Hybrid Robotic and Laparoscopic Gastrectomy (HRLG) for Gastric Cancer: Comparison with Conventional Laparoscopic Gastrectomy (CLG)

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INTRODUCTION

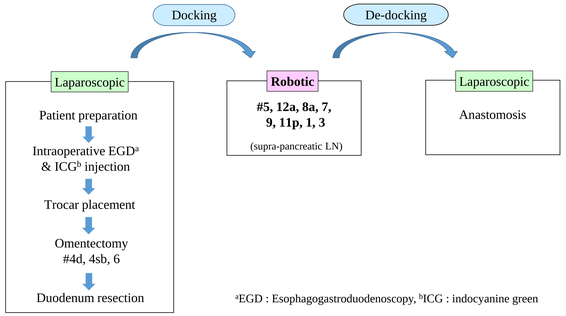
- The **incidence** of early gastric cancer **has increased in Korea** and **minimally invasive surgery** has been widely adopted in gastric cancer surgery.
- However, **LN dissection along the supra-pancreatic area** during **laparoscopic gastrectomy** is a challenging step, causing **postoperative complications** such as bleeding or pancreatitis.
- We aimed this study **to compare outcomes** of hybrid robotic and laparoscopic gastrectomy with conventional laparoscopic gastrectomy, and **to introduce a hybrid model** with robotic surgery in the supra-pancreatic area.

METHODS

- Period : 2019.03~2020.06
- Center : Seoul St. Mary's hospital, South Korea
- Who underwent curative gastrectomy (n=176)
- Comparison of 2 groups
  - Hybrid robotic and laparoscopic gastrectomy **(HRLG) group** : n=88
  - Conventional laparoscopic gastrectomy **(CLG) group** : n=88


da Vinci Xi model

HYBRID GASTRECTOMY MODEL



[a]EGD : Esophagogastroduodenoscopy, [b]ICG : indocyanine green

RESULTS

Table 1. Patients clinical characteristics

Variable	HRLG (n=88)	CLG (n=88)	p-value
Age, mean ± SD (yrs)	57.15 ± 10.51	66.23 ± 11.55	< 0.000
Gender			0.010
Male	38 (43.2%)	55 (62.5%)	
Female	50 (56.8%)	33 (37.5%)	
BMI, mean ± SD (kg/m^2)	23.93 ± 3.33	24.72 ± 3.50	0.124
ASA score			< 0.000
1	34 (38.6%)	11 (12.5%)	
2	53 (60.2%)	71 (80.7%)	
3	1 (1.1%)	6 (6.8%)	
Tumor location			0.105
Upper third	17 (19.3%)	20 (22.7%)	
Middle	34 (38.6%)	21 (23.9%)	
Lower third	37 (42.0%)	47 (53.4%)	
cT stage			0.023
T1	60 (68.2%)	42 (48.3%)	
T2	21 (23.9%)	26 (23.4%)	
T3	6 (6.8%)	14 (16.1%)	
T4	1 (1.1%)	5 (5.7%)	
cN stage			0.062
N0	83 (94.3%)	71 (81.6%)	
N1	5 (5.7%)	13 (14.9%)	
N2	0 (0)	2 (2.3%)	
N3	0 (0)	1 (1.1%)	

Table 2. Operative and pathological outcomes

Variable, n (%)	HRLG (n=88)	CLG (n=88)	p-value
Open or Laparoscopic conversion case	0 (0.0)	0 (0.0)	N/A
Extent of resection			0.096
TG	6 (6.8%)	15 (17.0%)	
DG	77 (87.5%)	69 (78.4%)	
PG	5 (5.7%)	4 (4.5%)	
Extent of LN dissection			0.128
<D1+	33 (37.5%)	43 (48.9%)	
≥D2	55 (62.5%)	45 (51.1%)	
Types of reconstruction			0.292
B-I	9 (10.2%)	4 (4.5%)	
B-II	42 (47.7%)	53 (60.2%)	
R-Y	32 (36.4%)	27 (30.7%)	
double tract	5 (5.7%)	4 (4.5%)	
Total number of retrieved LNs	48.05 ± 17.20	44.19 ± 19.83	0.170
Number of supra-pancreatic LN retrieval	**11.27 ± 5.46**	9.17 ± 5.19	0.010
EBL, mean ± SD (mL)	28.64 ± 25.95	37.73 ± 47.94	0.120
Postop. HD, mean ± SD (day)	7.42 ± 3.27	8.56 ± 4.41	0.054
Op time, mean ± SD (min)	**183.23 ± 38.46**	145.34 ± 33.43	< 0.000
Docking time, mean ± SD (min)	3.41 ± 1.55		
Console time, mean ± SD (min)	59.01 ± 21.13		

Table 3. Comparison of inflammatory markers

Variable, mean ± SD	HRLG (n=88)	CLG (n=88)	p-value
WBC count (μL)			
POD1	12269.00 ± 2958.10	11318.30 ± 3672.73	0.060
POD5	6732.21 ± 2084.283	7984.53 ± 6716.93	0.101
CRP (mg/dL)			
POD1	4.29 ± 2.38	**5.11 ± 2.64**	0.030
POD5	7.75 ± 5.17	**9.86 ± 6.51**	0.019
Serum amylase (U/L)			
POD1	74.01 ± 32.43	**83.33 ± 34.86**	0.046
POD5	78.01 ± 75.69	63.05 ± 43.56	0.135
Drain amylase (U/L)			
POD1	1158.80 ± 1207.93	**1954.16 ± 3102.38**	0.028
POD3	189.82 ± 232.03	284.36 ± 584.59	0.166
D-dimer (mg/L)			
POD1	3.91 ± 3.79	4.26 ± 3.10	0.513
POD5	3.89 ± 2.49	**5.09 ± 4.15**	0.030
Platelet count (10^9/L)			
POD1	231.92 ± 215.96	201.24 ± 65.78	0.204
POD5	229.61 ± 58.67	213.19 ± 75.01	0.110
Neutrophil count (%)			
POD1	81.57 ± 5.67	80.99 ± 5.69	0.502
POD5	66.80 ± 7.59	68.09 ± 9.01	0.308
Lymphpocyte count (%)			
POD1	11.74 ± 7.95	11.70 ± 4.42	0.966
POD5	20.36 ± 7.27	18.45 ± 7.87	0.099
Platelet-to-lymphocyte ratio			
POD1	26.23 ± 42.46	21.06 ± 16.79	0.289
POD5	12.41 ± 4.72	13.93 ± 10.04	0.202
Neutrophil-to-lymphocyte ratio			
POD1	6.16 ± 2.91	**7.44 ± 4.72**	0.031
POD5	3.81 ± 1.87	**4.87 ± 3.75**	0.020

Table 4. Morbidity and mortality

Variables, n (%)	HRLG (n=88)	CLG (n=88)	p-value
Complication	8 (9.1)	16 (18.2)	0.079
Pulmonary	0 (0)	**4 (4.5)**	0.043
Anastomotic bleeding	0 (0)	0 (0)	N/A
Anastomotic leakage	0 (0)	1 (1.1)	0.316
Anastomotic stenosis	1 (1.1)	0 (0)	0.316
Duodenal leakage	0 (0)	0 (0)	N/A
Intra-abdominal bleeding	0 (0)	0 (0)	N/A
Ileus	2 (2.3)	2 (2.3)	1.000
Pancreatitis[a]	6 (6.8)	9 (10.2)	0.418
Postoperative pancreatic fistula (POPF)[b]	11 (12.6)	14 (16.3)	0.497
Intra-abdominal inflammation	0 (0)	0 (0)	N/A
Wound infection	0 (0)	0 (0)	N/A
A-loop syndrome	1 (1.1)	0 (0)	0.316
Delayed gastric emptying	1 (1.1)	2 (2.3)	0.560
Others[c]	6 (6.8)	9 (10.2)	0.418
Operative mortality (within 30 days)	0 (0)	0 (0)	N/A

[a]Pancreatitis; serum amylase or lipase greater than three times the upper normal serum value
[b]POPF; amylase content of drain greater than three times the upper normal serum value
[c]Others : fluid collection, bacteremia, omental infarction

CONCLUSION

- **Hybrid robotic and laparoscopic gastrectomy (HRLG) is superior** to conventional laparoscopic gastrectomy (CLG) in terms of **suprapancreatic LN dissection** and **postoperative inflammation.**
- Additional prospective large sample studies should be performed for further evaluation of the real benefit of the robotic surgery.

