Hybrid Natural Orifice Transluminal Endoscopic Surgery with Sentinel Lymph Node Navigation for Deep Early Gastric Cancer at Fundic Area

Yoon Suk Park¹, Seong Hwan Kim¹, Hee Yun Ryu¹, Young Kwan Cho¹, Yun Ju Jo¹, Tae il Son², Young Ok Hong³

¹Department of Internal Medicine, Eulji General Hospital College of Medicine, Eulji University, Seoul, Korea
²Department of Surgery, Eulji General Hospital College of Medicine, Eulji University, Seoul, Korea
³Department of Pathology, Eulji General Hospital College of Medicine, Eulji University, Seoul, Korea

Correspondence to: Seong Hwan Kim, MD, PhD
Department of Internal Medicine Eulji General Hospital, College of Medicine, Eulji University, 68, Hangeulbiseok-ro, Nowon-gu, 139-711 Seoul, Korea

Telephone: +82-2-970-8297    Fax: +82-2-972-8621    Email: shkim@eulji.ac.kr

Running head: Hybrid NOTES in EGC
ABSTRACT

After refusing to surgical treatments, hybrid natural orifice transluminal endoscopic surgery with sentinel lymph node navigation might be considered as an optional treatment in a case of deep early gastric cancer which has the anatomic location with low probability of lymph node metastasis. We report a case that deep early gastric cancer of fundus beyond the endoscopic submucosal dissection indication was treated by hybrid natural orifice transluminal endoscopic surgery with sentinel lymph node navigation. In a conventional approach, total gastrectomy had been needed. However, the patient refused surgical intervention. In this case, since the patient showed no positivity of sentinel lymph node navigation intraoperatively, laparoscopic basin lymph node dissection was not performed.

Hybrid natural orifice transluminal endoscopic surgery might be considered for specific area such as the safety zone where lymph node metastasis is less likely to occur.

Key Words: Natural orifice transluminal endoscopic surgery; Stomach neoplasm; Lymphatic metastasis
INTRODUCTION

The diagnostic rate of early gastric cancer (EGC) has remarkably increased because of developments of technology and cancer mass screening system. It also became crucial in improvement of survival rate of gastric cancer.\textsuperscript{1} In recent years, the debate on expanding indications for endoscopic submucosal dissection (ESD) has undergone actively among clinicians, specifically with lymph node metastasis (LNM) being the most controversial matter.\textsuperscript{2} Yet, few, if any, focus on the hybrid natural orifice transluminal endoscopic surgery (NOTES) technique which we believe to be the new alternative on EGC treatment. Gastrectomy and lymphadenectomy has been performed as the standard treatment for EGC beyond the indication of endoscopic resection. EGC beyond the classic ESD indications has the relatively high risk of LNM, which varies from 5.7\% to 20\%.\textsuperscript{3-5} Conversely, it suggests that in so many cases it would be able to avoid gastrectomy with lymphadenectomy. As for hybrid NOTES, it enables minimal surgical resection using the ESD technique and a laparoscopic lymphadenectomy can also be performed simultaneously in cases of EGC with a risk of LNM. Thus, NOTES might be advised as a modified treatment for EGC. Like our case, EGC in fundic area has low probability of lymph node metastasis. Moreover, the patient refused any surgical treatment. In this situation, hybrid NOTES might be considered as an optional treatment.
CASE REPORT

A 61-year-old man who underwent health examinations at other hospital was diagnosed as submucosal invasion of EGC and had been strongly recommended total gastrectomy and lymphadenectomy. However, the patient visited our hospital for less invasive treatment such as ESD. Presented herein was performed by computed tomography (CT) demonstrated mild enhancing wall thickening in the fundic area without perigastric fatty infiltration and lymphadenopathy. (Fig. 1) White light endoscopy showed about 1.5cm sized EGC type IIa lesion at fundus. (Fig. 2A) Endoscopic ultrasonography showed suspicious findings of deep submucosal invasion of EGC (Fig. 2B). Total gastrectomy should be needed under the condition that deep invasion of submucosal layer is suspected. However, he still refused total gastrectomy. So, in the end we made a decision to perform hybrid NOTES technique with sentinel lymph node (LN) navigation which enable to perform endoscopic full-thickness gastric resection and laparoscopic basin lymphadenectomy. First of all, we performed the chromoendoscopic observation of the lesion with indigocarmine spraying, marking around the lesion safety margin and each was injected by 1cc indocyanine green at three different site around the lesion. (Fig. 3A) Subsequently, one camera port at the umbilicus and four trocars were inserted at four quadrants of the upper left, upper right, lower left, and lower right, respectively. For 15 minutes after injection, we looked for the presence of sentinel LN. However, we couldn’t find it at laparoscopic view. So we did not perform the sampling of the sentinel LN. And consecutively, applied the ESD technique which makes a circumferential incision as deep as the submucosal layer around the lesion.(Fig. 3B, 3C, 3D, 3E) After then, we took a circumferential endoscopic full-thickness resection around the lesion through the submucosal incision line. Subsequently, laparoscopic stapling was
performed around the two-third of the lesion through the circumferential endoscopic full-thickness gastric resection incision line.6 And then resected specimen was retrieved. The procedure had been completed after confirming the suture site and any bleedings. (Fig. 3F) Estimated total blood loss was below 100cc during the surgery. Laparoscopic LN dissection had been considered. However, it was not performed (Fig. 4A), because none of sentinel LN positivity was confirmed. (Fig. 4B) The pathology of resected full-thickness specimen reported that EGC type IIa, moderately differentiated adenocarcinoma with mucinous component comprise the 3rd submucosal layer invasion with clear resection margin. No lymphovascular and perineural invasion was found. (Fig. 5) None of recurrence or complications has been notified so far for 3 years of regular CT and endoscopy follow-up.
DISCUSSION

Minimal invasive surgery has been more and more indispensable with the increasing frequency of EGC. As the survival rate of patients with early gastric cancer improves, the quality of life after surgery should also be evaluated with great care. Comparing the past surgical outcomes, complication rate of gastrectomy has been significantly improved. However, we could not avoid a certain level of surgical complications. We can not be free from post-gastrectomy syndrome such as dumping syndrome, oral intake restriction, anemia if we get underwent surgery. Minimally invasive modalities such as sentinel LN navigation, ESD and NOTES are now in the limelight as a way to solve those problems. However, there are various ongoing debates over expanding the indications for minimal invasive treatment such as ESD, because it is difficult to predict whether the LNM exists. If deep submucosal invasion of EGC was suspected as our case, we can not be sure that there is no LNM which is a single most important factor in prognosis of gastric cancer. Also we couldn`t guarantee the cure. Thus, the role of minimally invasive treatment such as ESD has come to be meaningless. Therefore, we chose the hybrid NOTES technique with sentinel LN navigation. It could be possible to make a full-thickness resection and selective metastatic LN dissection. List of factors that are directly associated with LNM include: depth and size of tumor and presence of ulcer. LNM occurred less in the upper third portion with the depth down to submucosal layer compared to other areas. The presence of less-lymphatically drained safety zone in the fundus which is a part of the upper third portion makes EGC less likely to metastasize to nearby LN, like in this case. Also, compared to other areas of the stomach, LN dissection range is smaller in the upper third portion which makes hybrid NOTES even more viable. In the recent years, there are numerous studies being conducted on sentinel node (SN) mapping.
Until now, dye-based and radioisotope-based techniques are the mainstay for lymph node detection. Using the infrared ray beam or fluorescence imaging enable to increase the detection rates of traditional dye agents such as indocyanine green.\textsuperscript{11} In this case, SN mapping guidance by simple indocyanine green injection was used because unfortunately we don’t have fluorescence imaging equipment. Indocyanine green fluorescence imaging technique allows the practitioner to visually determine LNM. Up to 94.7\% of SN detection rate was confirmed in T1 and T2 gastric cancer through this SN mapping technique.\textsuperscript{12} However, such a technique is still in the third phase of clinical trial currently. So, it couldn’t be a standard treatment. Despite the fact that long-term data needs to be accumulated before applying expanded indications for ESD and hybrid NOTES due to the possibility of recurrence through LNM, hybrid NOTES with sentinel LN evaluation could be carefully considered as a treatment option for EGCs beyond the expanded ESD indication that occur in the upper third portion including the fundic area, especially.
CONFLICT OF INTEREST

The authors have no financial conflicts of interest

ACKNOWLEDGEMENTS
REFERENCES


FIGURE LEGEND

**Fig. 1.** (A & B) Transverse & coronal view of abdominal computed tomography scan shows mild enhanced wall thickening in fundic area without perigastric lymphadenopathy.

**Fig. 2.** (A) White light endoscopy shows early gastric cancer (EGC) IIa lesion with central ulceration at fundic area. (B) Endoscopic ultrasonography reveals invasion to deeper submucosal layer.

**Fig. 3.** (A) Perilesional indocyanogreen injections were performed intraoperatively. (B,C,D) Endoscopic full-thickness resection was performed by insulated knife. (E) Laparoscopic closure was performed by stapler.

**Fig. 4.** (A) Laparoscopic view shows negativity of sentinel lymph node (LN) after indocyanine green injection. (B) Resected full-thickness specimen reveals adequate safety margin with all perilesional marking dots.

**Fig. 5.** Multiple well formed tumor glands are noted in the mucosa and submucosa with abundant mucin pools. (A) HE x100, (B) HE x200