

Preliminary Study for Sentinel Lymph Node Biopsy with ^{99m}Tc Tin-Colloid in Patients with Gastric Cancer

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Purpose: The sentinel lymph node (SLN) is defined as the first draining node from the primary lesion and it would be the first site of metastasis. The objective of this study was to determine the feasibility of an SLN biopsy in patients with gastric cancer for the assessment of the lymph node status. **Methods:** From November 2001 through to March 2002, SLN biopsies were performed in fourteen consecutive patients whose preoperative imaging studies showed T₂ or T₁ and no lymph node metastases. Three hours prior to each operation, a ^{99m}Tc tin-colloid (2.0 ml, 1.0 mCi) was injected via endoscopy into the patient's gastric submucosa. Subsequently a lymphoscintigraphy was performed serially using a dual head gamma camera. After a SLN biopsy had been performed using the gamma probe (NEO2000™ Gamma Detection System, Neoprobe CO, 1999, USA), all the patients underwent a radical gastrectomy (D₊). The SLN was cut into three pieces for a frozen sample, H&E and immunohistochemistry (IHC) staining. **Results:** The location of all the SLNs was in the perigastric area. No skip metastases were found. SLNs were identified in 12 of the 14 patients (success rate, 85.7%). Of these 12 patients, 6 had lymph node metastases in SLNs or Non-SLNs, or both; 3 in both SLNs and non-SLNs; 2 in SLNs alone; and 1 in non-SLNs alone. The sensitivity of the SLN status in the diagnoses of the lymph node status of the

patient was 82.2% (5/6) and the specificity was 100.0% (6/6). The diagnostic accuracy according to SLN status was 91.7% (11 of 12). **Conclusion:** SLN biopsies using a radioisotope in patients with gastric cancer are a technically feasible and accurate technique; they are a minimally invasive approach in the assessment of the node status of patients with gastric cancer. (J Korean Surg Soc 2002;63:129-134)

Key Words: Sentinel lymph node biopsy, Stomach neoplasm, Lymphatic metastasis

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 (D₂ or D₂₊)
 .(3,4) 가 가
 .(5)

Table 1. Patient characteristics

No	Sex	Age	T depth	Tumor size (cm)	No. of metastatic LN	Total LN	SLN* Bx	No. of SLNs	Probe Count	Exploration time (min)	Op time (min)	Op name	Complication
1	M	51	Mucosa	2×1.5	0	36	Success	1	180	165	170	RSG [†]	None
2	M	64	Mucosa	3×1.5	0	36	Success	1	70	195	170	RSG	None
3	M	53	Mucosa	2×1	0	29	Success	1	70	210	190	RSG	None
4	M	46	Mucosa	2×1	0	41	Failed			140	220	RSG	None
5	M	29	Mucosa	3×2.5	0	33	Success	1	55	240	160	RSG	None
6	M	47	Submucosa	5×2	0	32	Success	1	210	120	200	RSG	Int bleeding
7	M	44	Submucosa	3×2	2	42	Success	2	100	180	235	RSG	None
8	M	63	Submucosa	1.8×1.5	1	28	Success	1	290	240	180	RSG	None
9	F	68	Muscularis propria	3×1.7	7	26	Failed			220	170	RSG	None
10	F	49	Subserosa	2.5×2	0	49	Success	4	100	180	240	RTG [‡]	None
11	F	38	Subserosa	1.5×1	5	64	Success	2	147	125	160	RSG	None
12	F	29	Subserosa	1×0.8	4	55	Success	5	2000	210	190	RSG	None
13	F	47	Subserosa	1.5×1.8	4	27	Success	1	340	240	250	RTG	None
14	M	47	Perigastric	3.5×2	4	38	Success	1	350	270	165	RSG	None

* = Sentinel lymph node; † = Radical subtotal gastrectomy; ‡ =Radical total gastrectomy.

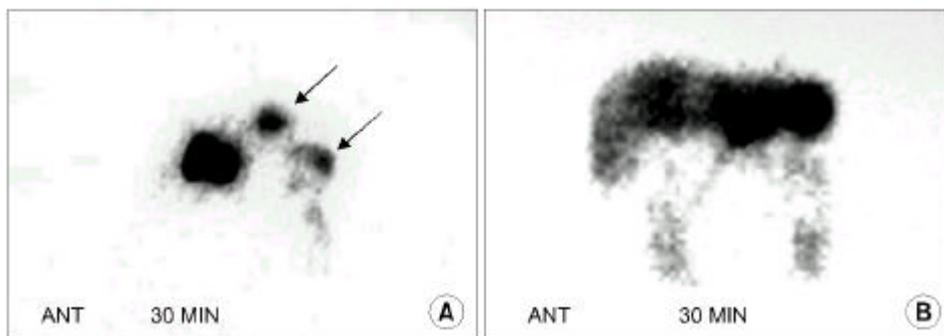


Fig. 2. Lymphoscintigraphy with ^{99m}Tc tin-colloid. (A) The two hot spots (arrows) were found at the perigastric area. (B) The liver and both kidney were showed because of systemic injection.

11
10.6±2.5
2) (Lymphoscintigraphy)
14 8 3
, 1 systemic injection (Fig. 2).
3)
1/3
#3, 5, 6
#3, 1 #5 2 #6
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#3, #4 1/3

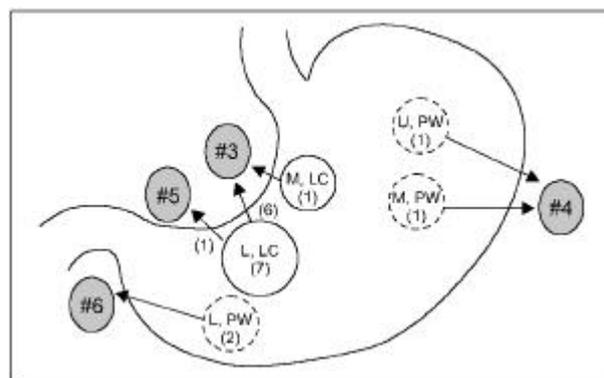


Fig. 3. The location of tumor and sentimental lymph node. L = lower 1/3, M = middle 1/3, U = upper 1/3, LC = lesser curvature, PW = posterior wall. () = number of case.

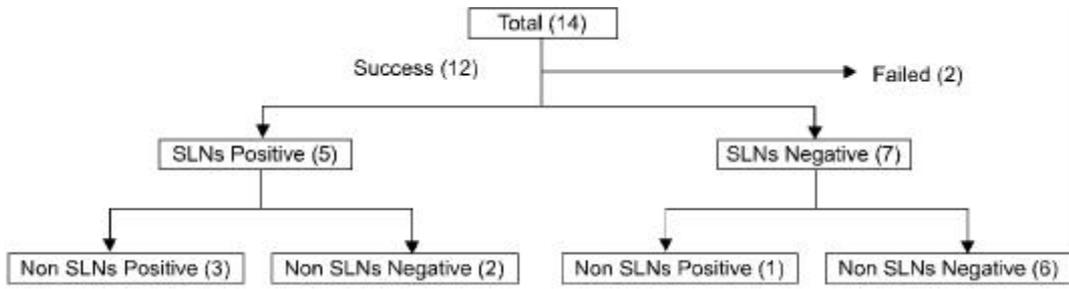


Fig. 4. Results of sentinel lymph node biopsy. Detection rate (12/14) = 85.7%, Sensitivity (5/6) = 82.2%, Specificity (6/6) = 100.0%, Diagnostic accuracy (11/12) = 91.7%.

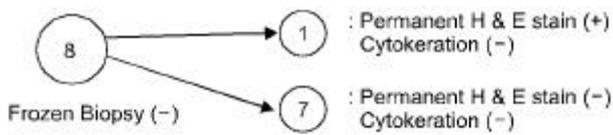


Fig. 5. Frozen biopsy, permanent stain and immunohistochemical stain of sentinel lymph nodes.

1 #4 (Fig. 3).

4)

14 12 (85.7%)

가 7 6

가 1 #4 (18)

가 #3, 7, 9 가 가

5 3 가 가

2 가 (Fig. 4).

5)

8 1 7

(Fig. 5).



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가 가

Cabanas가 penile cancer

Morton

1977

1992

1994 Giuliano

Miwa(6)

D₁

D₂

D₂

10

가

가

D₂

가

1/4 가 5 mm

1999 Maruyama (19) skip metastasis

2001 가

D₁, 가

가

D₂ or D₂₊ 가

(12) (14)

(15) (16)

(17)

(18)

D₂

- 1505-13.
- 3) Samson PS, Escovidal LA, Yrastorza SG, Veneracion RG, Nerves MY. Re-study of gastric cancer: Analysis of outcome. *World J Surg* 2002;26:428-33.
 - 4) Jatzko GR, Lisborg PH, Denk H, Stettner HM. Stomach carcinoma: Optimizing therapy by extended lymph node dissection. *Zentralbl Chir* 1999;124:376-80.
 - 5) Adachi Y, Shiraiishi N, Suematsu T, Shiromizu A, Yamaguchi K, Kitano S. Most important lymph node information in gastric cancer: multivariate prognostic study. *Ann Surg Oncol* 2000;7:503-7.
 - 6) Miwa K. Optimal nodal dissection for early gastric cancer. *Nippon Geka Gakkai Zasshi* 2001;102:484-9.
 - 7) Morton DL, Wen DR, Wong JH. Technical details of intraoperative lymphatic mapping for early stage melanoma. *Arch Surg* 1992;127:392-9.
 - 8) Edwards MJ, Whitworth P, Tafra L, McMasters KM. The details of successful sentinel lymph node staging for breast cancer. *Am J Surg* 2000;180:257-61.
 - 9) Choi JW, Lee HD, Park BW, Jung WH, Oh KK, Ryu YH. Experience with sentinel lymphadenectomy in 157 cases of breast carcinoma. *J Korean Surg Soc* 2002;62:119-26.
 - 10) Hiratsuka M, Miyashiro I, Ishikawa O, Furukawa H, Motomura K, Ohigashi H, et al. Application of sentinel node biopsy to gastric cancer surgery. *Surgery* 2001;129:335-40.
 - 11) Miwa K. Sentinel node concept and its application for cancer surgery. *Nippon Geka Gakkai Zasshi* 2000;101:307-10.
 - 12) Aikou T, Higashi H, Natsugoe S, Hokita S, Baba M, Tako S. Can sentinel node navigation surgery reduce the extent of lymph node dissection in gastric cancer? *Ann Surg Oncol* 2001;8:90-3.
 - 13) Kitagawa Y, Kubota T, Otani Y, Furukawa T, Yoshida M, Fujii H, et al. Clinical significance of sentinel node navigation surgery in the treatment of early gastric cancer. *Nippon Geka Gakkai Zasshi* 2001;102:753-7.
 - 14) Yasuda S, Shimada H, Ogoshi K, Tanaka H, Kise Y, Kenmochi T, et al. Preliminary study for sentinel lymph node identification with Tc-99m tin colloid in patients with esophageal or gastric cancer. *Tokai J Exp Clin Med* 2001;26:15-8.
 - 15) Feig BW, Curley S, Lucci A, Hunt KK, Vauthey JN, Mansfield PF, et al. A caution regarding lymphatic mapping in patients with colo cancer. *Am J Surg* 2001;182:707-12.
 - 16) Fukui Y, Yamakawa T, Taniki T, Numoto S, Miki H, Monden Y. Sentinel lymph node biopsy in patients with papillary thyroid carcinoma. *Cancer* 2001;92:2868-74.
 - 17) Smith JW, Shiu MH, Kelsey L. Morbidity of radical lymphadenectomy in the curative resection of gastric carcinoma. *Arch Surg* 1991;126:1469-73.
 - 18) Ricardo LR, Blake C, Ronald FM. *The surgical clinics of north America: Multidisciplinary approach to cancer*: Philadelphia: W.B. Saunders; 2000.
 - 19) Maruyama K, Sasako M, Kinoshita T, Sano T, Katai H. Can sentinel node biopsy indicate rational extent of lymphadenectomy in gastric cancer surgery? Fundamental and new information on lymph-node dissection. *Langenbecks Arch Surg* 1999;384:149-57.
 - 20) Thom M. Lymphatic mapping and sentinel node biopsy: is the method applicable to patients with colorectal and gastric cancer? *Eur J Surg* 2000;166:755-8.
 - 21) Siewert JR, Sandler A. Potential and futility of sentinel node detection for gastric cancer. *Recent Results Cancer Res* 2000;157:259-69.
 - 22) Kitagawa Y, Ohgami M, Fujii H, Mukai M, Kubota T, Ando N, et al. Laparoscopic detection of sentinel lymph nodes in gastrointestinal cancer: a novel and minimally invasive approach. *Ann Surg Oncol* 2001;8:86-9.
 - 23) Kitagawa Y, Fujii H, Mukai M, Kubota T, Ando N, Watanabe M, et al. The role of the sentinel lymph node in gastrointestinal cancer In; Leong SP, Wong JH, editors. *The Surgical Clinics of North America: Sentinel lymph node in human solid cancer* 2000;80:1799-809.
 - 24) Eckelman WC, Steigman J, Paik C. Radiopharmaceuticals. In: Sandler MP, Patton JA, Coleman RE, Gottschalk A, Wackers FJ TH, Hoffer PB. *Diagnostic nuclear medicine*. 3rd ed. Baltimore: Williams and Wilkins; 1996. p.199-216.