledochal bile in patients with choledocholithiasis provides crucial insights into the bacterial profile and antibiotic resistance patterns, which are essential for effective management and treatment of these patients(1). The common bile duct, an essential part of the biliary system, facilitates the transport of bile from the liver and gallbladder to the duodenum. When stones obstruct this duct, it can result in a buildup of bile and subsequent infection. Bacterial infection of the bile, or cholangitis, is a severe condition that can rapidly progress to sepsis if not promptly addressed(2). Understanding the microbial flora present in choledochal bile can guide appropriate antibiotic therapy, reducing morbidity and mortality associated with these infections(3).

Microbiological studies of choledochal bile have identified a wide range of pathogens, including Gram-negative bacteria such as *Escherichia coli* and *Klebsiella* species, which are the most commonly isolated organisms(4). Additionally, Gram-positive bacteria like *Enterococcus* species and anaerobes like *Bacteroides* species are frequently detected(5,6). The emergence of multidrug-resistant organisms poses a significant challenge in the management of biliary tract infections, highlighting the need for ongoing surveillance and tailored antimicrobial strategies(7). In the context of a tertiary care hospital, where patients with complex and severe conditions are often referred, the microbiological profile of choledochal bile may differ from that seen in primary or secondary care settings(8,9). Tertiary hospitals serve as referral centers for advanced diagnostic and therapeutic procedures, including endoscopic retrograde cholangiopancreatography (ERCP), which is commonly performed to diagnose and treat choledocholithiasis(10). The procedure itself, while therapeutic, can introduce bacteria into the biliary tract, complicating the microbiological landscape(11,12).

The present study aims to investigate the microbiology of choledochal bile in patients with choledocholithiasis admitted to MGM Medical College and Hospital, Navi Mumbai. By analyzing bile samples obtained during ERCP, this study seeks to identify the bacterial species present, their antibiotic resistance patterns, and any correlations with clinical outcomes. This information is essential for developing

effective treatment protocols and improving patient care. Previous studies have emphasized the importance of local microbiological data in guiding empirical antibiotic therapy. Regional variations in bacterial profiles and resistance patterns necessitate hospital-specific studies to inform clinical practice(13). Moreover, understanding the microbiology of choledochal bile can help anticipate potential complications and improve preventive measures, such as the selection of prophylactic antibiotics during biliary procedures.(14)

In summary, the microbiology of choledochal bile in patients with choledocholithiasis is a critical area of research that directly impacts clinical management and patient outcomes. This study conducted at a tertiary care hospital aims to provide valuable insights into the bacterial landscape and resistance patterns associated with choledocholithiasis. The findings will contribute to better therapeutic strategies, enhanced patient safety, and overall improvement in the care of patients with biliary tract infections(9).

Methodology

This prospective study was conducted at the MGM Medical College and Hospital in Navi Mumbai. Routine bile samples were collected in the Bacteriology Laboratory for culture and antibiotic sensitivity testing between September 2023 to November 2023, with a total sample size of 20. The study included 20 patients who underwent therapeutic or complicated diagnostic ERCP for presumed cholangitis and obstructive biliary disease during this period. The bile samples were received in sterile containers with liquid medium and incubated for 24-48 hours at 37°C. The next day, the samples were inoculated on Blood agar, Chocolate agar, and MacConkey agar and incubated overnight at 37°C aerobically. All plates were examined for visible growth, and the colonies were identified using standard microbiological procedures. Antibiotic sensitivity testing of the microorganisms was performed using the modified Kirby-Bauer Disc Diffusion method on Muller Hinton agar, with results interpreted according to the CLSI (Clinical Laboratory Standards Institute) Guidelines. Statistical analysis of the collected data was performed using IBM SPSS Statistics version 26.0. Descriptive and inferential statistics were employed to analyze the data, ensuring accurate and reliable results.

RESULTS:

The study on patients with choledocholithiasis admitted to MGM

Medical College and Hospital, Navi Mumbai, reveals that the condition predominantly affects females (60.0%) compared to males (40.0%). The mean age of the patients was 52.85 years. Clinically, 85.0% of patients presented with abdominal pain, and 40.0% had a fever. Laboratory findings indicated that 85.0% had positive bile cultures, suggesting a high incidence of biliary infection, while 70.0% exhibited leucocytosis. Bacteremia was less common, observed in only 10.0% of patients. Biochemical analysis showed elevated liver enzymes with mean serum alkaline phosphatase at 756.55 UI/L, serum AST at 142.6 UI/L, serum ALT at 143.7 UI/L, and elevated bilirubin levels, indicating significant hepatobiliary involvement.

Distribution according to demographic and laboratory findings			
Variable		frequency	percentage
Gender	Male	8	40.0%
	Female	12	60.0%
Fever		8	40.0%
Abdominal Pain		17	85.0%
Bacteremia		2	10.0%
Bile Positive Culture		17	85.0%
Leucocytosis (>12,000/mm ³)		14	70.0%
Mean age ± SD		52.85 ± 13.13	
Serum Alkaline Phosphatase (mean, UI/L)		756.55 ± 188.71	
Serum AST (mean, UI/L))		142.6 ± 43.09	
Serum ALT (mean, UI/L)		143.7 ± 46.30	
Serum Total Bilirubin (mean, mg/dL)		6.11 ± 2.63	
Serum direct Bilirubin (mean, mg/dL)		4.38 ± 1.19	

The microbiological analysis of choledochal bile samples from patients with choledocholithiasis showed a varied distribution of microorganisms. Klebsiella was the most prevalent, found in 30.0% of samples, followed by Pseudomonas, present in 25.0%. Notably, 25.0% of the samples showed no bacterial growth, which could be attributed to prior antibiotic treatment or other factors. Enterococcus was identified in 15.0% of samples, while E. coli was the least common, found in only 5.0%. This distribution underscores the need for precise microbiological diagnosis to guide effective antibiotic therapy and enhance patient outcomes in choledocholithiasis cases.

Microorganism Distribution		
Microorganism	Frequency	Percentage
Klebsiella	6	30.0%
No Growth	5	25.0%
Pseudomonas	5	25.0%
Enterococcus	3	15.0%
E. coli	1	5.0%

The antibiotic sensitivity testing of microorganisms isolated from choledochal bile samples in patients with choledocholithiasis showed varied responses. Intermediate sensitivity was observed in 45.0% of the cases, indicating that these pathogens had a moderate response to antibiotics. Sensitive strains, which were fully responsive to antibiotic treatment, accounted for 30.0% of the samples. Conversely, 25.0% of the isolates were resistant, highlighting a significant proportion of pathogens that did not respond to standard antibiotic therapies.

The antibiotic resistance patterns of microorganisms isolated from choledochal bile samples in patients with choledocholithiasis highlight key treatment considerations. E. coli showed resistance to Ampicillin and Ceftriaxone but was sensitive to Gentamicin, Ciprofloxacin, and Imipenem. Klebsiella was resistant to Ampicillin and showed intermediate sensitivity to Ceftriaxone, yet remained sensitive to Gentamicin, Ciprofloxacin, and Imipenem. Pseudomonas exhibited resistance to Ampicillin and intermediate sensitivity to Gentamicin but was sensitive to Ciprofloxacin, Ceftriaxone, and Imipenem. Enterococcus was sensitive to Ampicillin, Ciprofloxacin, Ceftriaxone, and Imipenem, though resistant to Gentamicin. Streptococcus showed sensitivity to all tested antibiotics except for intermediate sensitivity to Ciprofloxacin.

Antibiotic Resistance Pattern of Microorganisms					
Microorganism	Ampicilli n	Genta micin	Ciproflo xacin	Ceftriax one	Imipene m
E. coli	R	S	S	R	S
Klebsiella	R	S	S	I	S
Pseudomonas	R	I	S	S	S
Enterococcus	S	R	S	S	S
Streptococcus	S	S	I	S	S

DISCUSSION:

The current study reveals that the condition predominantly affects females (60.0%) compared to males (40.0%), with a mean age of 52.85 years. These findings are consistent with other recent studies, which also report a higher prevalence of choledocholithiasis among females, often attributed to hormonal factors influencing biliary cholesterol saturation and gallstone formation(15). Clinically, 85.0% of patients in the study presented with abdominal pain, and 40.0% had fever, typical symptoms reported in other research. Laboratory findings showed that 85.0% of patients had positive bile cultures, with 70.0% exhibiting leucocytosis. These rates are corroborated by studies indicating high incidence of biliary infections in choledocholithiasis patients, emphasizing the importance of microbiological diagnostics (16).

Microbiological analysis from the current study identified Klebsiella (30.0%), Pseudomonas (25.0%), and Enterococcus (15.0%) as the most common pathogens. This distribution aligns with findings from other regions, where Klebsiella and Pseudomonas are frequently isolated in biliary infections (3,9). The absence of bacterial growth in 25.0% of samples could be due to prior antibiotic use, as noted in similar studies. Antibiotic sensitivity testing in the current study revealed intermediate sensitivity in 45.0% of cases, full sensitivity in 30.0%, and resistance in 25.0%. These results are consistent with the variability in antibiotic responses seen in other studies, where intermediate and resistant strains pose significant treatment challenges (5,8,9). For instance, Klebsiella and Pseudomonas have shown similar resistance patterns, necessitating tailored antibiotic regimens based on sensitivity tests .

Overall, these findings highlight the importance of region-specific studies to inform effective treatment protocols and improve patient outcomes in choledocholithiasis. The consistency of these results with other recent studies underscores the relevance and applicability of the data across different healthcare settings.

CONCLUSION:

The findings of the current study highlight the importance of region-specific studies to inform effective treatment protocols and improve patient outcomes in choledocholithiasis. The consistency of these results with other recent studies underscores their relevance and applicability across different healthcare settings, emphasizing the need for ongoing surveillance and personalized antimicrobial strategies to manage biliary tract infections effectively.

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