

BACTIBILIA AND THEIR SUSCEPTIBILITY PATTERNS IN PATIENTS UNDERGOING LAPROSCOPIC CHOLECYSTECTOMY

Zubair Ahmad Khan, Jamil Ahmad, Muhammad Khizar Hayat, Khalid Saifullah Baig

Rehman Medical College, Peshawar, Khyber Pakhtunkwa, Pakistan

ABSTRACT

Objective: To determine the prevalence and spectrum of bactibilia and their susceptibility patterns in patients undergoing laproscopic cholecystectomy.

Materials & Methods: This was a cross-sectional study conducted in laboratory of Rehman Medical Institute (RMI). Reports of laproscopic bile cultures were taken from RMI archives from January to December 2017 and were analyzed for the presence of different microorganisms and their sensitivity to different antibiotics. The results were put into Microsoft Excel 2013 and analyzed using pivot tables in Microsoft Excel 2013.

Results: Total of 100 bile samples were cultured during the study period. Out of this 51% of the total samples yielded no growth whereas 49% of the samples were positive for different microorganisms. The microorganism showing least resistance to antibiotics were *Enterococcus fecalis*, Enterococcus species and Streptococcus species while *Escherichia coli* and *Klebsiella pneumonia* were found to be most resistance.

Conclusion: Most of the bile sample cultures did not yielded growth of any microorganisms. The most prevalent microorganism was *Escherichia coli*. Likewise, *Escherichia coli* and *Klebsiella pneumonia* were found to be most resistant. Amoxicillin/clavulanic acid, ceftazidime, ciprofloxacin and gentamicin were found to be least effective whereas, amikacin, clindamycin, norfloxacin, rifampicin and vancomycin were found to be most effective antibiotics.

Key Words: Bile Culture, Laparoscopic Surgery, Antibiotics, Resistance, Rehman Medical Institute.

This article can be cited as: Khan ZA, Ahmad J, Hayat MK, Baig KS. Bactibilia and their susceptibility patterns in patients undergoing laproscopic cholecystectomy. Pak J Pathol. 2019; 30(1): 17-19.

INTRODUCTION

Bile is a complex aqueous secretion that originates from hepatocytes and is modified distally by absorptive and secretory transport systems in the bile duct epithelium [1]. In a healthy person, the biliary tree is normally sterile, but biliary obstruction is often associated with secondary bacterial colonization [2]. Biliary obstruction causes an increase in intrabiliary pressure which subsequently results in bacterial proliferation and dissemination. It may cause bacteremia as well. Bactibilia is the presence of bacteria bile. Bactibilia is one of the markers of acute cholecystitis.

Biliary tract infection is among common causes of bacteremia. Most frequently, Gram-negative Enterbacteriaceae isolates are the causative pathogens. Whereas, enteric Gram-positive organisms and anaerobes are uncommon agents. Viral and fungal agents are also very rare [3-5].

Emergence of antibiotic resistance in bacterial pathogens is recognized as a major public

health threat affecting humans worldwide. Antimicrobial resistance occurs when microorganisms such as bacteria, render the medications used to cure them ineffective [6]. Rapidly emerging resistant bacteria threaten the extraordinary health benefits that have been achieved with antibiotics [7]. Multi drug resistant (MDR) pathogens are resistant to multiple antibiotics, and they commonly originate in hospital settings due to many reasons like; clustering of highly vulnerable patients, extensive use of invasive procedures and frequent use of multiple antibiotics [8]. These MDR pathogens have already invalidated first-line and second-line antibiotic treatment options and health care professionals are now forced to use those antibiotics that are more toxic and more expensive [9].

It is assumed that laparoscopic surgery offers many advantages in comparison to conventional surgery for instance, smaller scar, less pain, less blood loss, quick recovery and less internal scarring [10,15]. Nonetheless, the main advantage of laproscopic surgery is low rates of postoperative infections. The aim of this study was to determine the prevalence of bactibilia in laparoscopic aspirates. In addition to that, their antibiotic resistance was also determined.

Correspondence: Dr. Zubair Ahmad Khan, Consultant General and Laproscopic Surgeon, Department of General Surgery, Rehman Medical Institute Peshawar, Pakistan.

Email: zubair.ahmad.khan71@gmail.com

Received: 27 Sep 2018; Revised: 13 Feb 2019; Accepted: 21 Mar 19

MATERIAL AND METHODS

This was a cross-sectional retrospective study conducted in laboratory of Rehman Medical Institute (RMI). Reports of Laparoscopic Bile Cultures were taken from RMI laboratory archives from January-December 2017 and were analyzed for the presence of different microorganisms and their sensitivity to different antibiotics. The results were put into Microsoft Excel 2013 and analyzed using pivot tables in Microsoft Excel 2013.

RESULTS

During the study period total 100 bile samples were received at RMI and were subjected to culture for the presence of different microorganisms.

51 samples out of the total were found to have no organism growth which corresponds to 51 % of the total samples. Out of the remaining 49 % of the samples, the most prevalent organism was *Escherichia coli* accounting for 55.1 %. The least common organism were *Citrobacter braakii*, *Enterococcus fecalis*, *Enterococcus species* and *Streptococcus species* accounting for 4.08 % each. The results are depicted in Table-1 below.

Table-1: Microorganisms retrieved from bile samples (n=100).

Microorganisms	Culture Results
No Microorganism	51
<i>Citrobacter braakii</i>	2
<i>Escherichia coli</i>	18
<i>Escherichia coli (extended spectrum beta lactamase)</i>	9
<i>Enterobacter species</i>	4
<i>Enterococcus fecalis</i>	2
<i>Enterococcus species</i>	2
<i>Klebsiella pneumonia</i>	10
<i>Streptococcus species</i>	2

All the pathogens were subjected to Kirby Bauer disc diffusion method to determine their resistance profile. For this purpose multiple antibiotics like amikacin, clindamycin, norfloxacin, rifampicin, vancomycin, cefoperazone/ salbactam, erythromycin, minocycline, piperacillin/tazobactam, tigecycline, levofloxacin, doxycycline, cotrimoxazole, chloramphenicol, cefotaxime, cefipime, aztreonam, ampicillin, amoxicillin/clavulanic acid, ceftazidime, ciprofloxacin and gentamicin representing different classes of antibiotics were used. *Escherichia coli* (Extended Spectrum Beta Lactamase) and *Klebsiella pneumonia* were found to be the most resistant microorganism being resistant to 12 different types of

antibiotics. Whereas, *Enterococcus fecalis* was found to be least resistant. It was resistant to only one antibiotic. Table-2 shows all the microorganisms resistant to different number of antibiotics.

Table-2: Number of antibiotics resistant to each microorganism.

Microorganisms	No. of Antibiotic Resistance
<i>Citrobacter braakii</i>	2
<i>Stenotrophomonas maltophilia</i>	4
<i>Escherichia coli</i>	8
<i>Escherichia coli (Extended Spectrum Beta Lactamase)</i>	12
<i>Enterobacter species</i>	10
<i>Enterococcus fecalis</i>	1
<i>Enterococcus species</i>	8
<i>Klebsiella pneumonia</i>	12
<i>Pseudomonas aeruginosa</i>	4
<i>Streptococcus species</i>	2

Table-3 describes the number of microorganisms resistant to different antibiotics.

Table-3: Antibiotics resistant to microorganism.

No of Microorganisms Resistant	Antibiotics
1 or Less	amikacin, clindamycin, norfloxacin, rifampicin, vancomycin
2 – 4	cefoperazone/ salbactam, erythromycin, minocycline, piperacillin/tazobactam, tigecycline, levofloxacin, doxycycline, cotrimoxazole, chloramphenicol, cefotaxime, cefipime, aztreonam, ampicillin
5 or more	amoxicillin/clavulanic acid, ceftazidime, ciprofloxacin, gentamicin

The antibiotics against which microbes have developed most resistance are amoxicillin/clavulanic acid, ceftazidime, ciprofloxacin and gentamicin. Whereas amikacin, clindamycin, norfloxacin, rifampicin and vancomycin were found to be most effective.

DISCUSSION

The emergence of MDR pathogens has perplexed scientific fraternity and have created the havoc of losing lifesaving drugs. The exact prevalence and their resistance pattern in different sample types is still not completely known. The present study was conducted on laparoscopic bile aspirates. It is usually considered that laparoscopy is

a safe procedure and there is very low chances of post-operative infections. In this study total 100 samples were taken into account and the bactibilia was found in 49 % samples.

Similar kind of study was also conducted on uncomplicated cases of gallstone diseases at Combined Military Hospital (CMH) Quetta. According to their results 76.4 % of their samples were negative [2]. In another study carried out at the Department of Surgery, POF Hospital, Wah Cantt, 68 % samples were found to be negative for the presence of microorganisms in bile [11]. A study carried out at Lady Reading Hospital, Peshawar for frequency of common bacteria and their antibiotic sensitivity in patients with symptomatic cholelithiasis also resulted in 41.27% of the patients cultures returning negative [12]. Likewise, another study published in World Journal of Gastroenterology in 2012 states that 49.5% of their samples were negative [13].

The most common microorganism detected in bile cultures in our study was *Escherichia coli* accounting for 55.1% of the total cases of microorganism detection. In a study conducted by Asian Academic Medical Center, 36% of their positive cultures also had detected *Escherichia coli* [14].

Amoxicillin/clavulanic acid, ceftazidime, ciprofloxacin, gentamicin showed resistance to five (5) or more microorganisms as per our study. Our study however contradicts the findings of another study conducted at Lady Reading Hospital, Peshawar [12]. According to their findings four bacteria showed resistance to amoxicillin in more than 50% of the cases while ciprofloxacin was found to be sensitive to the four bacteria. Gentamicin, ceftazidime and ciprofloxacin were found to be highly resistant in the study published in World Journal of Gastroenterology in 2012 [13].

Escherichia coli and *Klebsiella pneumonia* was found to be resistant to 12 different antibiotics in our study. In a study conducted in Lady Reading Hospital, Peshawar, both these bacteria were found to be resistant to the following antibiotics; cephradine, cefuroxime, ceftriaxone, ciprofloxacin and amoxicillin [12]. In the present study all these antibiotics were used along with many other antibiotics mentioned in Table-3.

CONCLUSION

Most of the bile samples cultured showed no microorganisms. However, 49 % samples were positive for one or different types of pathogens. The most frequent pathogens *Escherichia coli*. It was also observed that 33 % of *Escherichia coli* was Extended

Spectrum Beta Lactamase (ESBL) positive. All these ESBL positive *E. coli* and *Klebsiella pneumonia* were the most resistant pathogens. According to the findings of this research, amikacin, clindamycin, norfloxacin, rifampicin and vancomycin were most effective antibiotics.

AUTHORS CONTRIBUTION

Zubair Ahmad Khan: Principal author, concept, data analysis, paper writing and proof reading.

Jamil Ahmad: Supervision of the project and approval.

Muhammad Khizar Hayat: Literature Review and paper writing.

Khalid Saifullah Baig: Data collection and statistical analysis.

REFERENCES

1. Boyer JL. Bile Formation and Secretion. *Comprehensive Physiology*. 2013; 3(3): 1035-78.
2. Csendes A, Fernandez M, Uribe P. Bacteriology of the gallbladder bile in normal subjects. *Am J Surg*. 1975; 129: 629-31.
3. Ahmad M, Akhtar MR, Akhtar MR. Microbiology of bile in symptomatic uncomplicated gallstone disease. *Pak Armed Forces Med J*. 2015; 65(4): 491-3.
4. *Drugs and Therapeutics Bulletin* 2005; 43: 62-4.
5. Greenberger NJ, Isselbacher KJ. Diseases of the gallbladder and bile ducts. In: Fauci S.A., Braunwald E., Isselbacher K.J., et al.(eds). *Harrison's Principles of Internal Medicine*. Mc GrawHill, New York, 1998.
6. What is antimicrobial resistance? World Health Organization [<http://www.who.int/features/qa/75/en/>]. Accessed November 20, 2017.
7. Bartlett JG, Gilbert DN, Spellberg B. Seven ways to preserve the miracle of antibiotics. *Clin Infect Dis*. 2013; 56(10): 1445-50.
8. Golkar Z, Bagazra O, Pace DG. Bacteriophage therapy: a potential solution for the antibiotic resistance crisis. *J Infect Dev Ctries*. 2014; 8(2): 129-36.
9. Lushniak BD. Antibiotic resistance: a public health crisis. *Public Health Rep*. 2014; 129(4): 314-6.
10. Agha R, Muir G. Does laparoscopic surgery spell the end of the open surgeon? *J Royal Society of Med*. 2003; 96(11): 544-6.
11. Malik ZI, Malik MAM, Salahuddin O, Azhar M, Dilawar O. Micro flora of Bile aspirates in symptomatic cholelithiasis. *J of Rawalpindi Med Coll*. 2009; 13(1): 38-40.
12. Manan F, Khan MA, Faraz A, Khan M. Frequency of common bacteria and their antibiotic sensitivity in patients with symptomatic cholelithiasis. *J Postgraduate Med Institute*. 2014; 28(2): 177-83.
13. Kaya M, Bestas R, Bacala F, Bacaksiz F, Arslan EG, Kaplan MA. Microbial profile and antibiotic sensitivity pattern in bile cultures from endoscopic, retrograde cholangiography patients. *World J Gastroentrol*. 2012; 18(27): 3585-89.
14. Vincent BDG, Salvador, Maria CH, Lozada, Rafael JC. Microbiology and antibiotic susceptibility of organisms in bile cultures from patients with and without cholangitis at an Asian academic medical center. *Surg Infections*. 201; 12(2): 105-111.
15. Bruhat MA, Chapron C, Mage G, Pouly JL, Canis M, Wattiez A, et al. The benefits and risks of Laparoscopic surgery. *Rev Fr Gynecol Obstet*. 1993; 88(2): 84-8.