

Use of Laparoscopic versus Open Repair for Perforated Peptic Ulcers is Affected by Surgeon Experience

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General Surgery

Background

The incidence of perforated peptic ulcers (PPU) has decreased with effective medical treatment such that surgical repair has become a relatively infrequent procedure. A laparoscopic approach has benefits over open repair but is often underutilized.

We hypothesized that surgical experience and clinical presentation are the main factors to influence the surgical approach for repair.

Methods

A retrospective chart review of PPU repairs in a hospital regional network over 10 years was performed to collect surgeon demographics (graduation date, training, and fellowship training), time of presentation, patient clinical condition, comorbidities and whether surgeries were done at a regional or tertiary site. Outcome variables included length of stay, complications and readmissions. Multivariate analysis was used to establish statistically significant correlations.

Results

Table 1. Data summary stratified by Patient Characteristics					
	[ALL] N=219	Laparoscopic N=52	Open N=167	p.overall	N
Age, Median [25th;75th]	62.6 [53.6;74.6]	59.9 [53.3;73.0]	63.0 [54.4;74.7]	0.394	219
Sex, N (%):				0.555	219
Female	108 (49.3%)	28 (53.8%)	80 (47.9%)		
Male	111 (50.7%)	24 (46.2%)	87 (52.1%)		
BMI, Median [25th;75th]	26.3 [22.6;31.2]	26.4 [22.9;30.7]	26.2 [22.5;31.3]	0.614	219
Previous.Surgery, N (%):				0.210	212
No	135 (63.7%)	27 (55.1%)	108 (66.3%)		
Yes	77 (36.3%)	22 (44.9%)	55 (33.7%)		
NSAID, N (%):				0.916	219
No	155 (70.8%)	36 (69.2%)	119 (71.3%)		
Yes	64 (29.2%)	16 (30.8%)	48 (28.7%)		
Immunosuppressant, N (%):				0.965	219
No	187 (85.4%)	45 (86.5%)	142 (85.0%)		
Yes	32 (14.6%)	7 (13.5%)	25 (15.0%)		
Anticoagulation Use, N (%):				0.574	219
No	201 (91.8%)	49 (94.2%)	152 (91.0%)		
Yes	18 (8.22%)	3 (5.77%)	15 (8.98%)		
COPD, N (%):				1.000	219
No	191 (87.2%)	45 (86.5%)	146 (87.4%)		
Yes	28 (12.8%)	7 (13.5%)	21 (12.6%)		
CHF, N (%):				0.768	219
No	202 (92.2%)	49 (94.2%)	153 (91.6%)		
Yes	17 (7.76%)	3 (5.77%)	14 (8.38%)		
Cirrhosis, N (%):				0.203	219
No	211 (96.3%)	52 (100%)	159 (95.2%)		
Yes	8 (3.65%)	0 (0.00%)	8 (4.79%)		
CKD, N (%):				0.738	219
No	206 (94.1%)	50 (96.2%)	156 (93.4%)		
Yes	13 (5.94%)	2 (3.85%)	11 (6.59%)		

Table 3. Outcomes					
	[ALL] N=219	Laparoscopic N=40	Open N=179	p.overall	N
Length of stay (days), Median [25th;75th]	8.00 [6.00;15.5]	6.00 [5.00;10.5]	9.00 [6.00;16.0]	0.002	219
Mortality, N (%):				0.264	219
No	195 (89.0%)	38 (95.0%)	157 (87.7%)		
Yes	24 (11.0%)	2 (5.00%)	22 (12.3%)		
Readmission, N (%):				0.694	219
No	208 (95.0%)	39 (97.5%)	169 (94.4%)		
Yes	11 (5.02%)	1 (2.50%)	10 (5.59%)		

Table 2. Data summary stratified by Surgeon Characteristics					
	[ALL] N=219	Laparoscopic N=52	Open N=167	p.overall	N
Previous.Surgery, N (%):				0.210	212
No	135 (63.7%)	27 (55.1%)	108 (66.3%)		
Yes	77 (36.3%)	22 (44.9%)	55 (33.7%)		
Residency Graduation year, Median [25th;75th]	2006 [1999;2010]	2008 [2001;2011]	2006 [1999;2009]	0.063	219
Residency Graduation time, N (%):				0.418	219
Before 2006	97 (44.3%)	20 (38.5%)	77 (46.1%)		
2006 and after	122 (55.7%)	32 (61.5%)	90 (53.9%)		
Residency type, N (%):				0.054	219
Community	77 (35.2%)	12 (23.1%)	65 (38.9%)		
Tertiary	142 (64.8%)	40 (76.9%)	102 (61.1%)		
Fellowship, N (%):				0.765	219
No	86 (39.3%)	19 (36.5%)	67 (40.1%)		
Yes	133 (60.7%)	33 (63.5%)	100 (59.9%)		
MIS fellow, N (%):				<0.001	219
No	163 (74.4%)	28 (53.8%)	135 (80.8%)		
Yes	56 (25.6%)	24 (46.2%)	32 (19.2%)		
Community Hospital, N (%):				0.115	219
No	103 (47.0%)	19 (36.5%)	84 (50.3%)		
Yes	116 (53.0%)	33 (63.5%)	83 (49.7%)		
Tertiary Hospital, N (%):				0.182	219
No	115 (52.5%)	32 (61.5%)	83 (49.7%)		
Yes	104 (47.5%)	20 (38.5%)	84 (50.3%)		

Results

Table 3. Outcomes					
	[ALL] N=219	Laparoscopic N=40	Open N=179	p.overall	N
Complication, N (%):				0.147	219
No	183 (83.6%)	37 (92.5%)	146 (81.6%)		
Yes	36 (16.4%)	3 (7.50%)	33 (18.4%)		
Discharge Disposition, N (%):				0.003	219
Home	123 (56.2%)	32 (80.0%)	91 (50.8%)		
SNF/LTACH	73 (33.3%)	6 (15.0%)	67 (37.4%)		
Death	23 (10.5%)	2 (5.00%)	21 (11.7%)		

Of 211 procedures for PPU, 49 were started laparoscopic (23.2%), 12 were converted to open (5.7%) and 162 were done open (76.5%). The open and laparoscopic cohorts were similar - age, sex, BMI, comorbidities, previous steroid use, NSAID, or anticoagulation use were not statistically significant between groups. Surgeons who attempted laparoscopy were more likely to have trained in a tertiary care center (83.3%, p< .008) or have an MIS fellowship (60.2%, p<.001). Laparoscopic repair had significantly shorter length of stay (8.5 versus 12.6 days; p<.01). Patients who received laparoscopic repair were more likely to be discharged home (80% vs 51%, p<.003) Open repair had more complications (18.4% vs 5.4%), re-admissions (5.2% vs 2.7%) and hospital mortality (12.1% vs 5.4%) than laparoscopic repar, although none reached statistical significance.

Conclusions

Surgeons who were trained in a tertiary care facility or underwent a minimally invasive fellowship were more likely to perform laparoscopic repair of perforated peptic ulcer, regardless of the patient’s clinical presentation, comorbid conditions and demographics.

Patients who received laparoscopic repair had a significant decrease in LOS and were more likely to be discharged home.

Educational efforts directed to community surgeons without MIS training are likely to result in more benefits for patients with PUD by increasing laparoscopic surgery for PPU. Increasing laparoscopic surgery for PPU will also aid in reducing hospital costs.