

Indocyanine green tracer-guided radical robotic distal gastrectomy using the Firefly system improves the quality of lymph node dissection in patients with gastric cancer

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Introduction: This study aimed to investigate the role of indocyanine green (ICG) as an intraoperative tool for improving lymph node dissection quality in radical robotic distal gastrectomy (RDG) for gastric cancer by comparing the rate of lymph node (LN) noncompliance with or without use of the Firefly system.

Methods: Patients with potentially resectable gastric cancer including of clinical tumor stage cT1-T4a, N0/+, M0 were registered in a prospective cohort study at our institution between March 2019 and December 2022. Patients were assigned to the da Vinci surgical system (DVSS) with **Firefly system (F group)** or the DVSS **without Firefly system (non-F group)**. The F group patients received endoscopic peritumoral injection of ICG to the submucosa 1 day before surgery. The rate of LN noncompliance, number of harvested LNs, and short-term outcomes were compared.

Results: Of the 94 patients participating in this study, 55 underwent Firefly system guided RDG and 39 underwent conventional RDG. The rate of LN noncompliance in the F group was lower than that in the non-F group (32.7% vs. 61.5%, $p=0.006$). The mean number of LNs harvested in the F group was significantly higher than that harvested in the non-F group (mean [SD], 31.2 [10.2] vs. 25.7 [12.6], $p=0.02$). Significant differences were found between the groups in blood loss and postoperative 3-35 hospital stay (83.9 [75.1] vs. 301.9 [766.7] mL; $p=0.003$ and 13.4 vs. 17.4 days, $p=0.049$).

Conclusion: The quality of LN dissection was improved with use of the Firefly system assisted ICG tracer without compromising safety.

Patients' characteristics

	F group (n=55)	Non-F group (n=39)	P value
Age (years)	72.4±11.8	71.6±10.8	0.749
Male/ Female	36/19	28/11	0.653
BMI (kg/m ²)	22.4±4.6	22.1±3.4	0.802
ECOG PS=0, 1/≥2	48/7	34/5	0.975
Location L/M	33/21	19/20	0.37
D1+/D2	34/21	25/14	0.828
cT1/2/3/4a	19/11/17/8	14/3/9/13	0.828
cN0/+	39/16	22/17	0.186
pT1/2/3/4a	25/6/12/12	13/4/10/12	0.55
pN0/1/2/3	31/9/7/8	20/6/7/6	0.832
Ly0/1	25/30	16/23	0.31
Diff/Undiff	24/32	15/23	0.74

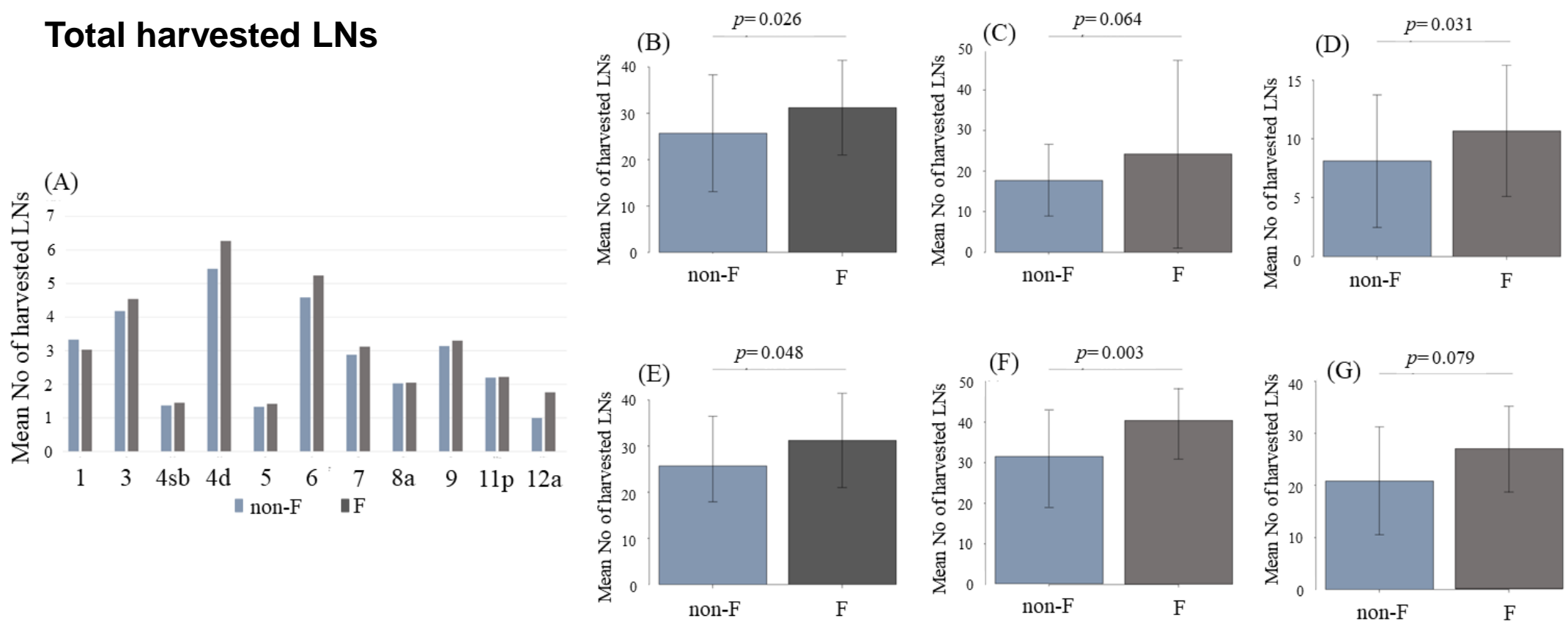
Lymph node noncompliance

	F group noncompliance	non-F group noncompliance	P value
All stations	18 (32.7%)	24 (61.5%)	0.006
Extraperigastric stations	14 (25.5%)	22 (56.4%)	0.002
Perigastric stations	15 (27.3%)	16 (41%)	0.19

Short-term outcomes

	F group	Non-F group	P value
Blood loss (mL)	83.9 ± 75.1	301.9 ± 766.6	0.03
Operative time (min)	377.3 ± 81.7	366.0 ± 125.4	0.59
Hospital stay (d)	13.4 ± 9.3	17.4 ± 9.9	0.04
Complication of ≥ C-D grade II	14 (25.4%)	11 (28.2%)	0.81
D-AMY (POD1) (IU/L)	505.6 ± 593.5	970.3 ± 2285.5	0.168
D-AMY (POD3) (IU/L)	161.2 ± 201.4	336.5 ± 678.7	0.08

Total harvested LNs



Lymph node noncompliance rate at each station

