CHUNG-ANG UNIVERSITY HEALTHCARE SYSTEM

Risk Factors for Conversion to Conventional Laparoscopy of Single Port Laparoscopic Appendectomy

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INTRODUCTION

- Single port laparoscopic appendectomy (SPLA)
  - Widely adopted with the expectation of better cosmetic outcomes and less surgical trauma
- Conversion to conventional laparoscopic appendectomy (CLA)
  - Not lead to advantages of SPLA
- The aim of this study was to evaluate the risk factors for conversion to CLA performing SPLA in acute appendicitis

METHODS

- August 2015 - November 2016
- Intended SPLA at Chung-Ang University Hospital
- Retrospectively reviewed
  - The patient's characteristics, operative data and postoperative surgical outcome
- **Conversion to CLA**
  - Any insertion of additional port
- **Complicated appendicitis**
  - Gangrenous or perforated appendicitis with or without fluid collection
  - Abscess or peritonitis in preoperative CT
- Univariable and multivariable analysis predictive factors for conversion to CLA

RESULTS

- Of 409 patients, 65 (15.9%) patients were treated with additional port insertion (conversion to CLA)
- On univariable analysis, age, sex, body mass index, complicated appendicitis, preoperative serum platelet count and C-reactive protein (CRP) level were associated with conversion to CLA
- After multivariable analysis, old age (OR=1.026, 95% CI: 1.007-1.045, p=0.007), male (OR=3.266, 95% CI: 1.609-6.630, p=0.001), increased serum CRP level (OR=2.569, 95% CI: 1.208-5.464, p=0.014) and complicated appendicitis (OR=6.586, 95% CI: 1.926-22.522, p=0.003) were significant risk factors for conversion to CLA
- The overall complication rate was similar between the patients underwent SPLA and conversion to CLA (1.5% vs. 1.5%, p>0.999)

Table 3. Multivariable analysis about predictive risk factors for conversion to CLA

Variables	Odds ratio	95% confidence interval	P value
Age	**1.026**	**1.007 – 1.045**	**0.007**
Male	**3.266**	**1.609 – 6.630**	**0.001**
Body mass index ≥ 25 kg/m²	1.147	0.544 – 2.421	0.718
Lymphocyte	1.000	0.999 – 1.000	0.054
Platelet	1.002	0.997 – 1.008	0.455
C-reactive protein	**2.569**	**1.208 – 5.464**	**0.014**
Albumin	0.208	0.078 – 0.555	0.002
Complicated appendicitis	**6.586**	**1.926 – 22.522**	**0.003**

Abbreviation: CLA: conventional laparoscopic appendectomy

Table 1. Clinical characteristics between SPLA and CLA conversion group

Characteristics	SPLA (n=344)	Conversion to CLA (n=65)	P value
Age, years (mean±SD)	29.0±16.4	40.8±21.3	**<0.001**
< 40 years	258 (88.1%)	35 (11.9%)	0.001
≥ 40 years	86 (74.1%)	30 (25.9%)	
Sex, n (%)			**0.004**
Male	151 (78.6%)	41 (21.4%)	
Female	193 (88.9%)	24 (11.1%)	
ASA, n (%)			0.067*
1,2	343 (84.5%)	63 (15.5%)	
≥ 3	1 (33.3%)	2 (66.7%)	
BMI, n (%)			**0.004**
< 25	278 (86.9%)	42 (13.1%)	
≥ 25	66 (74.2%)	23 (25.8%)	
Previous laparotomy, n (%)			0.929
No	303 (84.2%)	57 (15.8%)	
Yes	41 (83.7%)	8 (16.3%)	
Delayed appendectomy, n (%)			0.308*
No	339 (84.3%)	63 (15.7%)	
Yes	5 (71.4%)	2 (28.6%)	
Complicated appendicitis, n (%)			**<0.001**
No	318 (85.9%)	52 (14.1%)	
Yes	**7 (46.7%)**	**8 (53.3%)**	
WBC, /uL (mean±SD)	12472±4112	12409±4271	0.911
< 10000 /uL	90 (81.8%)	20 (18.2%)	0.442
≥ 10000 /uL	254 (84.9%)	45 (15.1%)	
Segment neutrophil, /uL (mean±SD)†	9805±4074	9969±4339	0.768
Lymphocyte, /uL (mean±SD)	1818±791	1597±685	**0.036**
Hemoglobin, g/dL (mean±SD)	13.7±1.6	13.9±1.6	0.413
Platelet, 10^3/uL (mean±SD)	259±65	241±74	**0.042**
C-reactive protein, mg/L (mean±SD)‡	21.0±36.7	57.0±65.1	**<0.001**
< 5 mg/L	151 (93.2%)	11 (6.8%)	**<0.001**
≥ 5 mg/L	190 (78.2%)	53 (21.8%)	
Albumin, g/dL (mean±SD)§	4.5±0.3	4.2±0.4	**<0.001**

Table 2. Operative data and surgical outcome between SPLA and CLA conversion group

Characteristics	SPLA (n=344)	Conversion to CLA (n=65)	P value
Operator, n (%)			<0.001
Staff	248 (80.3%)	61 (19.7%)	
Resident	96 (96.0%)	4 (4.0%)	
Name of operation, n (%)			<0.001
Appendectomy	268 (96.4%)	10 (3.6%)	
Cecectomy	76 (58.5%)	54 (41.5%)	
Colectomy	0 (0.0%)	1 (100.0%)	
Combined resection, n (%)			0.120*
No	342 (84.4%)	63 (15.6%)	
Yes	2 (50.0%)	2 (50.0%)	
Pathologic results, n (%)			<0.001
Acute appendicitis	213 (94.7%)	12 (5.3%)	
Perforated appendicitis	126 (72.8%)	47 (27.2%)	
Periappendiceal abscess formation	4 (44.4%)	5 (55.6%)	
Others	1 (50%)	1 (50%)	
Complication, n (%)			**>0.999***
No	339 (98.5%)	64 (98.5%)	
Yes	**5 (1.5%)**	**1 (1.5%)**	
superficial SSI	1	0	
deep SSI	4	1	
Duration of operation, min (mean±SD)	43.3±13.5	73.5±31.2	<0.001
Estimated blood loss, ml (mean±SD)	19.4±9.4	56.2±104.5	<0.001
Postoperative hospital stay, day (mean±SD)	2.7±3.2	5.8±5.6	<0.001

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CONCLUSION

- The conversion rate to CLA was 15.9%
- Increased serum CRP level and complicated appendicitis were the strong predictive factors for conversion to CLA performing SPLA in acute appendicitis