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# Bacterobilia in acute cholecystitis: bile cultures' isolates

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## SHORT REPORT

## Bacterobilia in acute cholecystitis: Bile cultures' isolates, antibiotic sensitivities and antibiotic usage. A study on a Pakistani population

Yousaf Bashir Hadi, Muhammad Waqas, Hafiz Muhammad Umer, Ammar Alam, Abdul Rehman Alvi, Muhammad Rizwan Khan, Amir H. Shariff

### Abstract

Acute cholecystitis is one of the most common acute surgical conditions. Laparoscopic cholecystectomy remains the mainstay of treatment. In patients managed non-operatively, antibiotics play an important role in the treatment of cholecystitis. The current retrospective observational study was conducted at a tertiary care hospital in Karachi, and comprised medical records of patients admitted between 2008 and 2014 with acute cholecystitis and in whom bile cultures were obtained. Of the 509 patients with a mean age of  $51.15 \pm 13.4$  years, early laparoscopic cholecystectomy (within 72 hours) was performed on 473 (92.9%) cases, while the rest underwent percutaneous cholecystostomy. Bile cultures were positive in 171 (33.6%) patients. Predominantly gram-negative organisms were isolated among a total of 137 (27%), with *E. coli* 63 (46%) being the most commonly isolated organism. Of the gram-positive organism, enterococcus 11 (8%) was the most common. Antibiotic sensitivities were determined. Based on our findings gram-negative coverage alone should be sufficient in our segment of the population.

**Keywords:** Acute cholecystitis, Bile cultures, Bacteriobilia, Antibiotic susceptibility.

### Introduction

Acute cholecystitis is one of the most common acute surgical conditions and it may range from a mild painful disorder to a life-threatening illness. Though conservative management can be attempted, early laparoscopic cholecystectomy (within 72-96 hours of the initiation of symptoms) remains the mainstay of treatment. Antibiotics are routinely administered in acute cholecystitis for perioperative prophylaxis or postoperative treatment. However, there are no clear indications for the use of antibiotics in patients with acute cholecystitis.<sup>1</sup> Literature has reported that gram-negative bacteria, particularly *E. coli*, are commonly isolated from

the samples of infected bile.<sup>2-4</sup>

The Tokyo Guidelines have advocated the use of bile cultures during operative interventions of all severe cases of acute cholecystitis.<sup>5</sup> When early cholecystectomy is performed, such antibiotic therapy serves as prophylaxis. The guidelines recommend that the choice of antibiotics should be made according to the severity assessment of the disease.

For community-acquired cholecystitis of mild to moderate severity, cefazolin, cefuroxime, or ceftriaxone is recommended by the Surgical Infection Society and Infectious Disease Society of America.<sup>6</sup> For acute cholecystitis of severe physiologic disturbance, advanced age, or immunocompromised state, the use of carbapenams, piperacillin-tazobactam, ciprofloxacin, levofloxacin, cefepime, or any one of these in combination with metronidazole has been recommended. Metronidazole or other drugs targeting anaerobes are commonly used in addition to a second generation or newer cephalosporin in medical management of patients with moderate to severe acute cholecystitis.<sup>7,8</sup>

More recent evidence questions the need for the administration of antibiotics in mild to moderate cholecystitis. A randomised controlled trial did not result in a greater incidence of postoperative infections in patients with mild to moderate cholecystitis in whom antibiotics were not given.<sup>9</sup> A recently published meta-analysis concluded that antibiotics should not be administered before laparoscopic cholecystectomy in patients with low- and moderate-risk cholecystitis.<sup>10</sup> It is likely that future guidelines for mild to moderate cholecystitis may not recommend the use of antibiotics. However, in the case of severe cholecystitis, antibiotics will continue to have a role.

The current study was planned to determine the common micro-organisms involved in acute cholecystitis and their antibiotic susceptibilities in a cohort of patients presenting to an urban tertiary care hospital in Pakistan. No studies have previously been conducted to find the pathogens commonly isolated in our region and their

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susceptibility to different antimicrobial agents.

## Methods and Results

The current retrospective observational study was conducted at Aga Khan University Hospital (AKUH), Karachi, and comprised medical records of patients admitted between 2008 and 2014, with acute cholecystitis and in whom bile cultures were obtained. Data was reviewed during early 2015. Exemption from ethical review was granted by the institutional review committee.

In our setting, patients diagnosed with acute cholecystitis are started on ceftriaxone and metronidazole unless there

**Table-1:** Patients' Characteristics.

Characteristic	Value
No. of Patients	509
Age (Mean) Years	51.15 ± 13.4
Gender	Male 258 (50.7%) Female 251 (49.3%)
Comorbidities	Hypertension 79 (15.5%) Diabetes 72 (14.1%)
Symptom duration in days (SD)	4.26 (3.776)
Histopathology	Acute 76 (14.93%) Acute on Chronic 433 (85.07%)
Hospital stay in days (SD)	3.49 (1.69)
Procedure performed	Cholecystectomy 473 (92.9%) Cholecystostomy 36 (7.1%)

**Table-2:** Microbiological profile.

Culture	Common organisms	Number present	Total (%)
No growth			338 (66.4%)
Monomicrobial isolates			137 (26.9%)
Gram negative	E.coli	63	
	Klebsiella	12	
	Enterobacter	6	
	S.paratyphi	5	
	P.aeruginosa	5	
	S.typhi	4	
	C.freundii	2	
	Others	7	
Gram +	Enterococcus	11	
	S. aureus	4	
	Group D Strept	6	
	Other gram positive	12	
Polymicrobial isolates			34 (6.7%)
	E.coli	22	
	Enterococcus	12	
	Group D Strep	10	
	K.pneumoniae	7	
	Enterobacter	5	
	Others	14	

is a contraindication or history of hypersensitivity. The practice of early cholecystectomy (within 72-96 hours) for acute calculous-cholecystitis is uniformly favoured among the practising surgeons. Percutaneous cholecystostomy tubes are inserted in patients who are either unfit for surgery and are unsuitable for conservative medical management or,

1. have a delayed presentation and are unsuitable for conservative medical management or fail conservative medical management.

As a routine practice, bile obtained from patients undergoing percutaneous cholecystostomy is sent for gram stain and culture. However, the practice of obtaining bile specimen during surgery varies among surgeons. Bile is usually only directly aspirated from gall bladder in cases of severe inflammation, suspicion of empyema and when the gall bladder is too distended to allow safe dissection.

The operating room and interventional radiology databases were reviewed for all cholecystectomies and cholecystostomies performed during the target period. The clinical, radiological and pathological (if available) data of these patients was then reviewed to determine which of them had acute cholecystitis. Of these patients, only those with bile samples sent for culture and sensitivity were included in the final analysis. Demographic and clinical variables were recorded from surgery initial assessment forms. Radiological findings were reviewed using the hospital's digital archives for patient investigations. Information on intraoperative findings was recorded from operative notes and final histopathology was reported by an experienced histopathologist according to a pretested pro forma.

Data was recorded and analysed using SPSS 21. Descriptive analysis was performed to calculate frequencies and percentages for categorical variables such as gender, co-morbidities, isolated organisms and the sensitivity pattern. Means with standard deviation were calculated for continuous variables such as age.

We identified a total of 509 patients who had had acute cholecystitis and in whom bile cultures had been obtained (Table-1).

Bile cultures were positive in 171(33.6%) patients. Of the bile cultures that were positive, single organisms were isolated in 137(80.1%) and polymicrobial infection was seen in 34 (19.9%) (Table-2).

Antibiotic susceptibility tests were performed according to the gram nature of cultured pathogens. Only 40% of organisms tested for ampicillin were found to be sensitive

to it. Moderate resistance against ciprofloxacin and cefuroxime with sensitivities of 75% and 69% respectively. Low resistance was found against imipenem, meropenem, piperacillin/tazobactam, vancomycin, clindamycin, gentamicin and amikacin with more than 80% of the organisms sensitive to each of these antibiotics. All gram positive organisms isolated in our study were found to be sensitive to vancomycin. Metronidazole was tested on the 2 anaerobes and it was sensitive in both of these organisms.

### Conclusion

Our study indicates that one-third of the patients presenting with acute cholecystitis had bacterobilia. Gram-negative organisms, especially *E. coli* were the most common. In general, there was low to medium resistance noted against the commonly-used antibiotics, while high resistance to ampicillin was noted. Bile microbiological analysis is a valuable diagnostic tool as it enables accurate selection of antibiotics for the management of acute cholecystitis. Based on our findings, coverage of anaerobes does not appear to be necessary in this population.

**Conflicts of Interest:** None of the authors report any conflicts of interest.

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