



## Incidence of Bactibilia in Uncomplicated Cholelithiasis and its Association with Post Operative Surgical Site Infections

### General Surgery

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### ABSTRACT

**Introduction:** Gallstone disease is a common cause of surgical intervention, with an estimated prevalence of 6.2% in Indian population. Cholecystectomy is associated with multiple complications with SSI being one of the commonest. We performed this study with the aim of establishing the causative association between bactibilia and SSI.

**Aims And Objectives:** Our aim was to determine the incidence of bactibilia and evaluate its role in post-operative surgical site infections. Further our objectives were to know the bacteriology of bile, antibiotic sensitivity profile of organisms isolated in bile, and comparison of incidence of bactibilia in normal bile and in patients with cholelithiasis

**Materials and methods:** This prospective study was performed by obtaining samples of bile from 100 patients who underwent cholecystectomy. In the control group we obtained bile samples from 50 patients who underwent laparotomy for causes other than diseases of the biliary tree and peritonitis. The samples obtained were cultured for anaerobic organisms and an antibiotic sensitivity profile was obtained.

**Results:** The most common organism cultured in bile was *Escherichia coli* in 10 cases (66.67%) followed by *Pseudomonas aeruginosa* in 3 patients (20%) and one patient each with *Klebsiella pneumoniae* and polymicrobial flora. In the control group bile was sterile in 96% of the cases with bactibilia present in only 2(4%) cases. The *E. Coli* cultured was sensitive to amikacin in 100% of the cases All the cultures of *Pseudomonas aeruginosa* were sensitive for amikacin and colistin The *Klebsiella pneumoniae* cultured from the bile in the single case was sensitive only to imipenem and gentamycin. Only three patients in the study group developed surgical site infections.. The organisms cultured were *E. Coli*, *Staphylococcus aureus* and Methicillin resistant *Staphylococcus aureus* (MRSA). No correlation was observed between bactibilia and incidence of surgical site infections.

### KEYWORDS:

Bactibilia, Surgical site infections, Bile culture

#### Introduction:

Gallstone disease or cholelithiasis is one of the most common diseases which need surgical intervention. The prevalence of cholelithiasis among the Indian population has been estimated at around 6.20%. The patient suffering from cholelithiasis typically presents with symptoms of pain abdomen (typically in the right upper quadrant), nausea, vomiting and dyspepsia. The spectrum of gallstone disease ranges from gall bladder sludge, asymptomatic cholelithiasis, uncomplicated cholelithiasis to complicated gallstone disease. Laparoscopic cholecystectomy is the management of choice replacing open cholecystectomy. The complications of cholecystectomy include cystic stump leak, common bile duct injury, common bile duct stricture, wound infection among others. However, the most common infective complication of cholecystectomy are surgical site infections (SSIs)<sup>3</sup>. It is therefore important to determine the incidence of bactibilia in cases of uncomplicated cholelithiasis whether bactibilia is a causative factor in surgical site infections occurring post cholecystectomy.

#### Aims and Objectives:

In the present study we aimed to determine the incidence of bactibilia (infection of bile) in cases of uncomplicated cholelithiasis and evaluate its role in post-operative surgical site infections. The objectives of the study were to know the incidence of bactibilia or infected bile in gallstone disease, to know the bacteriology of bile and antibiotic sensitivity profile of organisms isolated in bile, to study and compare the incidence of bactibilia in normal bile and in patients

with cholelithiasis and to evaluate the role of bactibilia in post-operative surgical site infections.

#### Materials and methods:

We conducted a prospective case control study in our institute from July 2014 to October 2016 after obtaining approval from the Institutional Ethical Committee. All the patients enrolled in the study were duly informed about the risks and benefits and a written consent was obtained. We obtained samples of bile from 100 patients who underwent cholecystectomy. In the control group we obtained bile samples from 50 patients who underwent laparotomy for causes other than diseases of the biliary tree and peritonitis. All the surgeries were performed by the same surgical team under aseptic precautions in the same operation theatre complex. The samples obtained were cultured for aerobic organisms and an antibiotic sensitivity profile was obtained. The data was collected in proformas, assimilated and statistical analysis was done using the SPSS 20.0 software.

#### Results:

The study included 100 cases in the study group and 50 cases in the control group. The study group consisted of 80 females and 20 males while the control group comprises 23 male and 27 female patients. The mean age of patients in the study group was 42.96 with a standard deviation of 9.48 years. The mean age of the control group was 39.54±16.35 years. 98% of the patients with uncomplicated cholelithiasis presented to the OPD with pain abdomen as the presenting complaint. 55% of the patients complained of nausea, 21%

of vomiting and 44% presented with dyspepsia. All four presenting complaints were present in only 8% of the cases. Ultrasonography of the abdomen revealed multiple stones in 84% of the patients and a single stone in 16% of the cases. The incidence of bactibilia in the study group was 15% while that in the control group was 4%. The most common organism cultured in bile was *Escherichia coli* in 10 cases (66.67%) followed by *Pseudomonas aeruginosa* in 3 patients (20%) and one patient each with *Klebsiella pneumoniae* and polymicrobial flora. In the control group bile was sterile in 96% of the cases with bactibilia present in only 2(4%) cases. The *E. coli* cultured was sensitive to amikacin in 100% of the cases followed by tigecycline(90%), Imipenem(80%), Colistin(70%), Levofloxacin(50%), Ertepenem(30%), Piperacillin + Tazobactam (20%), Doxycycline(20%) and Cotrimoxazole, Streptomycin and Gentamycin(10% each). All the cultures of *Pseudomonas aeruginosa* were sensitive for amikacin and colistin followed by gentamycin, imipenem, meropenem, and piperacillin + tazobactam. The *Klebsiella pneumoniae* cultured from the bile in the single case was sensitive only to imipenem and gentamycin. Only three patients in the study group developed surgical site infections. All the infections were detected on the third post-operative day and resolved by the prescription of antibiotic which was found sensitive on culture and sensitivity of the pus discharged from the surgical wound. The organisms cultured were *E. coli*, *Staphylococcus aureus* and Methicillin resistant *Staphylococcus aureus* (MRSA). No correlation was observed between bactibilia and incidence of surgical site infections.

#### Discussion:

In our study we enrolled 100 patients that underwent either laparoscopic or open cholecystectomy in our institute for bile culture and further analysis. In the control group we aspirated bile from the gall bladder of 50 patients who underwent a laparotomy for causes other than diseases of the biliary tree. G. Robert Mason et al performed a similar study in 1968 in which he cultured bile from 53 cases of uncomplicated cholelithiasis and 8 patients with a normal gall bladder<sup>4</sup>. A. Csendes et al cultured bile aspirated from the gall bladder of 30 patients with uncomplicated cholelithiasis and 20 patients with normal gall bladder in 1975. R. Gold-Deutch et al (1996) obtained bile cultures from 247 patients undergoing laparoscopic cholecystectomy. G. J. Morris-Stiff et al in 2007 performed a culture study of the bile aspirated from 128 patients undergoing cholecystectomy<sup>7</sup>. I. Sattar et al collected samples of bile from culture in 100 consecutive patients undergoing laparoscopic cholecystectomy for uncomplicated cholelithiasis in 2007. The sample size in our study was similar to the previous studies conducted.

We found the incidence of bactibilia to be 15% in uncomplicated cholelithiasis. Mason et al, Van Leeuwen et al, Morris-Stiff et al, den Hoed et al and Gold-Deutch et al also found a similar incidence of bactibilia with 13.9%, 16.4%, 15.6%, 13.3% and 12.8% respectively (Table 1). Other studies reported a higher incidence of bactibilia.

**Table 1: Incidence of Bactibilia in Uncomplicated Cholelithiasis in Various Studies.**

Study	Year	Incidence of bactibilia
Present study	2016	15%
Flemma et al <sup>58</sup>	1967	50%
Mason et al <sup>59</sup>	1968	13.9%
Csendes et al <sup>60</sup>	1975	30%
Van Leeuwen et al <sup>61</sup>	1985	16.4%
Ohdan et al <sup>62</sup>	1993	23.4%
Gold-Deutch et al <sup>63</sup>	1996	12.8%
den Hoed et al <sup>64</sup>	1998	13.3%
Morris-Stiff et al <sup>66</sup>	2007	15.6%
Sattar et al <sup>67</sup>	2007	36%

On comparison with the control group which had 50 patients and only two patients had a positive bile culture. This represents an incidence of bactibilia to be 4% in cases without biliary disease i.e. the

control subjects. We found the presence of bactibilia in uncomplicated cholelithiasis to be statistically significant ( $p=0.045$ ). Csendes et al reported cultures in control subjects to be 100% sterile. None of the other studies stating the incidence of bactibilia in uncomplicated cholelithiasis compared the presence of bactibilia in cases of uncomplicated cholelithiasis with that in patients without gallstone disease.

Similarly *E. coli* was cultured as the most common organism from bile in studies by Mason et al (27.7%), Ohdan et al (21.8%), den Hoed et al (65.8%), van Leeuwen et al (36%) and Sattar et al (47.2%). However, statistical analysis showed the presence of *E. coli* in as the most common organism cultured as statistically non-significant.

In our study the incidence of SSIs was only 3%. However, the bacterium cultured in bile was isolated in only one case of SSI. This led us to the conclusion that the incidence of SSIs is not associated with a positive bile culture.

The incidence of SSIs reported by Sattar et al was similar to our study at 4%. Ohdan et al and Morris-Stiff et al reported a lower incidence of SSIs at 0.006% and 0.039% respectively. Van Leeuwen et al reported a higher incidence of SSIs at 9% (Table 2). The incidence of SSIs after cholecystectomy is our study extremely low. Hence, intravenous administration of 1g ceftriaxone at the time of incision is adequate prophylaxis for the prevention of SSIs.

**Table 2: Incidence of SSIs in Various Studies.**

Study	Incidence of SSI(%)	SSI associated with bactibilia(%)
Present study	3.00	1.00
Ohdan et al <sup>62</sup>	0.006	0.006
van Leeuwen et al <sup>61</sup>	9.00	-
Morris-Stiff et al <sup>66</sup>	0.023	0.008
Sattar et al <sup>67</sup>	4.00	2.00

Similar to our study, all the above authors except Ohdan et al concluded that the incidence of SSIs was not associated with bactibilia.

The most common organism cultured in SSIs in our study was *Staph. aureus*. Similarly, Morris-Stiff<sup>66</sup> et al found *Staph. aureus* as the most common organism cultured from SSIs.

In our study maximum bacteria(86.67%) cultured from bile were sensitive to Amikacin followed by Colistin, Imipenem, Tigecyclin, Levofloxacin, Gentamycin, Ertepenem, Piperacillin + Tazobactam, Doxycycline, Cotrimoxazole, Streptomycin and Meropenem in decreasing order. The antibiotic sensitivity profile of organism isolated from bile was analysed by G. Petakovic et al<sup>9</sup> in 2001 and they suggested that the organisms isolated from bile were sensitive to Amikacin, Cefalexin, Ceftriaxone, Ofloxacin and Perfloxacin. The sensitivity to biliary flora to Amikacin is a similar feature of our study and that of Petakovic et al.

#### Conclusions:

Bactibilia is present in 15% of the patients undergoing either laparoscopic or open cholecystectomy for the management of uncomplicated cholelithiasis. The most common organism cultured from bile is *Escherichia coli* with an incidence of 66.67% among the cases with bactibilia. The patients with uncomplicated cholelithiasis have a statistically significant higher incidence of bactibilia (15%) as opposed to patients without biliary disease (4%). The incidence of surgical site infections after cholecystectomy whether laparoscopic or open in uncomplicated cholelithiasis is very low (3%) with *Staph. aureus* being the most common organism involved. The occurrence of surgical site infections has no correlation with the presence of bactibilia. The routine antibiotic prophylaxis used in our institution (Ceftriaxone 1g intravenously) is sufficient for the prevention of surgical site infections in cholecystectomy.

**References:**

1. Schirmer BD, Winters KL, Edlich R. Cholelithiasis and Cholecystitis. 2005;15(3):329-38.
2. Unisa S, Jagannath P, Dhir V, Khandelwal C, Sarangi L, Roy TK. Population-based study to estimate prevalence and determine risk factors of gallbladder diseases in the rural Gangetic basin of North India. *HPB : The Official Journal of the International Hepato Pancreato Biliary Association*. 2011;13(2):117-25.
3. Deziel DJ. Complications of cholecystectomy. Incidence, clinical manifestations, and diagnosis. *The Surgical clinics of North America*. 1994;74(4):809-23.
4. Mason GR. Bacteriology and antibiotic selection in biliary tract surgery. *Archives of Surgery*. 1968;97(4):533-7.
5. Csendes A, Fernandez M, Uribe P. Bacteriology of the gallbladder bile in normal subjects. *The American journal of surgery*. 1975;129(6):629-31.
6. Gold-Deutch R, Mashiach R, Boldur I, Ferszt M, Negri M, Halperin Z, et al. How does infected bile affect the postoperative course of patients undergoing laparoscopic cholecystectomy? *The American journal of surgery*. 1996;172(3):272-4.
7. Morris-Stiff G, O'DONOHUE P, Ogunbiyi S, Sheridan W. Microbiological assessment of bile during cholecystectomy: is all bile infected? *Hpb*. 2007;9(3):225-8.
8. Sattar I, Aziz A, Rasul S, Mehmood Z, Khan A. Frequency of infection in cholelithiasis. *J Coll Physicians Surg Pak*. 2007;17(1):48-50.
9. Petaković G, Korica M, Gavrilović S. [Bacteriologic examination of gallbladder contents]. *Medicinski preglod*. 2001;55(5-6):225-8.