Short-term outcomes depending on type of esophagojejunostomy in laparoscopic total gastrectomy for gastric cancer: A retrospective study based on a Korean Nationwide Survey for Gastric Cancer in 2019

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Purpose

The study aimed to assess the effectiveness and outcomes of different esophagojejunostomy (EJ) techniques used in laparoscopic total gastrectomy (LTG) for gastric cancer.

Methods

KGCA survey database 2019 TG (n=1,212)

Exclusion criteria

→ History of neoadjuvant chemotherapy (n=35)

→ Handsewn EJ procedure (n=3)

→ Stage, LN dissection data unavailable (n=18)

1155 patients enrolled for statistical analysis

	Intracorporeal	Extracorporeal
Linear stapler	**773 (IL)**	**134 (EL)**
Circular stapler	**137 (IC)**	**111 (EC)**

IPTW (Inverse probability of treatment weighting): age, sex, extent of lymph node dissection, and stages were balanced between study groups

Results

Table 1 The comparison of postoperative morbidity after laparoscopic total gastrectomy according to type of anastomosis

Grades	Unadjusted						IPTW	
	Intracorporeal (n=910)		Extracorporeal (n=245)					
	Linear staplers (n=773)	Circular staplers (n=137)	Linear staplers (n=134)	Circular staplers (n=111)	*P*	Standardized difference	*P*	Standardized difference
Grade I	17 (2.2 %)	5 (3.6%)	4 (3.0%)	2 (1.8%)	0.628b	0.065	0.845b	0.059
Grade II	78 (10.1%)	9 (6.6%)	12 (9.0%)	9 (8.1%)	0.581a	0.069	0.599a	0.046
Grade IIIa	41 (5.3%)	9 (6.6%)	2 (1.5%)	1 (0.9%)	0.037a	0.189	0.061a	0.195
Grade IIIb	15 (1.9%)	1 (0.7%)	0 (0%)	0 (0%)	0.193b	0.124	0.141b	0.125
Grade IVa	14 (1.8%)	0 (0%)	0 (0%)	1 (0.9%)	0.181b	0.122	0.129b	0.12
Grade V	2 (0.3%)	0 (0%)	0 (0%)	0 (0%)	1.000b	0.036	0.824b	0.035
Total	**175 (22.6%)**	**24 (17.5%)**	**18 (13.4%)**	**14 (12.6%)**	0.010a	0.151	0.006a	0.176

na, not available, a: Chi-square test; b: fisher exact test;

The overall complication rates were lower in the extracorporeal group (EL: 13.4% vs. EC: 12.6%) compared to the intracorporeal group (IL: 22.6% vs. IC: 17.5%).
Major complication (> grade IIIa) rates: IL: 9.4% vs. IC: 7.3% vs. EL: 1.5% vs. EC: 1.8%; $p = 0.001$ and 0.004 before and after IPTW, respectively) were observed.
EJ-related complications (EJ leakage and stricture) were not significantly different between the groups before and after IPTW (5.6% vs. 3.6% vs. 3.0% vs. 3.6% in IL vs. IC vs. EL vs. EC groups; $p = 0.447$ and 0.614 before and after IPTW, respectively).
The incidence of EJ leakage did not differ significantly between the groups before and after IPTW (4.3% vs. 2.2% vs. 3.0% vs. 1.8% in IL vs. IC vs. EL vs. EC groups; $p = 0.527$ and 0.418 before and after IPTW, respectively).
With regard to EJ stricture rates, there were no significant differences between groups before and after IPTW (1.3% vs. 1.5% vs. 0% vs. 1.8% in IL vs. IC vs. EL vs. EC groups; $p = 0.519$ and 0.474 before and after IPTW, respectively).

Table 2 Risk factors related to overall complications in patients who underwent laparoscopic total gastrectomy: Multivariate analysis

Variables	Before IPTW			After IPTW		
	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value
Age (> 70 vs. ≤ 70)	1.653	1.202–2.273	0.002	1.625	1.182-2.233	0.003
Type of reconstruction						
EL vs. IL	0.551	0.317–0.959	0.035	0.495	0.284-0.864	0.013
EC vs. IL	0.511	0.278–0.939	0.031	0.407	0.216-0.766	0.005
Previous abdominal surgery (yes vs. no)	1.437	1.009–2.047	0.045	1.459	1.027-2.073	0.035
Operation time (>240 vs. ≤ 240 min)	1.768	1.281–2.440	0.001	1.781	1.290-2.458	0.001

Age > 70 years, type of reconstruction (IL group vs. EL or EC group), history of previous abdominal surgery, and longer operation time (> 240 min) were predictable risk factors for the occurrence of overall complications both before and after IPTW

Results

Table 3 Risk factors related to major complications in patients who underwent laparoscopic total gastrectomy: Multivariate analysis

Variables	Before IPTW			After IPTW		
	Odds ratio	95% CI	*p-value*	Odds ratio	95% CI	*p-value*
Age (> 70 vs. ≤ 70)	1.927	1.226–3.030	0.005	1.832	1.168–2.871	0.008
Sex (male vs. female)	1.89	1.056–3.382	0.032	1.691	0.962–2.971	0.068
Type of reconstruction						
EL vs. IL	0.123	0.029–0.513	0.004	0.24	0.080–0.718	0.011
EC vs. IL	0.174	0.042–0.728	0.017	0.128	0.026–0.629	0.011
EL vs. IC	0.163	0.035–0.765	0.022	0.284	0.083–0.973	0.045
EC vs. IC	0.23	0.048–1.098	0.065	0.152	0.028–0.828	0.029
Operation time (> 240 vs. ≤ 240 min)	1.637	1.035–2.590	0.035	1.661	1.053–2.620	0.029

Before IPTW, age > 70 years, male sex, type of reconstruction (IL group vs. EL or EC group), and longer operation time (> 240 min) were identified as independent risk factors associated with major complications in multivariate analysis. After IPTW, only the male factor lost statistical significance.

Table 4 Risk factors related to Esophagojejunstomy-related complications in patients who underwent laparoscopic total gastrectomy: Multivariate analysis

Variables	Before IPTW			After IPTW		
	Odds ratio	95% CI	*p-value*	Odds ratio	95% CI	*p-value*
Hospital volume (< 100 vs. ≥ 100)	1.893	0.916–3.908	0.085	1.786	0.888–3.594	0.104
Operation time (> 240 vs. ≤ 240 min)	1.654	0.958–2.857	0.071	1.766	1.035–3.014	0.037

Operation time ≥ 240 min was the only risk factor associated with EJ-related complications. The type of reconstruction was not a predictor for EJ-related complications in univariate and multivariate analyses.

Conclusion

Although the results are different from those of previous studies, this suggest that the IL method is also a difficult procedure with high complication rates.

The selection of the EJ method should be individualized based on the surgeon's level of expertise and experience.