

Evaluation of polyps by endoscopic ultrasonography (eus) : implication for endotherapy

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Abstract

EUS is the single best imaging modality in precise visualization of the five layers structure of G.I. tract wall, space occupying lesion and surrounding structures. In case of "protruding lesion" into the G.I. lumen, the site of origin of the tumor can be easily determined by EUS, and then its nature can be presumed (1). However, despite of these tiny details of the G.I. wall obtained by EUS, histology is still mandatory, especially when dealing with lesion suspected of malignancy (2). In case of sessile malignant "polypoid" lesion, Endoscopic Mucosal Resection (EMR) guided by EUS, could be considered in specific cases of selected patients.

Conventional EUS transducer (7.5 and 12 Mhz) employed for this purpose is not sufficient for differentiating cancers invading the muscularis mucosae from those invading the sub-mucosa. A Miniature Ultrasonic Probe (20 and 30 Mhz) which can be used through the biopsy channel of an endoscope has recently been developed and is accurate in measuring such a superficial infiltration and in assessing regional lymph nodes allowing then an exact pre-treatment staging. In patient not fitted for surgery, with a lesion less than 2 cm and involving less than half circumference of the lumen, EMR could be performed according to the parietal infiltration (T), the nodal involvement (N) and the related involved organs (Esophagus, Stomach, Colo-rectum).

Conclusions : EUS may be useful and sometimes is mandatory for assessing the G.I. tract polyps before resection. (*Acta gastroenterol. belg.*, 1999, 62, 196-199).

Key words : gastrointestinal polyp, inflammatory fibroid polyp, endoscopic ultrasonography (EUS), miniature ultrasonic probe, endoscopic mucosal resection (EMR), polypectomy.

Foreword

Among all novel techniques that have increased the role of the gastrointestinal endoscopy, endosonography is unique : it endows the endoscopist with the matchless ability to see within and beyond the wall of the gut. With the rapidly increasing use of minimal invasive surgery, a meticulous pre-procedure delineation of the lesion extend will render EUS even more important in the near future.

EUS of the GI wall

Endoscopic ultrasonic transducers emit short length sound waves at high frequencies and the waves pass through tissues of different acoustic impedance. Reflection of US beam occurs upon changes in acoustic impedance, at the boundary between layers. Several in vitro studies have demonstrated that the EUS image, a five layers structure, of the GI wall almost corresponds

with the histological layers. This five layers structure is seen throughout the GI tract (3,4,5). The thickness of the ultrasonic image of the GI wall and the layers does not exactly correspond to that of the respective layers on the histological section. The thickness of a structure in an ultrasonic image is a measure of time, not a distance. Ultrasonic thickness represents the time required for an ultrasound wave emitted by a transducer to travel and return from a reflective tissue interface rather than the real distance between the transducer and the tissue. Although the correspondence is not exact in term of layer thickness (acoustic interfaces have to be added or subtracted), it works well in clinical practice, especially in tumoral staging. The thickness of the normal GI wall is 2-4 mm. With all this in mind, we realise that EUS is able to define the exact layer of origin of a parietal growing-up lesion, its size and its limits (6-15).

Endoscopic mucosal resection (EMR)

Forceps biopsy specimens of a polypoid lesion are often too small to be representative. Biopsies findings are generally unreliable, because biopsy specimens may not be representative of the entire lesion, especially when there is severe dysplasia. Repeated biopsies may provide a correct diagnosis but we don't know how many specimens and how many attempts at biopsy are sufficient for a correct diagnosis. These lesions have to be completely resected by EMR to obtain a final diagnosis and also obtain at the same time a definitive treatment (16). All lesion precluded for EMR, flat or polypoid, must be located within the mucosal layer, less than 20 mm and without lymph node. Before the procedure an EUS examination of the lesion will give this kind of information (17).

EMR is a method comparatively easy to carry out and appears to be very safe in terms of complication (no perforation, 8% required endoscopic hemostasis because of arterial bleeding) (18).

The method for proceeding EMR is simple and consist of lifting the lesion by submucosal saline injection, possibly assisted and assessed by EUS. Then the lesion is held with a grasping forceps or with an aspiration through a cap and resected by a snare.

The negative indications of EMR are : hypoechoic changes in the submucosa, ulcerative change and fusion of the second and fourth layers. These figures are demonstrated by prior EUS examination (18,19).

Miniprobes

For diagnosis of a superficial cancer growing up inside a flat or a polypoid lesion, the frequencies of the US beam (7.5 & 12 Mhz) usually utilized in conventional EUS are not sufficient for differentiating cancer invading the muscularis mucosae from those invading the submucosa (20). That the reason why we need of enhancing lateral resolution by use of higher frequencies (20-30-40 Mhz) (21,22). Such frequencies are now available by the use of miniprobe.

The most important advantage of miniprobe is their convenience. Namely, using the miniprobe, we could obtain an ultrasonic image of lesions during routine endoscopic work-up : easy accessibility of EUS examination. Second, using the miniprobe, we could obtain real time EUS scanning lesion in more detail under endoscopic visualisation. Third, the real utility of the miniprobe is particularly clear for small lesion, obtaining an adequately scanned image, even if a gastric lesion is located in the prepyloric region or at the cardia where manipulation of the conventional ultrasound endoscope is not always easy.

Finally, the miniprobe can always be passed through stenoses.

Major disadvantages include the limited scanning area and depth of penetration (10-15 mm). It seems to be the first ligne procedure for parietal lesion : high frequency ultrasound probe sonography during diagnostic endoscopy is particularly useful when evaluating superficial and submucosal lesions of less than 2 cm in depth, and when selecting lesions amenable to EMR (21,23,24).

In order to resume the usefulness of EUS on the assessment of GI tract polypoid lesions, we only will mention some critical cases.

EUS of GI tract polyps

Benign polyps appear on EUS mainly as echohomogenous, echodense (rarely echopoor) lesions originating in the first and possibly second wall layer. In many cases the second echopoor layer is clearly visible beneath the lesion. Balloon compression of epithelial polyps located in the antrum or cardia, may lead to compression of deeper layers, thus giving rise to overstaging or misstaging of the polyps as infiltrative lesions (25).

Gastric adenoma

Gastric adenoma could be differentiated from early gastric cancer invading the submucosa and from infiltrating cancer by means of EUS. However, carcinoma

confined to the mucosa are indiscernible from adenoma on the basis of the echopattern alone (8,9,11,15).

In clinical practice, EUS could be performed prior to planned endoscopic polypectomy especially of larger and sessile adenomas so as to detect transmural growth, in which case treatment would change to gastric surgery. The use of EUS prior to polypectomy is also indicated to exclude the presence of large intratumoral vessels (2). Focal thickening of gastric folds mimicking a polypoid lesion can also be caused by intramural vessels in portal hypertension. As large particle or snare biopsy would have serious consequences in such cases, EUS is recommended prior to large particle biopsy of giant gastric folds. Metastases of other tumor (eg. ovarian carcinoma or malignant melanoma) can look like a polyp and can be well visualize on EUS but the clinical implications of such investigations are probably limited (1). This apply especially in the distinction of benign from malignant mucosal overgrowth where EUS is not able to give a reliable differential diagnosis. In all cases, the EUS examiner should refrain from making an histologic diagnosis and should concentrate on obtaining descriptive findings.

Duodenal carcinoid tumor

A duodenal carcinoid tumor is an epithelial neoplasm with a great tendency, at early stage, to penetrate the lamina propria with infiltration of the submucosa. It is observed as a submucosal tumor. Prognosis depends on metastasis to lymph node or liver metastases. The parameters predicting the metastatic spread are the depth of growing, the histological type, the presence of mitotic figures, ulceration and size of the tumor (26,27).

Gastric inflammatory fibroid polyps

Such protruding lesions, covered by normal mucosa, are detected as submucosal tumors by endoscopy. No histological diagnosis by means of endoscopic superficial biopsies is possible because the characteristic structures are situated below the mucosae. Inflammatory fibroid polyps develop in the deep mucosa and or submucosa without encapsulating and appear on EUS imaging as echopoor lesion located in the second or the third layer with indistinct margins. Therefore, endoscopic removal could be performed for histologic diagnosis without complication. Local excision is curative since there is no malignant potential (28).

Colorectal adenoma

In smaller pedunculated polyps which have to be snared and resceted anyway, there is no real need for endosonographic scanning. Larger sessile adenomas, especially of the villous type, may contain focal or even infiltrating malignancy and the results of histological examination of biopsy specimens can be negative.

Colorectal adenoma are well recognized as precancerous lesions.

We can not say for sure whether EUS permits accurate differentiation between adenoma and carcinoma (29). Malignant adenoma tend to be more echo-poor and inhomogenous but unfortunately false positive and false negative occur. This applies especially in the distinction of benign from malignant mucosal tumor where EUS is not able to give a reliable differential diagnosis (30).

Anyway, EUS could allow presumptive diagnosis since there are certain echofeatures which suggest a benign tumor (smaller, well demarcated, echo-homogenous lesions) or a malignant tumor (larger, echo-inhomogenous lesion with irregular margins, destructions of the layers and enlarged surrounding lymph nodes).

EUS cannot be used to differentiate between villous adenoma and T1 carcinoma, whereas infiltration of the muscularis propria by an adenoma containing a T2 carcinoma with a negative superficial biopsy could be detected by EUS (30). The practical value of EUS in this setting is not entirely clear. Large adenoma have to be removed anyway, either endoscopically or surgically. Histological examination of the resected specimen indicates whether malignancy is present and whether the excision was radical enough.

Whether EUS will change the management of these patients is open to discussion (29).

Rectal carcinoid tumor

Rectal carcinoid tumor is an epithelial neoplasm developing in the lower portion of the mucosa and have a wide variation in degree of malignancy: submucosal invasion is often observed at early stage. EUS evaluation of these epithelial tumors will guide treatment (31): endoscopic resection may be performed for rectal carcinoid tumor without atypia, less than 1 cm and confined to submucosa. Nevertheless, we have to keep in mind that the incidence of metastases is around 1.7% if there is an invasion of the submucosa and 48% if there is an invasion of the muscularis propria (32).

Conclusions

In determination of the nature of polypoid lesions, EUS has been found to be accurate. However, caution is necessary when assessing the ability of EUS to determine the nature of a given polypoid lesion: EUS can not replace histology, and although conclusions can be drawn from the endosonographic pattern and layer of origin, histopathological confirmation is still mandatory. This apply especially in the distinction of benign from malignant mucosal overgrowth where EUS is not able to give a reliable differential diagnosis. In all cases, the EUS examiner should refrain from making an histologic diagnosis and should concentrate on obtaining descriptive findings. EUS can help for de-

terminations making. EUS enhances the safety of endoscopic resection of GI polypoid lesions. EUS provides useful information together with histological findings for deciding whether treatment should consist of endoscopic or surgical resection.

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