Perspective

Future perspective of laparoscopic surgery for gastric cancer: sentinel node navigation function-preserving surgery for early gastric cancer

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Abstract: After the introduction of laparoscopic surgery in gastric cancer, the short-term surgical outcome is improved regarding the quality of life (QOL) with the equivalent morbidity comparing to the conventional open surgery. However, there is controversy concerning the long-term improvement of QOL after laparoscopic gastric cancer surgery. This might be due to the same resection range of stomach and lymph node dissection between laparoscopic surgery and open surgery. To improve the long-term QOL without impairing recurrence and survival in gastric cancer surgery, stomach preserving surgery with minimal lymph node dissection through the laparoscopic approach should be considered without residual tumor in the stomach and surrounding lymph nodes. The sentinel node biopsy (SNB) concept can be adopted for this purpose. The SNB results in terms of sensitivity from individual institutions are unsatisfactory and heterogeneous among practicing surgeons. However, recently performed multicenter study from Japan offers the optimism of SNB in gastric cancer. Currently, SENORITA (Sentinel Node Oriented Tailored Approach) study group in Korea is preparing the phase III trial for stomach preserving surgery with SNB. Before the phase III trial, quality-control study of participating institutions is underway for the standardization and overcoming the learning curve of SNB. If the SNB and stomach preserving surgery can be verified by this phase III trial, it might be a good surgical option instead of standard gastrectomy and lymphadenectomy resulting in improved long-term QOL without hampering the recurrence and survival in the subgroup of early gastric cancer.

Key Words: Early gastric cancer (EGC); sentinel node biopsy; stomach preserving surgery

Submitted Apr 15, 2013. Accepted for publication May 06, 2013.
doi: 10.3978/j.issn.2224-4778.2013.05.02
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Introduction

As the screening program for gastric cancer has been developed in Korea, the proportion of early gastric cancer (EGC) has been increased and the survival from the gastric cancer was improved (1,2). The standard surgical option for these EGC patients is gastrectomy with enough resection margins and the lymph node dissection according to the Japanese guideline except the absolute indication for endoscopic resection (ER) (3). Such surgical treatment makes the survival of EGC increase more than 90% but the short-term surgical outcomes are still morbid and postoperative quality of life (QOL) was impaired due to the resected stomach and destroyed nerves system during the lymph node dissection. As a consequence, the need for the minimally invasive approach is required for potential long-term survival of EGC.

After the application of laparoscopic surgery in gastric cancer, the short-term surgical outcomes are improved regarding QOL with the equivalent morbidity comparing to the conventional open surgery and the final survival

results are waiting from the prospective trials in Korea (4,5). However, there is controversy of long-term improvement of QOL after laparoscopic surgery. This might be due to the same resection range of stomach and lymph node dissection between laparoscopic and open surgery. To improve the long-term QOL without impairing recurrence and survival in gastric cancer, stomach preserving surgery with minimal lymph node dissection through the laparoscopic approach should be considered without residual tumor in the stomach and surrounding lymph nodes.

Several organ-preserving or function-preserving surgeries such as proximal gastrectomy (PG), pylorus preserving gastrectomy (PPG) and vagus nerve preserving surgery were tried but the results are still controversial (6,7). The essential factor for preserving stomach function is not only the remaining gastric volume but also preserving the nerve innervation, esophagogastric junction (EGJ) and pylorus as well. Therefore, these essential factors should be saved during the surgical treatment for the preservation of stomach function. ER is probably the best therapeutic option as the stomach preserving surgery. However, indication of ER is very limited and application of it is only for absolute indication (3). Several retrospective studies were investigated to expand the indication of ER but the clinical application was still not acceptable due to the risk of potential lymph node metastasis (8,9).

Sentinel node biopsy (SNB) concept was initially applied in penile cancer and it is already clinically applied to prevent the lymphedema in breast cancer and melanoma. It has been supposed that the SNB can be applied for organ-preserving or function preserving surgery in gastric cancer if the SNs are free of metastasis.

Review of literatures

During more than decade of years a lot of feasibility studies of SNB in gastric cancer were reported in the literature. Most of series were small in number of patients, single institution based and there was no standard definition or technique for SNB. The details of SNB method were variable in terms of indication, biopsy method, tracers, injection site and pathologic evaluation among studies. Fortunately, several review articles and meta-analysis were already reported about the SNB in gastric cancer (10-12). The pooled estimate of detection rate was more than 90% but the sensitivity is of just around 80% with heterogeneity between the studies. The important factors improving sensitivity were the number of SN, EGC, double tracers, submucosal injection and more precise pathologic method. Meta-analysis of SNB in gastric cancer concluded that the result of SBN is unsatisfactory and heterogeneous between practicing surgeons. Therefore, clinical application of SNB in gastric cancer should be cautious and more studies are warranted to improve the sensitivity of SNB in gastric cancer. Recently, the feasibility study of SNB in gastric cancer is rarely published but more challenging methods are investigated.

Past and current trials

Two Japanese feasibility multicenter trials for SNB in gastric cancer were performed. One is the Japan Clinical Oncology Group trial (JCOG0302) and the other is Japanese Society for Sentinel Node Navigation Surgery (SNNS) trial. Both studies were a little bit different in the protocols and the final results were greatly different. The JCOG0302 was terminated midway before the goal because of the unexpected high false negative rate and its cause was believed to be the simple pathologic evaluation method and the learning curve of participating institutions (13). On the other hand, SNNS trial was finished and reported in the proceedings of medical congress (14). The detection rate was 97.5% with average 5.6 SNs and the sensitivity was 93% with four cases of false negative. Two cases of them were T2 lesions and missing metastatic nodes were located at the same sentinel basin in 3 cases. These results suggested the optimism of SNB if the indication was limited with T1 and sentinel basin dissection was done harvesting more than 5 SNs.

Single institution's phase II trial from Japan was reported and the result of limited gastrectomy with SNB was satisfactory for short term outcome and recurrence during the observation period (15). Another single center phase II trial from Korea is ongoing and the result is waiting (16).

Even the controversies remaining about the SNB in gastric cancer, many experiences were accumulated in the academic society and several knowhows were suggested that how the SBN result can be improved from studies. What's more important is that the serious academic question that the clinical application of SNB in gastric cancer is possible or not. Until now, there is no identified phase III trial of SNB in gastric cancer in the world. Recently a study group named SENORITA (Sentinel Node Oriented Tailored Approach) was launched in Korean academic society including surgeons, gastroenterologists, pathologists and nuclear medicine doctors to solve this question by phase III trial (17-19). The protocol of SENORITA multicenter

phase III trial was made after several consensus meetings between co-investigators and expert seminars (20).

As many previous studies have pointed out, the essential and indispensible requirement of SNB in gastric cancer is the standardization and overcoming the learning curve. The preceding quality control study for phase III trials is now ongoing (21). The measurement of quality control was checked by performance of critical 7 steps of SNB consisting of endoscopic, surgical and pathologic procedures. If the SNB was performed perfectly in ten patients by completion of this 7 steps, that institution can participate the phase III trials.

Conclusions

Laparoscopic SNB and organ-preserving surgery in gastric cancer could offer the improved short-term surgical outcomes in terms of postoperative M&M and QOL. It could also improve the long-term QOL by minimizing the gastric resection and lymph node dissection in the EGC survivors without impairing recurrence and survival. To validate this hypothesis, multicenter phase III trial is warranted and this new procedure will benefit the subgroup of EGC patients.

Acknowledgements

This work was supported by the National Cancer Center, Republic of Korea (Grant 1110550-3).
Disclosure: The authors declare no conflict of interest.

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Cite this article as: Ryu KW, SENORITA Study Group. Future perspective of laparoscopic surgery for gastric cancer: sentinel node navigation function-preserving surgery for early gastric cancer. Transl Gastrointest Cancer 2013;2(3):160-163. doi: 10.3978/j.issn.2224-4778.2013.05.02

