The relation between bactobilia and postoperative septic complications in uncomplicated cholelithiasis patients

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Objectives
The objective this study is to find the relation between postoperative septic complications and cultural bacteria in bile of uncomplicated gallstones patients.
Background
Gallbladder (GB) and biliary tract disease is constant because as they are one of the most common causes of admission to hospital.
Bile is usually sterile in healthy individuals, however, in the presence of gallstones in the GB or biliary ducts, it could be colonized with bacteria (bactobilia) in 20–46% of cases.
Bactobilia has been shown to be a risk factor predisposing to postoperative septic complications, which are one of the most important concerns of surgeons. Wound infection after elective cholecystectomy uncomplicated symptomatic gallstones ranges from 2.3–20%.[(2)]
Patients and methods
Forty cases of chronic calcular cholecystitis at Menoufia University Hospital were selected on clinical diagnosis, ultrasonographic and laboratory findings underwent cholecystectomy. They were divided into two groups, each including 20 patients subjected to sampling of biliary fluid before cholecystectomy. They were sent to be tested for the presence of bacteria with postoperative follow-up for infective complications.
Results
There was no statistical significant difference between patients of both groups as regarding age or sex, operative data or complications, postoperative hospital stay, postoperative complications during early follow-up, while results revealed that mixed organism was the most finding in bactobilia group.
Conclusion
From the study we concluded that the infective complications occurs in the presence of bactobilia but also occurred even in equal percentage in absence of bactobilia.

Keywords:
bactobilia, gall stone disease, the relation between bactobilia and postoperative septic complications in uncomplicated cholelithiasis patients

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Introduction

The interest in gallbladder (GB) and biliary tract disease is constant because they are one of the most common causes of admission to hospital in our environment. The prevalence of gallstone disease is very high, it constitutes 20.5 million people in USA i.e., 6.3 million men and 14.2 million women. Twenty % of people over the age of 65 have gallstones, and one million new cases are diagnosed every year [1].

In healthy people, bile is typically sterile, nevertheless, if gallstones are present in the GB or biliary ducts, bile may become bacterially colonized (bactobilia). Bacteria have been found in 20–46% of symptomatic gallstone disease patients who undergo cholecystectomy [2–4].

It is well known that bactobilia is a common finding in individuals at high risk or with complicated gallstone, including obstruction of the biliary tract, choledocolithiasis, those aged greater than 70 years, acute calcular cholecystitis, a functional GB, and biliary prostheses. However, there is little data regarding the prevalence of bactobilia in patients who have undergone cholecystectomy due to uncomplicated gallstones [1,5].

Bacteria has been demonstrated to be a risk factor for postoperative septic problems, one of the biggest

worries for surgeons, particularly in laparoscopic surgery. Between 2.3–20% of patients with simple symptomatic gallstones acquire wound infection following elective cholecystectomy [2].

The aim of this study was to find the relation between postoperative septic complications and cultural bacteria in bile of uncomplicated gallstone patients.

Patients and methods

This was a prospective comparative study conducted on 40 patients whom were presented to the Department of Surgery and were suffered from chronic calcular cholecystitis that were subjected to cholecystectomy. The study was conducted at Menoufyia University during the period from Apr 2018 to Apr 2019.

Inclusion criteria for this study included patients with chronic calcular cholecystitis, normal common bile duct (CBD) diameter, no impacted stones or gravels, normal liver functions including liver enzymes, total and direct bilirubin in addition to alkaline phosphatase enzymes, and normal coagulation profile. Patients with obstructive jaundice, high total and direct bilirubin, alkaline phosphatase enzyme, age greater than 65 years, blood coagulopathies, elevated WBCs count, and immunosuppressive status were excluded from this investigation.

Patients were divided into two groups: group A included 20 patients of chronic calcular cholecystitis were managed by laparoscopic cholecyctestomy followed by follow-up for complications due to the presence of bacteria in the bile aspirate and group B included 20 patients of chronic calcular cholecystitis were managed by laparoscopic cholecyctestomy followed by follow-up for complications and the culture of the bile aspirate was negative for organisms.

After approval of local ethics committee, all patients included in the study or their relatives were informed well about the procedure and had an informed written consent before carrying the procedure.

All patients in the study were subjected to A. Clinical assessment in the form of complete history taking, clinical examination to confirm the pathology of patients. B. Laboratory investigations in the form of complete blood picture, coagulation profile, liver function tests, kidney function tests, and blood chemistry: include blood glucose level, C-reactive protein (CRP), and Gamma-Glutamyle transferase (GGT). C. Imaging studies by abdominal US. D. Operative assessment of the two groups included firstly, 3–5 ml bile was aspirated to sent for culture and sensitivity for organism if present, operative time, operative complications.

Follow-up of patients in short term for a period of one month postoperatively for complications included postoperatively such as septic complications 'superficial skin infection, intra-abdominal sepsis', BD lesions, bleeding, pneumonia, re-admissions.

Version 20.0 of the IBM SPSS software suite was used to analyse the data. Tables were used to collect the data, which were then analysed using the Chi square (χ^2) and a P value of less than 0.05 was regarded as significant.

Results

Our results revealed that:

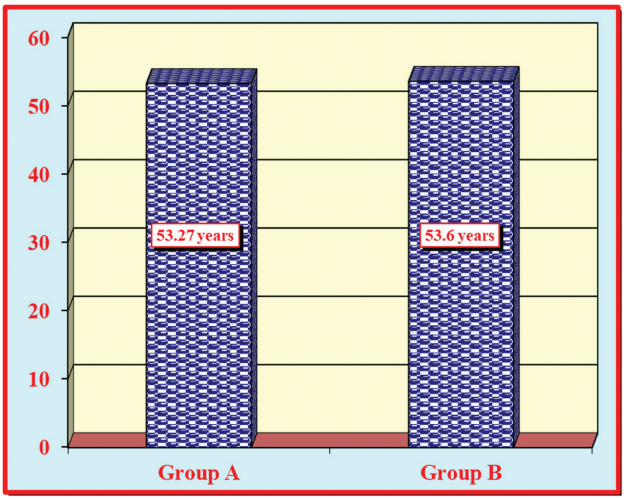
Age

The age of patients in group A ranged between 38 and 68 years with a mean age of 53.27±8.9 years while that of the group B ranged between 37 and 66 years with a mean age of 53.6±8.97 years and the statistical analysis revealed that there was no statistical significant difference between patients of both groups as regarding age ($P=0.999$), (Table 1, Fig. 1).

Table 1 Demographic data of the studied groups

Variable	Group A	Group B	*P*
Age	53.27±8.9	53.6±8.97	0.999 (NS)
Sex			
Male	4 (20%)	6 (30%)	0.861 (NS)
Female	16 (80%)	14 (70%)	
P	0.01 (S)	0.01 (S)	

Figure 1



Age distribution in both studied groups.

Sex

Four cases out of cases of the group A (4/20, 20%) were males and 16 were females (16/20, 80%) while in group B six patients (6/20, 30%) were males and 14 of them (14/20, 70%) were females and the statistical analysis revealed that there was no statistical significant difference between patients of both groups regarding sex while in each group females were more significantly affected by gall stone disease as regarding sex ($\chi^2=2.3$; $P=0.861$; 0.01, respectively), (Table 1, Fig. 2).

Operative data

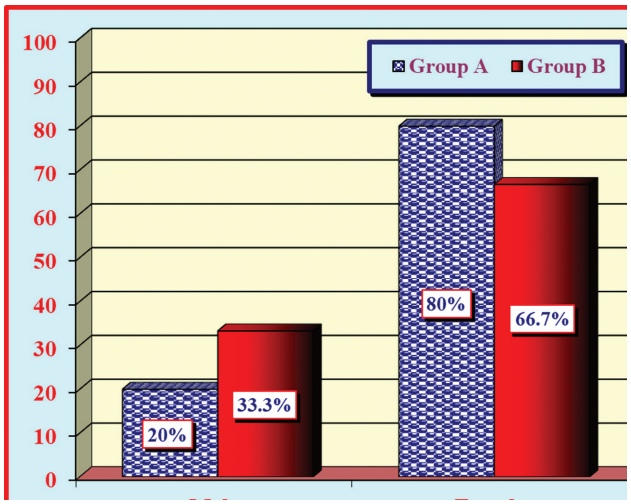
Bleeding 'blood loss'

The amount of blood lost in group A ranged between 5 and 20 ml with a mean value of 8.5±2.1 ml while that of group B ranged between 10 and 25 ml with a mean value of 10.5±2.5 ml and the statistical analysis revealed that there was no significant difference between both groups ($P=0.765$), (Table 2, Fig. 3).

Intraoperative complications

Two (10%) cases in group A experienced intraoperative complicated in the form of bleeding (1/20, 5%) and GB bed injury in only 1 case (1/20, 5%) and the remaining cases of this group passed without complications while in group B, 2 cases (2/20, 10%) experience complications one of them complicated by bleeding (1/20, 5%), and the other one experience bile leak due to injury to the GB bed (1/20, 5%) and the remaining case did not experience any complication intraoperatively. Also, the statistical analysis revealed that there was no statistical significant difference between both groups regarding rate of intraoperative complications ($\chi^2=2.55$, $P=1.0$), (Table 2, Fig. 4).

Figure 2

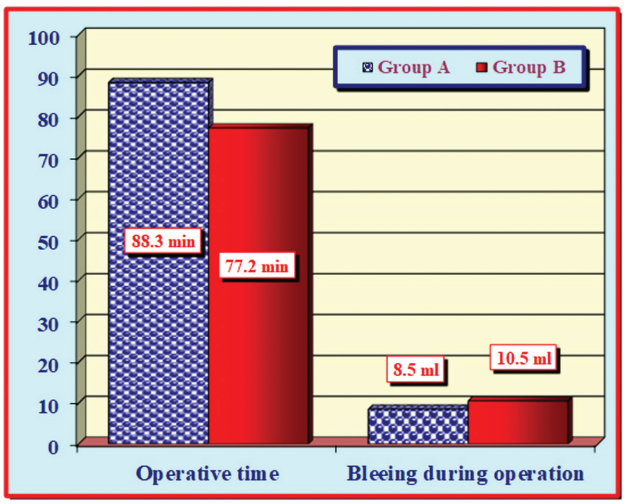


Sex distribution in both studied groups.

Table 2 Operative data of the studied groups

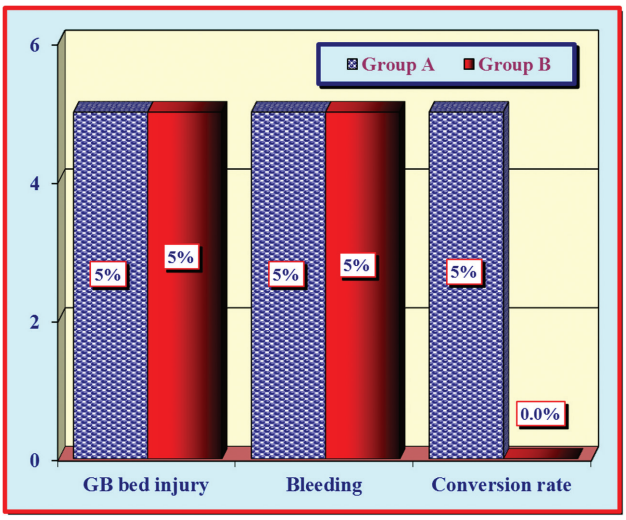
Variable	Group A	Group B	*P*
Intraoperative bleeding	8.5±2.1	10.5±2.5	0.765 (NS)
Intraoperative complications	2/20 (10%)	2/20 (10%)	1.0 (NS)
Rate of conversion to OC	1/20 (5%)	0/20 (0.0%)	0.271 (NS)

Figure 3



Bleeding and the operative time in our groups.

Figure 4



Intraoperative complications in our groups.

Table 3 The results of bile culture of group of bactobilia

Variable	Group A
Mixed	14 (70%)
Streptococci	4 (20%)
E.coli	2 (10%)
P	0.021

Conversion to open cholecystectomy (OC)

In group A, only 1 case converted to open cholecystectomy (OC) (1/20, 5%) due to difficult dissection as a results of excessive adhesions while no case in group B (0/20, 0.0%) converted from laparoscopic cholecystectomy to OC. The statistical analysis revealed that there was no statistical significant difference between both groups as regards the rate of conversion to OC ($\chi^2=3.12$, $P=0.271$), (Table 2, Fig. 4).

Bile culture

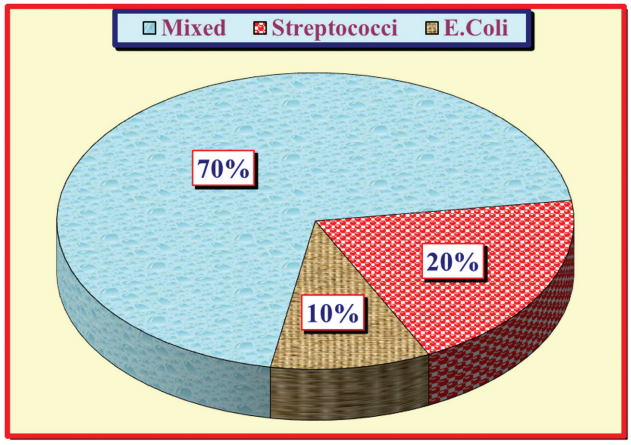
Most of the cultures of group A were mixed organism (14/20, 70%) while 2 cases (2/20, 10%) were *E.coli* and 4 cases (4/20, 20%) were streptococci. In group B all cases of bile culture were negative. The statistical analysis revealed that the most common organism in bactobilia was mixed infection ($\chi^2=6.44$, $P=0.021$), (Table 3, Fig. 5).

Follow-up data

Postoperative hospital stay

Postoperative hospital stay in patients of group A ranged between 2 and 5 days with a mean value of 3.33±1.1 days while in group B the hospital stay ranged between 2 and 4 days with a mean value of 2.8±0.9 days and the statistical analysis revealed that there was no statistical significant differences between both groups ($P=0.625$), (Table 4).

Figure 5



Intraoperative complications in our groups.

Table 4 PostOperative follow-up data of the studied groups

Variable	Group A	Group B	*P*
Postoperative hospital stay	3.33±1.1	2.8±0.9	0.625 (NS)
Postoperative complications	5/20 (25%)	6/20 (30%)	0.315 (NS)

Follow-up

Early follow-up of cases of group A showed that 5 cases (5/20, 25%) had complications which was simple and in the form of superficial wound infection (2/20, 10%), seroma collection in 1 case (1/20, 5%) and deep wound infection in 2 cases (2/20, 10%). While in cases of group B; 6 cases (6/20, 30%) had complications 5 of them were superficial wound infection at the port site (5/20, 25%) and only 1 case had deep wound infection on top of seroma collection (1/20, 5%). The statistical analysis revealed that there was no difference between groups regarding postoperative complications ($\chi^2=3.12$, $P=0.315$), (Table 4).

In group A 'bactobilia group' 4 cases were complicated by infection; two of superficial wound infection and another two by deep wound infection. Swaps were taken from all cases and a culture and sensitivity test was done for all. One of them (1/4, 25%) the organism was staph. Epidermidis; and the other 3 cases were staph. Aureus (3/4, 75%) and comparing with the organisms that found in the bile denoting that a nonsignificant correlation between the organisms commonly found in the bile and that present in the culture and sensitivity test ($P=0.222$).

Discussion

Cholecystectomy is one of the most common abdominal surgical procedures, and often performed due to acute cholecystitis and other complications of gallstones. Sufficient data concerning the bacteriology of bile in patients undergoing cholecystectomy for acute cholecystitis do not exist in the literature. Previous studies reported that the rate of bile culture positivity ranged from 9 to 42%. The microorganisms were determined in 23.3% of the patients who underwent cholecystectomy, and our results were thought to be similar to previous studies [6–8].

In healthy people, bile is typically sterile; nevertheless, if gallstones are present in the GB or biliary ducts, bile may become bacterially colonised (bactobilia). Bacteria have been found in 20 to 46% of symptomatic gallstone disease patients who have a cholecystectomy [2–4].

In some studies, bactobilia has been shown to be a risk factor predisposing to postoperative infectious complications, which are one of the most important concerns of surgeons, especially in laparoscopic surgery. The rate of postoperative wound infection after elective cholecystectomy in uncomplicated symptomatic gallstone ranges from 2.3 to 20% [2].

Human bile though sterile normally, can become infected in biliary tract obstruction due to entry of microorganisms through various routes like papilla of Vater or hematogenous leading to bactobilia. In a study from Karachi, out of 100 patients undergoing cholecystectomy 36 (36%) patients were having bactobilia.

In a study from United Kingdom, 20 (15.6%) out of 128 patients were found to have culture detected microorganisms. The pathogenesis of bile infection is incompletely understood, with the prevailing theories not fully explaining all the observations. There is relatively sparse data, both local and international on the prevalence of the infection in patients undergoing cholecystectomy. The conservative and prophylactic treatment therefore is based on best guess basis [9].

Planning the antibiotic prevention and treatment of postoperative infections may benefit from the detection of bactobilia. It is generally only recommended for individuals with certain underlying conditions that potentially raise the risk of such infections to obtain bile cultures after biliary surgery. Pyrexia, prior biliary instrumentation, prior biliary sepsis, bilioenteric anastomosis, immune suppression status, a palpable GB, an elevated white blood cell (WBC) count, an elevated blood alkaline phosphatase level, and advanced age are some of these risk factors. But there are still conflicting findings regarding the use of bile cultures during biliary surgery [2].

This was a prospective comparison research done on 40 patients who underwent cholecystectomy after being diagnosed with chronic calcular cholecystitis and brought to the Department of Surgery. The research was carried out at Menoufyia University from April 2018 to April 2019.

Although the age range in our study was typically between the fifth and sixth decades of life, there was no difference in age between the study groups.

Dyrhovden and colleagues, found in there study that the age of patients was in the seventh decade of life which disagree with our results [10].

In their study, Ghahramani and colleagues discovered that cases who tested positive for bactobilia were in their sixth decade of life, which was consistent with our findings. However, there was a marked rise in the age of cases compared with controls who tested negative for bactobilia, which is in conflict with our findings [2].

In contrast to our findings, Ramos and colleagues observed that the age of cases and controls was in the fourth decade of life [1].

Sharma and colleagues, found in their study that the most commonly age affected was in the fourth decade of life which disagree with our results [3].

In each group females were commonly affected than males but there was no statistical difference between both groups regarding sex.

Dyrhovden and colleagues, found in there study that males were more significantly affected than females which disagree with our results [10].

Bajaj and colleagues, found in their study that females were more affected significantly than males and this was in agreement with our results [5].

Sharma and colleagues, found in their study that females were significantly affected than males which was agree with our results [3].

Ghahramani and colleagues, found in their study that the incidence was common in females than males without significant difference between both groups of the study which was in agree with our results [2].

Ramos and colleagues, found in their study that the incidence was common in females than males without significant difference between both groups of the study which was in agree with our results [1].

In our study, during operation there was no statistical significance between the two groups regarding blood loss intraoperatively, operative time and complications during operations and rate of conversion from laparoscopic cholecystectomy to conventional cholecystectomy.

In this study, bile culture during operation revealed in bactobilia group, the common organisms were mixed in most cases (70%) followed by streptococci and the least was *E. coli* constituting (10%).

Engin and colleagues, found in their study that the most frequently isolated bacteria were Enterococcus spp. (22.8%), Staphylococcus spp. (19%), *E. coli* (18.1%), Klebsiella spp. (9.5%), Streptococci spp. (7.6%), and Enterobacter spp. (6.6%) which disagree with our results [8].

Dyrhovden and colleagues, found in there study that the most common isolated organism was streptococci

(14%), followed by Klebsiella and enterococcus (10% for each) which disagree with our results [10].

Ramos and colleagues, found in their study that the most common organism isolated from bile in cases was enterobacteria (43%) followed by polymicrobial infection (32.7%), then staphylococci (10.6%) which disagree with our results [1].

Bajaj and colleagues, found in their study that that the most common organism isolated from bile was *E. coli* (47.94%), followed by Klebsiella (17.53%), then Pseudomonas (16.49%) which disagree with what we found in our results [5].

Sharma and colleagues, found in their study that that the most common organism isolated from bile was *E. coli* (37.03%), followed by Pseudomonas (29.62%), then Klebsiella (14.81%) which disagree with what we found in our results [3].

Kumar and colleagues, found in their study that that the most common organism isolated from bile was *E. coli* (51.16%), followed by Klebsiella (20.93%), then Pseudomonas (9.3%) which disagree with what we found in our results [11].

In our study, there was no statistical difference between both groups of the study regarding post-operative hospital stay and the postoperative complications.

Ghahramani and colleagues, found in their study that there was no significant difference between both groups regarding postoperative complications which was in agree with our results. In addition they reported in the study that Samy and MacBain, found in their study that there was increase incidence of postoperative complications in cases of bactobilia than control cases and this disagree with our results [2,12].

Conclusion

From our study we concluded that even that the infective complications occurs in presence of bactobilia but they also occurred even in equal percentage in absence of bacobilia.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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