Less pain and reduced risk of early postoperative ileus after clipless vs. conventional laparoscopic appendectomy

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INTRODUCTION

- Laparoscopic appendectomy (LA) in increasing with satisfactory outcomes
- However, some patients require prolonged hospitalization or re-hospitalization due to postop. ileus & pain
- We aimed to examine the operative safety including postop. outcomes of clipless vs. conventional LA

METHODS

PATEINTS

- Retrospective, single-center, cohort study included 1,013 pts. of LA at our hospital, 2015.1 ~ 2018. 2
- Clipless LA using an ultrasonic energy device for coagulation (n = 290)
- Conventional LA with clips or staples (n = 723)
- Baseline characteristics, operative details, and perioperative outcomes were compared
- Early postoperative ileus was diagnosed in patients who required prolonged hospitalization or re-hospitalization because of symptoms of abdominal discomfort and radiologic findings indicative of ileus within 2 weeks after LA

SURGICAL TECHNIQUES

- Surgery was performed using a single incision or the conventional three ports, considering the age and sex of the patient
- Patients in group A underwent LA wherein coagulation was achieved using an ultrasonic energy device for dissecting the meso-appendix and occluding the appendiceal artery
- Patients in group B underwent LA using the traditional method, wherein dissection of the meso-appendix and occlusion of the appendiceal artery were performed using endo clips or laparoscopic staples
- The stump of the appendix was ligated using preformed suture loops

RESULTS

- The clinico-demographic characteristics of the patients are summarized in Table 1
- The mean age at surgery was significantly higher in group A than in group B (32.9±18.1 vs. 32.5±17.6 years, P = 0.006), but no significant between-group differences other facts

Table 1. Clinico -demographic characteristics and laboratory parameters of patients indicated for laparoscopic appendectomy

	Group A (n=290)	Group B (n=723)	*P* value
Age, years	35.9 (± 18.1)	32.5 (± 17.6)	0.006
Male sex	145 (50.0%)	373 (51.6%)	0.647
Body mass index, kg/m²	22.7 (± 3.7)	22.5 (± 4.3)	0.648
Diabetes mellitus	6 (2.1%)	18 (2.5%)	0.691
Hypertension	31 (10.7%)	56 (7.7%)	0.131
Previous surgery history	29 (10.0%)	68 (9.4%)	0.771
ASA score			
I	223 (76.9%)	574 (79.4%)	
II	61 (21.0%)	133 (18.4%)	
III	6 (2.1%)	16 (2.2%)	0.626
Preoperative radiologic findings			
Non-perforated appendicitis	269 (92.8%)	688 (95.2%)	
Perforated appendicitis	21 (7.2%)	35 (4.8%)	0.313
Preoperative laboratory values			
WBC count, cells/μL	12,910 (± 4,204)	12,990 (± 4.313)	0.789
Neutrophil count, cells/μL	78.2 (± 10.5)	77.4 (± 11.4)	0.316
HS-CRP, mg/L	26.5 (± 53.3)	27.3 (± 43.8)	0.809

The patients were stratified according to the operative approach: group A, clipless laparoscopic appendectomy; group B, conventional laparoscopic appendectomy. Data are presented as mean (±standard deviation) or frequency (percentage), as appropriate. ASA, American Society of Anesthesiology; HS-CRP, high-sensitivity C-reactive protein; WBC, white blood cell

- Only one patient (in group B) had to be converted to open surgery because of severe adhesion due to previous surgery
- Significant differences between groups A and B were found regarding the operation time, which was shorter in group A (37.6±15.5 vs. 48.6±17.9 min, P < 0.001), as well as regarding the incidence of gross perforation of the appendix noted intraoperatively, which occurred less often in group A (33.1% vs. 45.8%, P < 0.001)
- There was no significant difference between groups A and B regarding the use of an indwelling drainage catheter or the estimated blood loss (Table 2)

Table 2. Operative characteristics of patients undergoing laparoscopic appendectomy

	Group A (n=290)	Group B (n=723)	*P* value
Single incision	93 (32.1%)	246 (34.6%)	0.551
Additional port	6 (2.1%)	6 (0.8%)	0.099
Open conversion	0	1 (0.1%)	0.526
Operative time, min	37.6 (± 15.4)	48.6 (± 17.9)	< 0.001
Indwelling drainage catheter	25 (8.6%)	75 (10.4%)	0.398
Perforated appendicitis	96 (33.1%)	331 (45.8%)	< 0.001
Estimated blood loss, mL	18.6 (± 13.5)	20.7 (± 14.4)	0.032

The patients were stratified according to the operative approach: group A, clipless laparoscopic appendectomy; group B, conventional laparoscopic appendectomy. Data are presented as mean (±standard deviation) or frequency (percentage), as appropriate.

- Despite application of the same protocols for patient-controlled analgesia, the overall postoperative VAS scores were lower in group A than in group B, with a significant difference observed at 24 h postoperatively (1.23 vs. 1.36, P = 0.035)
- Significantly less common in group A (18.1% vs. 31.6%, P = 0.025), there were no significant differences between groups A and B regarding the incidence of postoperative complications (Table 3)
- The incidence of postoperative small bowel obstruction was lower in group A than in group B, but the difference was not significant (0.3% vs. 0.7%; P = 0.516). The length of postoperative hospitalization was similar between groups A and B (3.8±1.3 vs. 3.8±1.2 days, P = 0.772)

Table 3. Postoperative outcomes of laparoscopic appendectomy

	Group A (n=290)	Group B (n=723)	*P* value
Postoperative complications	20 (6.9%)	39 (5.4%)	0.356
Wound seroma	6 (2.1%)	12 (1.7%)	0.656
Wound infection	9 (3.1%)	12 (1.7%)	0.145
Intraperitoneal abscess	3 (1.0%)	9 (1.2%)	0.780
Diarrhea	2 (0.7%)	2 (0.3%)	0.343
Postoperative small bowel obstruction	1 (0.3%)	5 (0.7%)	0.516
Postoperative hospitalization, days	3.8 (± 1.3)	3.8 (± 1.2)	0.772

The patients were stratified according to the operative approach: group A, clipless laparoscopic appendectomy; group B, conventional laparoscopic appendectomy. Data are presented as mean (±standard deviation) or frequency (percentage),as appropriate.

- On univariate analysis, factors significantly associated with early postoperative ileus included the BMI, placement of an indwelling drainage catheter, and clipless surgery (Table 4)
- On multivariate analysis, the placement of an indwelling drainage catheter was a risk factor (relative risk, 4.702; 95% CI, 2.124 - 10.411; P < 0.001), whereas clipless surgery was a protective factor (relative risk, 0.505; 95% CI, 0.257–0.994; P = 0.048)

Table 4. Analysis of risk factors for early postoperative ileus after laparoscopic appendectomy

	Univariate analysis			Multivariate analysis	
Variable	Ileus (n = 63)	Without ileus (n = 172)	*P* value	Relative risk (95% CI)	*P* value
Age, years	60.1 (± 9.4)	61.5 (± 10.2)	0.327		
Male sex	24 (38.1%)	89 (51.7%)	0.064		
Diabetes mellitus	1 (1.6%)	6 (3.5%)	0.448		
Hypertension	6 (9.5%)	16 (9.3%)	0.959		
Previous surgery history	10 (15.9%)	23 (13.4%)	0.625		
ASA score (II or III)	17 (27.0%)	43 (25.0%)	0.757		
BMI, kg/m²	3.8 (± 0.5)	3.6 (± 0.6)	0.018		
Single incision	16 (25.4%)	31 (18.0%)	0.211		
Perforated appendicitis	31 (49.2%)	67 (39.0%)	0.158		
Indwelling drainage catheter	18 (28.6%)	13 (7.6%)	0.000	4.702 (2.124-10.411)	< 0.001
Clipless surgery	15 (23.8%)	68 (39.5%)	0.025	0.505 (0.257-0.994)	0.048

Data are presented as mean (±standard deviation) or frequency (percentage), as appropriate. ASA, American Society of Anesthesiology; CI, confidence interval

CONCLUSION

- Compared to conventional LA, clipless LA was associated with comparable operative safety but reduced postoperative pain and risk of early postoperative ileus
- Our findings suggest that the clipless technique involving ultrasonic coagulation is preferable to the conventional approach involving the use of clips or staples