

Application of preoperative endoscopic ultrasonography-guided carbon nanoparticle tattooing combined with titanium clip labeling in esophagogastric junction adenocarcinoma

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Dear Editor,

In recent years, the incidence of esophagogastric junction adenocarcinoma (AEG) has significantly increased. Furthermore, the actual range of submucosal infiltration of AEG is much larger than the tumor border seen by the eye during operation. Therefore, accurate preoperative localization of the tumor is particularly important.

Three patients with Siewert type II AEG were chosen for this study. Histopathological examination showed that two of the patients had adenocarcinoma and one had ulcerative imprinted cell carcinoma. One week before surgery, under the guidance of 26G endoscopic ultrasonography (EUS)(OLYMPUS syringe nm-200U 0423, OLYMPUS), 1 mL of saline was injected into the mucosa 1 cm away from the tumor border to create a proper submucosal elevation. Following this, 0.1 mL of carbon nanoparticles (carbon nanoparticle suspension injection, Lummy) was injected into the same point (1). Thereafter, two titanium clips were placed on the upper edge of the submucosal infiltrating boundary of the tumor using EUS (Figure 1a, b). Using abdominal plain films, the location of the titanium clips in the three patients could be seen: the level was T10 in two patients and T11 in one (Figure 2a-c). During the operation, the submucosal infiltration boundary of the tumor, which was marked using the carbon nanoparticles (Figure 3a), could be quickly located; the operation was laparoscopically completed within 3 h. Pathological examination of the intraoperative samples, which were rapidly frozen, obtained from the three pa-

tients showed that the esophageal side margin was negative. Postoperatively, the three patients' stomachs were examined; the tumor upper border marked using the titanium clips and carbon nanoparticles could be seen (Figure 3b). With subsequent treatment, the patients recovered well, without any recurrence after 6 months, and no difference was found between these patients and those in whom labeling was not performed. The patients provided written consent for participation in the study.

In the past few years, injection of a dye for EUS or use of metal clips to mark the location of lesions in digestive diseases has become increasingly important (2). Preoperative labeling of cancers using metal clips based on imaging during development facilitates the choice of a favorable surgical approach, especially for an AEG operation, as the esophageal hiatus is at the T10 level. However, it

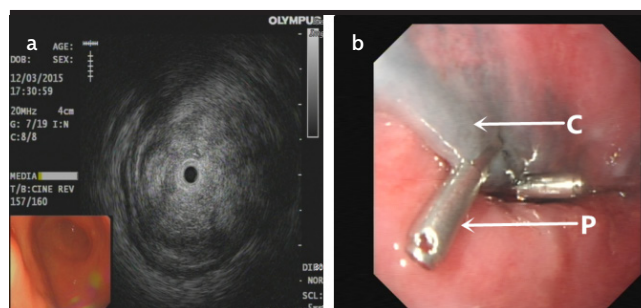


Figure 1. a, b. Using preoperative ultrasonography and under EUS guidance, charcoal nanoparticles (arrow C) were injected 1 cm into the upper edge of the cancer infiltration, and two peptide clips were placed at this location (arrow P).

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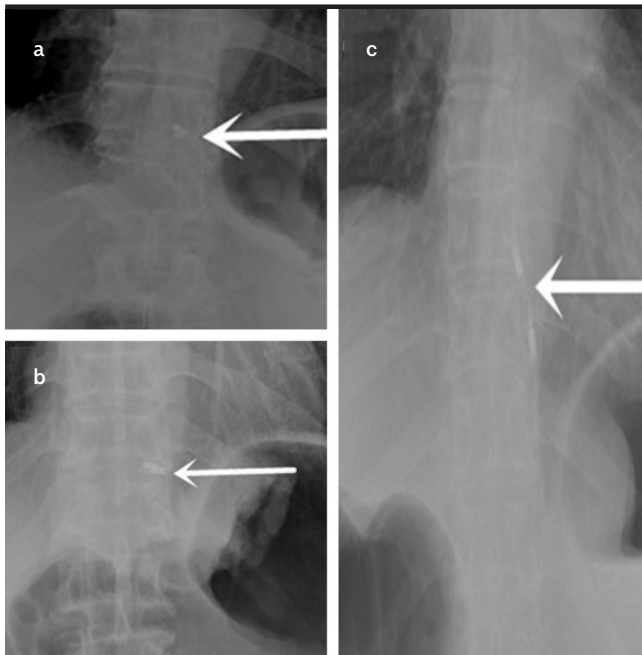


Figure 2. a-c. Abdominal plain film showing a peptide clip (arrow).

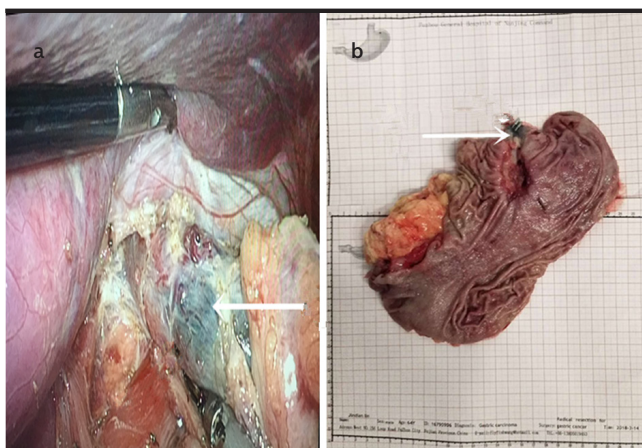


Figure 3. a, b. The location of the signs can be laparoscopically seen, and the location of the mark can be seen in the gastric specimen after operation (arrows).

is very difficult for the operator to accurately locate the metal clip by touch, and the high risk of the metal clip coming off increases the possibility of positioning failure. Preoperative use of charcoal nanoparticles to determine the boundaries of the tumor, at the same time, can also be

used to identify lymph nodes during surgery (3-5). Therefore, we combined these two positioning techniques, an accurate surgical approach to reduce unnecessary thoracotomy, and an individualized minimum safety margin of the lesion to achieve the safest range of excision, reduce the positive rate of margins, maximize the normal esophageal tissue structure and physiological function, and improve the curative effect and prognosis.

We firmly believe that this double labeling technology is a great breakthrough in AEG surgical strategy (1).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

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REFERENCES

1. Nagami Y, Machida H, Shiba M, et al. Clinical Efficacy of Endoscopic Submucosal Dissection for Adenocarcinomas of the Esophagogastric Junction. *Endosc Int Open* 2014; 2: E15-20. [\[CrossRef\]](#)
2. Machiels M, Van H J, Jin P, et al. Endoscopy/EUS-guided fiducial marker placement in patients with esophageal cancer: a comparative analysis of 3 types of markers. *Gastrointest Endosc* 2015; 82: 641-9. [\[CrossRef\]](#)
3. Wang W, Wang R, Wang Y, et al. Preoperative colonic lesion localization with charcoal nanoparticle tattooing for laparoscopic colorectal surgery. *J Biomed Nanotechnol* 2013; 9: 2123-5. [\[CrossRef\]](#)
4. Hartl DM, Chami L, Ghuzlan AA, et al. Charcoal Suspension Tattoo Localization for Differentiated Thyroid Cancer Recurrence. *Ann Surg Oncol* 2009; 16: 2602-8. [\[CrossRef\]](#)
5. Chang M S, Park J S, Park W, et al. Feasibility of Charcoal Tattooing for Localization of Metastatic Lymph Nodes in Robotic Selective Neck Dissection for Papillary Thyroid Carcinoma. *Ann Surg Oncol* 2015; 22(Suppl. 3): S669-75. [\[CrossRef\]](#)