

## ENDOSCOPIC ULTRASONOGRAPHY AND ITS ROLE IN THE STAGING OF OESOPHAGEAL CARCINOMA

G. Therapondos and J.N. Plevis, Centre for Liver and Digestive Disorders, Royal Infirmary of Edinburgh

### INTRODUCTION

Staging of oesophageal cancer is important in guiding clinical decisions with regards to treatment and especially in avoiding unnecessary surgical interventions. Endoscopic ultrasonography is a relatively new imaging modality, which compliments transabdominal ultrasonography and CT scanning in the staging of upper gastrointestinal malignancies.

### CASE HISTORY

A 56-year-old male, with a history of peptic stricture and Barrett's oesophagus, was referred with worsening dysphagia and significant weight loss. Oesophagoscopy showed a tight stricture between 29–36 cm from the teeth (Figure 1) and biopsies confirmed adenocarcinoma.

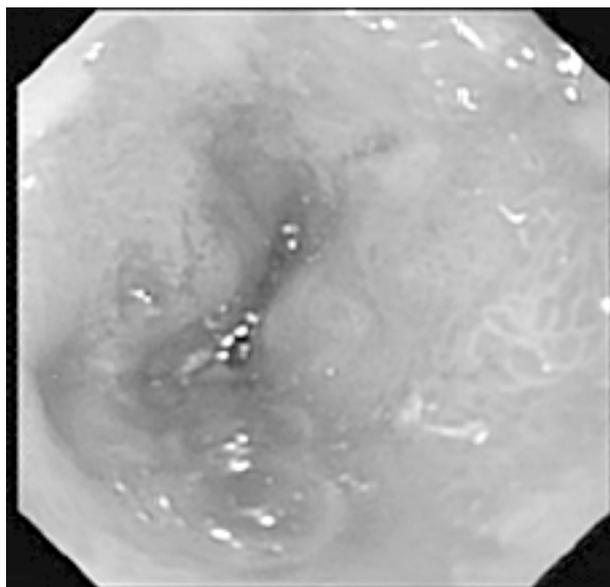


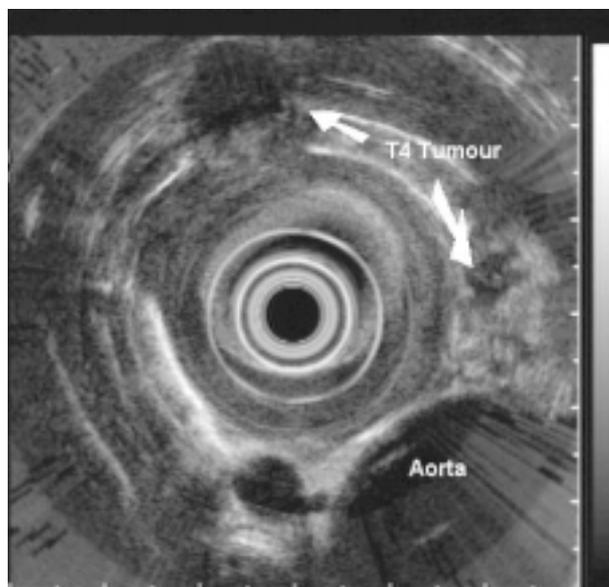
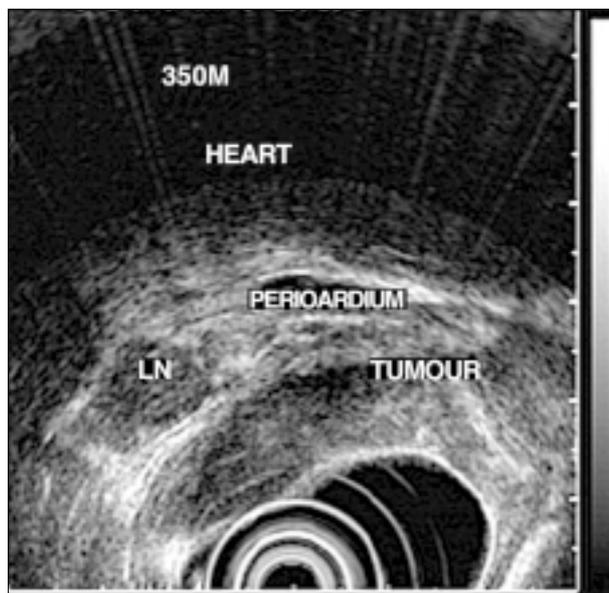
FIGURE 1

Endoscopic appearance of oesophageal stricture (reproduced in full colour online: [www.rcpe.ac.uk](http://www.rcpe.ac.uk)).

### Staging

Liver function tests and a chest radiograph were normal; CT scanning of the abdomen and thorax showed a thickened oesophageal wall from the level of the carina to the gastrooesophageal junction. No enlarged lymph nodes were identified and the liver, kidneys, spleen and pancreas were normal.

Further staging with endoscopic ultrasonography (the current routine practice in our unit) was carried out. The tip of the endoscopic ultrasound probe (which has a bigger diameter than a conventional endoscope) was unable to pass through the malignant stricture in the oesophagus and therefore, dilatation of the stricture was carried out, using Savary Gillard dilators, to a diameter of 14F. This allowed



FIGURES 2 & 3

Endoscopic ultrasound images showing multiple malignant lymph nodes but lack of invasion of aorta or pericardium.

the probe to be introduced into the stricture, but not through it into the stomach. Using ultrasound, the tumour was seen to extend into the mediastinum and multiple lymph nodes with malignant characteristics were seen around that area. There was no tumour invasion of the aorta or the pericardium (Figures 2 and 3). Tumour staging was judged to be T4N1. In view of these findings, it was decided that

surgical treatment of this patient's malignant oesophageal stricture was inappropriate.

### Progress

Thirty-six hours later the patient became very distressed and developed severe central chest pain. A chest radiograph showed a large right hydropneumothorax with mediastinal shift to the left (Figure 4). An intercostal drain was inserted and endoscopy confirmed oesophageal perforation at 31 cm. In an attempt to seal the perforation, a covered 12 cm Z-stent (Wilson Cook Europe A/S) was placed in the oesophagus (under fluoroscopic guidance) between 28–40 cm.

The patient subsequently suffered an acute myocardial infarction, right below knee deep venous thrombosis and right empyema, necessitating the insertion of an intercostal drain under general anaesthesia. A contrast swallow study confirmed the absence of an oesophageal leak (Figure 5) and demonstrated good palliation of his stricture. He was well enough to be discharged home, four weeks after admission to hospital. He survived for a further six months at home with minimal dysphagia.



FIGURE 4

Post-oesophageal perforation hydropneumothorax.

### DISCUSSION

We would like to discuss two issues. Firstly, we would like to expand on the use of endoscopic ultrasonography (EUS) for the staging of oesophageal and gastric cancer. Secondly, we will, briefly, elaborate on the use of covered metallic endoprosthesis in patients with an oesophageal perforation.

EUS is a relatively new technique, which is becoming increasingly available to the clinician. It has an established role in the staging of oesophageal and gastric cancer as well as in the assessment of pancreatic tumours, biliary tree, rectal tumours and gastric submucosal lesions. It has shown promise in the evaluation of patients with pancreatitis and portal hypertension, although its role in these conditions remains to be clarified.

The technique involves the application of high frequency sound waves (7.5–12 MHz) from within the gastrointestinal tract to image adjacent soft tissue structures. The ultrasound transducer is mounted onto the end of an oblique-viewing



FIGURE 5

Contrast swallow study showing patient oesophageal stent and absence of leak.

endoscope and can provide either 360° radial scanning or linear array.<sup>1</sup>

In 1987 the American Joint Committee on Cancer (AJCC) revised the staging criteria for oesophageal cancer.<sup>2</sup> The new criteria focus on depth of tumour invasion rather than tumour size, circumferential involvement or degree of lumen obstruction (Table 1). EUS can accurately assess tumour thickness and invasion of adjacent structures and should ideally be part of the evaluation of all patients with newly diagnosed oesophageal cancer who are considered to be operative candidates. The identification of invasion beyond the oesophageal wall and regional node metastases is critical in determining patient outcome. EUS should therefore be performed after distant metastatic disease has been excluded by CT scanning.

Studies comparing EUS with CT scanning in the preoperative staging of oesophageal cancer have shown that EUS is superior with regard to accurate detection of tumour penetration and recognition of lymph node metastases.

TABLE 1  
AJCC/UICC staging of oesophageal cancer.

#### Primary tumour (T)

TX	Primary tumour cannot be assessed
T0	No evidence of primary tumour
Tis	Carcinoma <i>in situ</i>
T1	Tumour invades lamina propria or submucosa
T2	Tumour invades muscularis propria
T3	Tumour invades adventitia
T4	Tumour invades adjacent structures

#### Regional lymph nodes (N)

NX	Regional lymph nodes cannot be assessed
N0	No regional node metastasis
N1	Regional node metastasis

#### Distant metastasis (M)

MX	Presence of distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

It has been reported that 91% of patients with malignant strictures which do not allow the passage of the echoendoscope, have either stage III or IV disease.<sup>3,4</sup> Same day dilatation of these strictures prior to EUS has produced unacceptably high perforation rates in some centres (25%)<sup>5</sup> but not in others.<sup>6</sup> Careful step-wise dilatation in several sessions, with the EUS procedure on a separate day, is recommended by some authors.<sup>7</sup>

The treatment options for patients with advanced disease who suffer oesophageal perforation post-dilatation are very limited. There are several reports in the literature,<sup>8,9</sup> including one prospective study,<sup>10</sup> which describe the use of plastic-covered metallic endoprotheses in such patients.

In general, the operators did not encounter difficulties during the placement procedures (always fluoroscopic). Some patients required a second stent for either very long strictures or stent migration but overall, the perforation was sealed within 12–36 hours and dysphagia was alleviated. As expected, the mean survival of these patients was 49–82 days but palliation of their symptoms remained satisfactory.

#### CONCLUSION

EUS should be offered to patients with oesophageal cancer who are operative candidates and who have been shown not to have distant metastases. Patients with tight strictures not permitting the passage of the probe, are at risk of perforation and should therefore be dilated cautiously. If perforation does occur, plastic-covered metal stenting provides excellent palliation.

#### REFERENCES

- <sup>1</sup> Chak A. The radial scanning echoendoscope. In: *Endoscopic Ultrasonography*. Van Dam J, Sivak MV, editors. Philadelphia: WB Saunders; 1999;19-27.
- <sup>2</sup> Sobin LH, Hermanek P, Hutter RV. TNM classification of malignant tumors. A comparison between the new (1987) and the old editions. *Cancer* 1988; **61(11)**:2310-4.
- <sup>3</sup> Catalano MF, Van Dam J, Sivak MV Jr. Malignant esophageal strictures: staging accuracy of endoscopic ultrasonography. *Gastrointest Endosc* 1995; **41(6)**:535-9.
- <sup>4</sup> Van Dam J, Rice TW, Catalano MF *et al*. High-grade malignant stricture is predictive of esophageal tumor stage. Risks of endosonographic evaluation. *Cancer* 1993; **71(10)**:2910-7.
- <sup>5</sup> Rice T, Zuccaro G. Staging esophageal cancer. The Cleveland experience. In: Van Dam, op. cit. ref. 1, 131-8.
- <sup>6</sup> Kallimanis GE, Gupta PK, al Kawas FH *et al*. Endoscopic ultrasound for staging esophageal cancer, with or without dilatation, is clinically important and safe. *Gastrointest Endosc* 1995; **41(6)**:540-6.
- <sup>7</sup> Rosch T, Classen M. Staging esophageal cancer. The Munich experience. In: Van Dam op. cit. ref 1, 139-45.
- <sup>8</sup> Nicholson AA, Royston CM, Wedgewood K *et al*. Palliation of malignant oesophageal perforation and proximal oesophageal malignant dysphagia with covered metal stents. *Clin Radiol* 1995; **50(1)**:11-4.
- <sup>9</sup> Watkinson A, Ellul J, Entwisle K *et al*. Plastic-covered metallic endoprotheses in the management of oesophageal perforation in patients with oesophageal carcinoma. *Clin Radiol* 1995; **50(5)**:304-9.
- <sup>10</sup> Morgan RA, Ellul JP, Denton ER *et al*. Malignant esophageal fistulas and perforations: management with plastic-covered metallic endoprotheses. *Radiology* 1997; **204(2)**:527-32.