Effect of Antibiotics Used During Laparoscopic Cholecystectomy with Intraoperative Cholangiogram on Post-operative Complications

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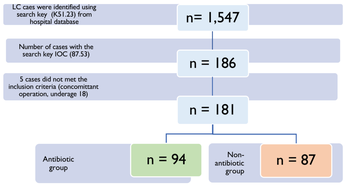


Introduction

Many randomized controlled trials have concluded that prophylactic antibiotics are unnecessary in laparoscopic cholecystectomy (LC) alone. On the other hand, bile spillage is recommended for antibiotic use. Therefore, in the setting of LC with intraoperative cholangiogram (IOC) antibiotics is usually given. Is antibiotics necessary in the setting of laparoscopic cholecystectomy with intraoperative cholangiogram (LCcIOC)?

Materials and Methods

Single-center retrospective data collection was conducted using the flowchart below. Inclusion criteria included patients who underwent LCcIOC during January 2018 till March 2023. The study population was extracted from the database as shown in the flowchart below.





Analysis was performed using three different settings: unmatched data, 1-to-1 propensity matched pairs and propensity model with double adjustment for factors with standard difference greater than 10%.

Patients' outcomes were compared between the antibiotic and non-antibiotic groups. The primary outcome is the rate of immediate and early complications. Complications of interest include bleeding, bile leakage, intra abdominal collection, CBD injury, conversion to open cholecystectomy, surgical site infection, post IOC cholangitis and post IOC pancreatitis. The secondary outcome is the length of stay. Ethical approval was granted prior to data collection, from the institutional review board Paholpolpayuhasena Hospital.

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Results

Table 1 – Baseline Characteristics of the Participants

Characteristics	Total (n=181)	No antibiotics use (n=87, 48.1%)	Antibiotics use (n=94, 51.9%)	P-value
Age, years	53.6±17.6	51.8±16.7	55.2±18.3	0.203
Male	71 (39.2)	30 (34.5)	41 (43.6)	0.209
Diagnosis				
Symptomatic gallstone	53 (29.3)	39 (44.8)	14 (14.9)	<0.001
Acute cholecystitis	61 (33.7)	1 (1.2)	60 (63.8)	
Subsided cholecystitis	23 (12.7)	19 (21.8)	4 (4.3)	
Gallstone pancreatitis	43 (23.8)	27 (31.0)	16 (17.0)	
Gallbladder polyp/tumor	1 (0.6)	1 (1.2)	0 (0.0)	
Underlying disease				
Diabetes	26 (14.4)	14 (16.1)	12 (12.8)	0.524
Hypertension	74 (40.9)	33 (37.9)	41 (43.6)	0.437
Dyslipidemia	44 (24.3)	19 (21.8)	25 (26.6)	0.456
CKD*	10 (5.5)	1 (1.2)	9 (9.6)	0.013
IHD**	5 (2.8)	2 (2.3)	3 (3.2)	0.714
Aspirin	8 (4.4)	7 (8.1)	1 (1.1)	0.022
Body mass index(kg/m²)	25.3 ± 5.0	25.2 ± 4.7	25.3 ± 5.2	0.816
Elective surgery	103 (56.9)	77 (88.5)	26 (27.7)	<0.001
Surgeon				
1	144 (79.6)	77 (88.5)	67 (71.3)	0.004
Others	37 (20.4)	10 (11.5)	27 (28.7)	
Operation time(min)	105.5 ± 42.3	95.7 ± 37.8	114.5 ±4.4	0.003
Technique*				
Ligation	156 (86.2)	78 (89.7)	78 (83.0)	0.193
Hemoclip	25 (13.8)	9 (10.3)	16 (17.0)	
Estimate blood loss(mL)	26.6 ± 56.4	23.1 ± 61.4	29.7 ±51.4	0.428
Length of stay	4.4 ± 3.1	4.0 ± 3.4	4.8 ±2.8	0.076
Major complications	12 (6.6)	6 (6.9)	6 (6.4)	0.890

Figure 1 – Distribution of P-score Before PS matching

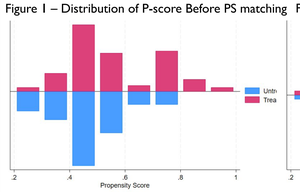


Figure 2 – Distribution of P-score After PS matching

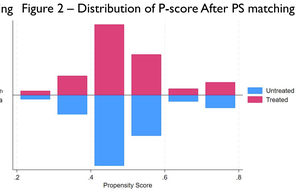


Figure 3 – Distribution of P-score Before PS matching

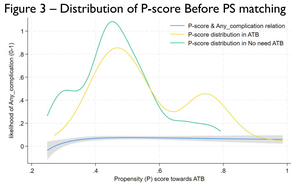


Figure 4 – Distribution of P-score After PS matching

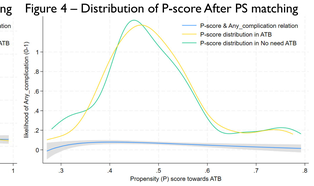


Table 2 - Baseline Characteristics of Propensity Score Matched Pairs and Standard Mean Difference

Characteristics	Total	No antibiotics	Antibiotics	SMD†
Age, years	52.0±16.9	51.9±16.4	52.1±17.4	-0.014
Male	57 (39.6)	28 (38.9)	29 (40.3)	0.028
Diabetes	17 (11.8)	8 (11.1)	9 (12.5)	-0.043
Hypertension	54 (37.5)	26 (36.1)	28 (38.9)	-0.057
Dyslipidemia	26 (18.1)	13 (18.1)	13 (18.1)	<0.001
Chronic kidney disease	1 (0.7)	1 (1.4)	0 (0.0)	0.167
Ischemic heart disease	2 (1.4)	1 (1.4)	1 (1.4)	<0.001
Body mass index,kg/m²	25.3±5.1	25.2±4.8	25.3±5.5	-0.029
Surgeon 1	124 (86.1)	63 (87.5)	61 (84.7)	0.080

† Standard mean difference; * propensity score generated by age, gender, surgeon, underlying diseases (HT, DM.DLLP.CKD.IHD,BMI groups), elective

Table 3 – Risk Difference Between Non-antibiotics and Antibiotics Groups

Groups	No antibiotics use	Antibiotics use	Risk difference* (95%CI)	P-value
Before propensity score matching				
complication	6 (6.9)	6 (6.4)	-0.02 (-0.10, 0.06)	0.643
After propensity score matching				
complication	5 (6.9)	4 (5.6)	-0.03 (-0.11, 0.06)	0.556
Propensity model with double adjustment* with inverse weighting multiple risk regression				
complication	6 (6.9)	6 (6.9)	0.01 (-0.11, 0.12)	0.877

*Analysis using generalized linear model, double adjusted by operation time, CKD, estimated blood loss, surgical technique uses to secure cystic duct and arterial supply

Table 4 –Difference Between Length of Stay Using Beta coefficient for Non-antibiotics and Antibiotics Groups

Groups	No antibiotics	Antibiotics	Beta coefficient* (95%CI)	P-value
Before propensity score matching				
Length of stay, days	3 (2-4)	4 (3-6)	**0.37** (-0.54, 1.28)	0.422
After propensity score matching				
Length of stay, days	3 (2-4)	4 (3-5.5)	**0.64** (-0.32, 1.60)	0.187
PS^ model with double adjustment with inverse weighting multiple risk regression				
Length of stay, days	3 (2-4)	4 (3-6)	**-0.51** (-1.55, 0.54)	0.338

^Propensity score, *Analysis using generalized linear model, double adjusted by operation time, CKD, estimated blood loss, surgical technique uses to secure cystic duct and arterial supply

Figure 5- Percentage of Overall Complication

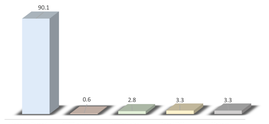
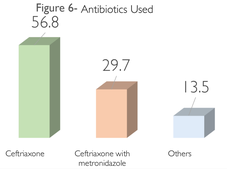


Figure 6- Antibiotics Used



The baseline characteristics of the participants are shown in Table 1. The mean age was 53 years, with a higher number of male participants. Additionally, there was greater antibiotic use in cases which are not elective and those with longer operative time. Figures 1-4 show the propensity score distribution before and after propensity score matching. Table 2 shows characteristics of the participants after propensity score matching and the standard mean difference calculated for each variable. The rate of any complication for the antibiotics group is 6.4% versus 6.9% in the non antibiotics group. After propensity score matching, the rate of complication are 6.9% and 5.6%, respectively. However, with the propensity score model using inverse weighting the rates of complication were similar between two groups. Furthermore, the length of stay for the antibiotics groups is 4 days whereas 3 days in the non antibiotic group, which were comparatively not statistically significant.

Conclusions

Although the antibiotic group had *fewer* complications, the effect of antibiotics used on postoperative outcomes in LCcIOC is minimal. Prophylactic antibiotics in the setting of LCcIOC may **not** be necessary. Selective antibiotic use may be appropriate when the benefits outweigh the risks.

