Assessing patient safety in laparoscopic cholecystectomy during surgical residency training: safety culture checklist and staff supervision

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Background : Laparoscopic cholecystectomy (LC) is essential for the qualification of general surgery at Bhumibol-Adulyadej-Hospital. Our program first started in 1976 and become one of the oldest surgical residency training centers in Thailand.

Objective : The objective is to prioritize patient safety in clinical setting, specifically in LC, during surgical training.

Methodology: This retrospective study demonstrates patients who underwent LC between January 2015 to December 2021. The safety culture checklist used in LC comprises three crucial steps: clear critical view of safety, identification of cystic artery and possible aberration, and dissection of encircled cystic duct before clipping. All attending staffs were board-certified surgeons by The medical council of Thailand with more than 5 years of practice in general surgery. The residents who performed the LC were proven eligible by LC assistance record in logbooks and participation in laparoscopic workshops. All the LC done by the residents, including the cases that attending staffs took over, are the study group. The control group was the LC solely done by attending staffs. The statistical data was analyzed under IBM-SPSS using t-test for continuous data and the chi-square test for categorical data with statistical significance of p-value < 0.05.

Table 1: Patient's characteristic of laparoscopic cholecystectomy

	Resident (n=165)	Staff (n=159)	*P* value	95%CI
Age (year)	58.28(±15.17)	58.10 (±14.80)	0.58	95%CI (-3.46-3.09)
EBL (ml)	25.90(±52.73)	35.38(±84.07)	0.35	95%CI (-5.80-24.76)
Operative time (min)	91.33 (±31.65)	87.98(±43.35)	0.13	95%CI (-11.62-4.93)
LOS (day)	4.34 (median 4)	5.09 (median 4)	0.01	95%CI (0.17-1.34)
Sex (FM/M)	59.4% / 40.6%	61.0% / 39.0%	0.77	
Dyslipidemia	43 (26.1%)	44 (27.7%)	0.74	
Thalassemia	5 (3%)	6 (3.8%)	0.71	
DM	32 (19.4%)	41(25.8%)	0.17	
Viral hepatitis	12 (7.3%)	7 (4.4%)	0.27	
CKD	4(2.4%)	7 (4.4%)	0.32	
IHD	14 (8.5%)	11 (7.0%)	0.61	
Stroke	4 (2.4%)	4 (2.5%)	0.96	
HT	60 (36.4%)	72 (45.3%)	0.11	
Pre-operative diagnosis				
Symptomatic gall stone	86 (52.1%)	66 (41.5%)	0.56	OR 1.53, 95%CI (0.99-2.38)
CBD stone	16 (9.7%)	16 (10.1%)	0.91	OR 0.96, 95%CI (0.46-1.99)
Acute cholecystitis	33 (20.0%)	56 (35.2%)	0.01	OR 0.46, 95%CI (0.28-0.76)
GB polyp	9 (5.5%)	9 (5.7%)	0.94	OR 0.96 95%CI (0.37-2.49)
GS pancreatitis	13 (7.9%)	5 (3.1%)	0.06	OR 2.63, 95%CI (0.92-7.57)
Subside cholangitis	8 (4.8%)	7 (4.4%)	0.85	OR 1.11, 95%CI (0.39-3.13)
Pathological diagnosis				
Chronic cholecystitis	148 (89.7%)	117 (73.6%)	0.01	OR 3.13, 95%CI (1.69-5.77)
Acute cholecystitis	12 (7.3%)	39 (24.5%)	0.01	OR 0.24, 95%CI (0.12-0.48)
Gall bladder cancer	5 (3.0%)	3 (1.9%)	0.38	OR 1.63, 95%CI (0.38-6.92)
Emergency LC	3 (1.8%)	16 (10.1%)	0.02	OR 0.17, 95%CI (0.05-0.58)
Conversion rate	3 (1.8%)	9 (5.7%)	0.07	OR 0.31, 95%CI (0.80-1.16)
3 vs 4 port	74.5%: 25.5%	75.5%: 24.5%	0.85	OR 1.05, 95%CI (0.64-1.74)
Drain insertion	14 (8.5%)	12 (7.5%)	0.76	OR 1.14, 95%CI (0.51-2.54)
GB perforation/ Bile spillage	21 (12.7%)	13 (8.3%)	0.18	OR 1.64, 95%CI (0.79-3.39)

EBL=estimate blood loss, LOS= Length of hospital stay, DM= Diabetic Mellitus, CKD= chronic kidney disease, IHD= Ischemic heart disease, HT= hypertension, GB= gall bladder, GS = gall stone

Table 2: Complications between resident and staff

	Resident (n=165)	Staff (n=159)	*P* value	OR	95%CI
Bile duct injury	1 (0.6%)	2 (1.3%)	0.54	0.48	0.04-5.33
SSI	4 (2.4%)	3 (1.9%)	0.52	1.29	0.29-5.87
Bleeding	12 (7.3%)	3 (1.9%)	0.02	4.08	1.13-14.74
Intra-abdominal organ injury	3 (1.8%)	1 (0.6%)	0.32	2.93	0.31-28.43
Overall complication	11 (11.5%)	9 (5.7%)	0.61	2.17	0.95-4.95

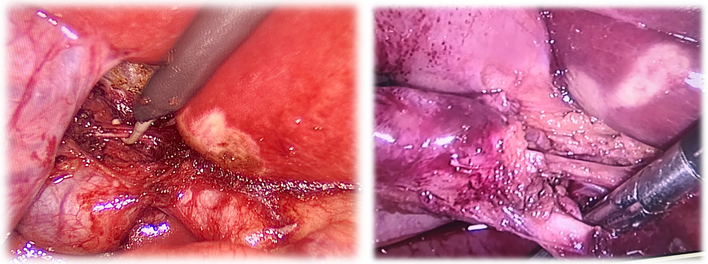
SSI= Surgical site infection, Bleeding (≥ 100 ml)

Table 3: Bleeding and related factor

	P value	OR	95%CI
Emergency operation	0.05	4.58	1.17-17.87
Conversion	0.10	4.60	0.91-23.16
4 ports	0.15	3.69	1.30-10.54
Resident to Staff	0.39	0.94	0.91-0.97
Drain placement	0.024	4.74	1.40-16.13
GB perforation/ bile spillage	0.06	3.39	1.02-11.29
Bile duct injury	0.87	0.99	0.99-1.01
SSI	0.29	3.61	0.41-32.03
Bleeding	0.02	4.08	1.13-14.74
Intra-abdominal organ injury	0.32	2.93	0.31-28.43
Overall complication	0.61	2.17	0.95-4.95

SSI= Surgical site infection, Bleeding (≥ 100 ml),

Results: 2,345 patients who underwent LC during the study period were included in this study. Residents performed 165 cases as the study group, and attending staff performed 159 cases as the control group.



Patient characteristics showed no statistical difference between the two groups. Statistically different in pathological diagnosis as chronic cholecystitis, acute cholecystitis, and cancer (89.7%, 7.3%, 3% vs. 73.6%, 24.5%, 1.9% (p 0.01, 0.01, 0.51), Emergency-LC (1.8% vs. 10.1%, p 0.02(OR0.17,95%CI 0.05-0.58), Postoperative hospital stay(4.34 vs 5.09 days, p 0.01(95%CI 0.17-1.34), Operative-time(91.33 vs 87.98 mins, p 0.13, (95%CI -11.62-4.92) and EBL (25.90 vs 35.38 ml, p 0.035, (95%CI -5.94-24.76). However, no significant difference in overall complication (11.5% vs 5.7%, p 0.06, (OR2.17,95%CI 0.95-4.95), conversion rate(1.8%% vs 5.7%, p 0.07, (OR0.31,95%CI 0.08-1.162), bile duct injury (n=1 vs n= 2, p 0.61,OR0.48, 95%CI 0.95 0.04-5.33) and surgical site infection(2.4% vs 1.9%, p 0.74, OR1.23,95%CI 0.29-5.86).

Conclusion, The surgical residency training in laparoscopic cholecystectomy is safe under the supervision of attending staff with a safety culture checklist.However, randomization and selection bias could not be avoided in this study.