



ESGE

EUROPEAN SOCIETY OF GASTROINTESTINAL ENDOSCOPY

GUIDELINES

Endoscopic Ultrasonography Part I

Technique and Upper Gastrointestinal Tract

In cooperation with the European Endosonography Club

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Endoscopic ultrasonography (EUS) is a combination of endoscopy and ultrasonography, a small ultrasonic transducer being incorporated into the tip of an endoscope. The high ultrasonic frequencies used (7.5 - 20.0 Mhz) provide excellent resolution, distinguishing between structures and lesions as small as 2 - 3 mm ; however, they also generate a limited penetration depth of only 4 - 6 cm. for the upper gastrointestinal tract, two different flexible instrument types are currently available : a 360° sector scanner (the 360° ultrasonic panoramic view is perpendicular to the shaft axis of the instrument) and a linear-type echo endoscope (providing a 100° sector parallel to the shaft axis). The standard instrument, with which most studies have been carried out, is the 360° radial scanner. Although data are limited, it seems that linear scanners achieve comparable accuracy in the established indications for EUS, such as submucosal tumors or cancer staging. Linear instruments that are equipped with an instrumentation channel provide a facility for EUS-guided biopsy. The additional use of Doppler ultrasound in combination with EUS is currently under investigation ; potential indications seem to be limited, but might include the diagnosis of vascular invasion by pancreatic tumors, or esophagogastric varices. For the lower gastrointestinal tract, rigid blind instruments using various scanning principles (radial, linear, multiplanar) and flexible forward viewing echo colonoscopes are available. Ultrasonic miniproboscopes have been used for the upper and lower gastrointestinal tract, as well as for pancreaticobiliary scanning when introduced into the respective ductal systems during endoscopic retrograde cholangiopancreatography (ERCP). Since they are still at the prototype stage, the use of these instruments is regarded as experimental at present, although the most recent prototypes have been very promising in clinical studies.

EUS is performed in a similar fashion to upper or lower gastrointestinal endoscopy, and has been conducted with sedation in most cases worldwide. the complication rates associated with the procedure seem to be very low (major complications en 0.05 % in a large retrospective survey), and comparable to the complication rates seen in diagnostic upper gastrointestinal endoscopy. The use of this sophisticated diagnostic technique requires considerable prior experience not only in upper gastrointestinal endoscopy and abdominal ultrasonography, but also sufficient training with the technique itself.

EUS-guided biopsy

EUS-guided fine-needle aspiration biopsy (FNBA) is best performed with linear-type echo endoscopes, since only these allow the course of the needle to be monitored. Sufficient data are available to demonstrate that EUS-guided FNAB is safe, with only occasional infectious complications (especially in pancreatic pseudocysts) being reported. The indications for which EUS-Guided FNAB is currently being used, and which are partly still under evaluation, are : suspected local and especially distant lymph-node metastases of gastrointestinal cancer ; mediastinal tumors ; accessible liver metastases ; indeterminate pancreatic tumors and probably with a much lower success rate - submucosal tumors and large gastric folds. Sensitivity rates of around 80 % or more have been reported for lymph-nodes, mediastinal tumors, and pancreatic masses. The ultimate clinical benefit largely depends on the subsequent treatment approach, e.g., whether it is clinically important to know the nature of a given lesion or not.

Conclusion : The use of EUS-guided FNAB can be recommended in cases in which it is considered clinically useful. The final accuracy and outcome benefit remains to be evaluated in prospective clinical trials

Esophageal Cancer

EUS provides the most accurate assessment available for the locoregional staging of esophageal cancer (T - and N - stages). EUS is superior to computed tomography (CT) in this respect. As with other malignancies, the diagnosis of distant metastases is beyond the scope of EUS, due to its limited penetration depth. EUS can have an impact on the management of patients only if they are considered candidates for surgery, and do not have distant metastases. EUS is especially useful in patients with esophageal cancer when stage-dependant treatment protocols are applied, e.g., local resection in stage T1 versus radical surgery in stages T2 - T4 ; primary surgery in stages T1/T2 versus preoperative radiochemotherapy with reasonable accuracy, thus probably decreasing the need for locoregional surgical staging.

Problems arise in the following situations :

- Impassable esophageal stenosis, when the full length of the tumor cannot be assessed. However, almost all of these tumors are in stage T3 or T4. Forceful dilation to allow passage of an echo endoscope may increase the risk of perforation. If full passage of the tumor stricture is considered clinically important (e.g., to differentiate between stages T3 and T4), dilation should be carried out stepwise ; introduction of a blind 7 -mm ultrasonic instrument may be safer for this indication.
- Although there are several criteria for diagnosing lymph node metastases, such as size and echo pattern, none of them is reliable enough to provide accurate differentiation between malignant and benign nodes in individual cases. However, there is a certain correlation between the T-stage have an increasing likelihood of node metastases. EUS-guided FNAB could also be helpful in proving malignancy.
- Although a high sensitivity of EUS has been reported in the detection of anastomotic recurrences, its specificity is probably lower, since false-positive findings occur due to granulomatous or fibrous tissue. More prospective studies are needed.
- Most, but not all of the studies available have shown that EUS is less reliable in restaging after chemotherapy or radiotherapy, or both, prior to surgery. It has, however, been successfully used to monitor patients after radiochemotherapy who did not undergo an operation. More prospective data are needed.

Recommendations : EUS can be used for the preoperative staging and assessment of resectability in operable patients without distant metastases, especially when stage-dependent treatment protocols are applied. The role of EUS in the detection of anastomotic recurrence and in restaging after radiochemotherapy is still under evaluation.

Reflux Esophagitis and Barrett's Esophagus

Wall changes visible with EUS show some correlation with the endoscopic severity of reflux esophagitis, but EUS will probably not substantially contribute to the diagnosis between peptic and malignant stenoses, in addition to endoscopy with biopsy. Preliminary data show that EUS is not reliable in differentiating Barrett's esophagus from Barrett's carcinoma in addition to endoscopic biopsy protocols.

Recommendations : No clinically established use of EUS. Application only within controlled trials.

Achalasia

It is not unequivocally accepted that EUS can demonstrate thickening of the muscularis propria in the distal esophagus, and these discrepant results may be due to less reproducible scanning conditions. Using high-frequency miniproboscopes, more consistent data demonstrating muscular thickening have been obtained. Only one study showed the detection of submucosal tumors in patients, some of whom had the classic clinical, radiological, endoscopic, and manometric picture of primary achalasia. It is not established whether EUS can identify patients with distal esophageal carcinoma causing secondary achalasia, in addition to endoscopy with biopsy.

Recommendations : no clinically established use as yet, further studies are necessary.

Gastric Carcinoma

As with esophageal cancer, EUS can also provide an accurate assessment of the T-stage and, to a somewhat lesser degree, of the N-stage. EUS has also been shown to be superior to CT in the local staging of gastric carcinoma. Assessment of resectability is possible with high reliability. The same problems are encountered as with high reliability. The same problems are encountered as with esophageal cancer, such as overstaging (which mainly occurs in ulcerated carcinomas), identification of malignant lymph-nodes, detection of anastomotic recurrence, and restaging. Since in the histopathological TNM classification, stages T2 and T3 are defined as infiltration into the subserosa (T2) or serosa (T3, this degree of accurate distinction cannot be made by means of EUS, and the EUS results in stage T2 are therefore poorer compared to the EUS results for the more advanced stages. EUS also seems to have difficulties in reliably differentiating between the mucosal and submucosal forms of early gastric cancer, although this distinction would be essential to select patients for endoscopic resection. It could be that higher frequencies are more accurate in this respect. When surgery is performed in every patient without distant metastases, EUS does not play a major role. However, when pre-treatment protocols are applied, using neoadjuvant chemotherapy in more advanced stages, EUS staging is crucial to select patients for either pre-treatment or primary surgery.

Recommendations : EUS can be used in the preoperative staging of gastric cancer in patients without distant metastases if the local stage has an impact on therapy (local resection, neoadjuvant chemotherapy. Application for the follow-up after surgery : see esophageal carcinoma. Restaging after chemotherapy : no data available as yet.

Submucosal Tumors :

Submucosal tumors are primarily diagnosed by upper gastrointestinal endoscopy or barium radiography ; EUS is then applied to differentiate a true submucosal tumor from extraluminal compressions by other lesions or structures, and it has been shown to achieve an accuracy of over 95 % accuracy in this respect. Although EUS can provide some clues as to the nature of a submucosal tumor (which can be judged by the layer of origin, echo pattern, and margins) EUS cannot substitute for histopathology in reliably differentiating between benign and malignant lesions. A smaller, well-demarcated submucosal tumor demonstrated on EUS is very likely to be benign, but single cases of small leiomyosarcomas have also been described. EUS precisely determines the tumor size and shape. It is likely, but has not been systematically studied as yet, that EUS follow-up of smaller, well-demarcated submucosal

tumors is a reasonably safe way of excluding malignancy if surgery is not considered in these patients.

Recommendations : EUS can be used in submucosal tumors to confirm the diagnosis (differentiation from extraluminal compression) and to plan therapy (resection or follow-up). Although providing exact morphological criteria to predict the likelihood of malignancy, EUS cannot replace the histopathological diagnosis.

Large Gastric Folds

In cases of thickened gastric folds, EUS can delineate gastric wall thickening and show which layers are involved and whether the layer structure is preserved. It therefore serves as an important adjunct to the histopathological diagnosis by conventional or large-particle biopsy. EUS can also exclude intramural vessels causing fold thickening, prior to planned large-particle biopsy. Hyperplastic folds, Ménétrier's disease, and early lymphoma show thickening primarily of the mucosa, whereas malignant processes (advanced lymphoma, linitis plastica) involve all layers, and lead to a destruction of the layer structure.

Recommendations : EUS can be used together with bioptic histology in all cases with suspicious gastric fold thickening, thereby excluding intramural vessels prior to large-particle biopsy. If EUS demonstrates mucosal thickening, large-particle biopsy should be diagnostic. EUS findings suspicious of malignancy should be diagnostic. EUS findings suspicious of malignancy should prompt further aggressive diagnostic steps.

Gastric Ulcer

Wall change due to gastric ulcer, and particularly chronic gastric ulcer, can be very similar to those produced by a localised carcinoma. It is therefore unlikely that EUS will be capable of differentiating between benign and malignant ulcers when endoscopic biopsies are repeatedly negative. Studies correlating the EUS patterns of peptic ulcers with their healing tendency should at present be considered experimental

Recommendations : No clinically established use at yet