

Endoscopic Ultrasonography: Examination Of (75) Iraqi Patients With Radial scanning echoendoscope and Curved Array Transducer Scanning and Guided Fine Needle Aspiration Biopsy

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ABSTRACT

Background: Ultrasound scanning under endoscopic guidance, called endoscopic ultrasound (EUS), is one of the more recent application of diagnostic ultrasound. EUS use has rapidly expanded since its first clinical utilization around 1980. The first flexible instrument were based on longitudinal scanning technique using electronic curved array transducer and the complementary radial scanning technique with mechanical transducer. **Patients and Method:** This study included 75 patients seen at the gastroenterology and hepatology center at Al-Sadder teaching hospital between 2008 and 2009 were submitted to the EUS examination for different indications. The examination reports contained an endoscopic and ultrasonic description including the location of possible lesion, its outline, presence or absence of stenosis, description of echo characteristics, possible involvement of surrounding including possible lymph nodes.

Results: We divided the results in to the following groups:

- Group 1: Hypertrophied gastric folds (7 patients)
- Group 2: Staging of gastric tumor (11 patients)
- Group 3: Diagnosis of bulge like lesion (5 patients)
- Group 4: Proving the diagnosis and staging of pancreatic tumor (14 patients)
- Group 5: Proving the diagnosis of pancreatitis and pancreatic pseudocyst (4 patients)
- Group 6: Proving the diagnosis and staging of periampullary tumor (14 patients)
- Group 7: Liver lesion (2 patients)
- Group 8: Others indications (4 patients)
- Group 9: Diagnosis of CBD stones (14 patients)

Conclusion:

- From this study it is concluded that it is possible to visualize various lesions of upper GI tract as well as various lesions adjacent to it by using EUS with curved array transducer.
- It seems that EUS has high diagnostic potential regarding exclusion of malignancy if normal wall layers are imaged in the esophagus or stomach and also if no lesion suggestive of malignancy is found in the pancreas.
- EUS is the most accurate modalities for T staging (wall invasion) of esophagus and stomach.
- EUS seems valuable for evaluation of hypertrophied gastric wall.

It is documented that EUS is very useful for detecting the cause behind external compression of gastric wall and also for submucosal elevation that caused by submucosal and stromal tumors.

Key word: EUS FNA malignancy

Introduction:-

Ultrasound scanning under endoscopic guidance, called endoscopic ultrasound (EUS), is one of the more recent application of diagnostic ultrasound. EUS use has rapidly expanded since its first clinical utilization starting around 1980. The first flexible instrument were based on longitudinal scanning technique using electronic curved array transducer and the complementary radial scanning technique with mechanical transducers.

Echoendoscopes

There are two types of echoendoscopes:

1. Radial scanning echoendoscopes: This ultrasound endoscope is equipped with side viewing optic and distally placed mechanically rotating scanning transducer. Perpendicular to the axis of insertion tubule the ultrasonic scan field is generated by single crystal element undergoing 360 degree rotation.

Most radial scanning instrument also include working channel mainly used for irrigation and suction. However, due to the 90 offset between the ultrasonic filed and direction of the working channel, an ultrasound guided puncture cannot be safely performed .this is because there is no visual control of the needle tip during advancement of the needle.

2.Linear array scanning echoendoscopes This instrument consists of an oblique forward viewing video gastroscope with curved linear array transducer mounted in front of the lens.

The electronic curved array transducer generated a 120 sector scans in longitudinal plan, with scanning direction along the axis of gastroscope.

The optical lens (axis) and the working channel are in the same plane, thus allowing visualization of interventional instrumentation in the endoscopic as well as in the ultra sound image. This facilitates EUS guided procedures such as Fine -needle Aspiration biopsy (FNA).

A water filled balloon may be attached to the transducer to improve acoustic coupling and to optimize visualization of interest. Filling or emptying of balloon is controlled by the air/water and suction valves of endoscope.

Indication of EUS

EUS is usually performed at the end of diagnostic work up in order to answer one or more specific questions.

The capability of visualizing 5 wall layers with high resolution qualifies EUS as the method of choice to other imaging modalities such as CT or MRI in imaging luminal lesions.

Generally accepted indication for EUS of upper gastrointestinal tract:-

- Staging of esophageal and gastric cancer.
- Staging of malignant gastric Lymphoma.
- Assessing operability of pancreatic cancer.
- Localization of pancreatic cancer.
- Staging of ampullary tumor.
- Staging of ductal biliary cancer.
- Submucosal tumors , extramural impression.
- Exclusion of pseudoachalasia.
- Giant gastric folds.
- Intramural gastric varices
- EUS guided FNA of paraesophageal tumors, pancreatic lesions, left adrenal gland, and intramural tumor.

Aim of study :

The aim of this study is to evaluate:-

- 1.If is possible to visualize a malignant tumor of the esophagus , stomach , pancreas and ampulla with endoscopic ultrasonography using curved array transducer.
- 2.If EUS reliably can diagnose a malignant tumor of esophagus ,stomach, pancreas and ampulla in

in patients suspected of these diagnosis.

3.The accuracy of EUS staging of upper GI tract malignancy and various malignancy adjacent to it using curved array transducer.

Patients and methods :

This study included 75 patients seen at the gastroenterology and hepatology center at Al-Sadder teaching hospital between 2008 and 2009 were submitted to the EUS examination for different indications.

These patients had been divided into the following groups according to the indications of examination:

Group 1: Hypertrophied gastric folds (7 patients)

Group 2: Staging of gastric tumor (11 patients)

Group 3: Diagnosis of bulge like lesion (5 patients)

Group 4: Proving the diagnosis and staging of pancreatic tumor (14 patients)

Group 5: Proving the diagnosis of pancreatitis and pancreatic pseudocyst (4 patients)

Group 6: Proving the diagnosis and staging of periampullary tumor (14 patients)

Group 7: Liver lesion (2 patients)

Group 8: Others indications (4 patients)

Group 9: Diagnosis of CBD stones (14 patients)

All these patients were examined by Olympus Aloka clv 260 units . This instrument consists of an oblique forward viewing gastroscope with curved array transducer mounted in front of the lens . The transducer frequency is 7.5 MHz . This echoendoscope has a working channel 2.0 mm for biopsy taking and FNA and Radial echoendoscope with mechanical rotating transducer along 360 degree .

The examination reports contained an endoscopic and ultrasonic description including the location of possible lesion, its outline , presence or absence of stenosis , description of echo characteristics, possible involvement of surrounding including possible lymph nodes.

Results:

According to the indications of examination, these 75 patients were divided into the following groups:

Group 1:-

Seven patients had hypertrophied gastric folds detected during upper endoscopic examination. Five patients had normal gastric wall and repeated gastric biopsy stay negative . One patient had loss of echolayer pattern of the wall consistent with linitis plastica. Remaining patient had hypoechoic thickening wall and follow up of this patient verified lymphoma. Table(1)

Group 2:-

Included 11 patients with gastric lesions (exophytic or polypoid mass) detected by upper endoscopic examination . Malignancy was confirmed histopathologically .

These patients had hypoechoic thickening of gastric wall at the site of lesion with perigastric lymph nodes detected by EUS. The staging was T2N1 T3N2 which confirmed by surgery .(table 3)

Group 3:-

Included 5 patients with bulge like lesions. Three patients, the bulge caused by splenic and liver impression. One patient the bulge was submucosal lesion arising from muscularis propria (LEIOMYOMA).

The last patient presented with bleeding per rectum and endoscopy revealed bulge like and rectal EUS revealed mass arising from muscularis propria mostly leiomyoma and this proved by surgery.

Group 4:-

This group includes patients (14) with pancreatic mass discovered by ultrasound or CT scanning and submitted to the EUS examination to confirm the diagnosis by FNA and for staging of tumor. Malignancy was confirmed histopathologically by EUS guided FNA. These findings were confirmed by surgical exploration. (table 2)

Group 5:-

Including 4 patients with acute and chronic pancreatitis that complicated by pseudocysts (head :1, body :1) as detected by ultrasound or CT scanning and submitted to EUS to exclude malignancy by FNA of the cysts.

(table 4) Examination of aspirated material verified the inflammatory origin of these cysts.

Group 6:-

Included fourteen patients referred for evaluation of periampullary tumor, 12 patients, ultrasound and CT scan showed pancreatic mass. EUS examination done and showed pancreatic tumor proved by FNA and surgery.

EUS examination showed hypoechoic lesions (in 2 patients) limited to the ampullary region. The final diagnosis (adenocarcinoma) was achieved by surgery and biopsy.

Group 7:-

Includes two patients with liver lesions.

Group 8:

Includes patients with different presentations and findings: Gastric polyps (2 patients) were confirmed by EUS to be mucosal in origin without feeding artery inside.

Polypectomy and histopathology considered these polyps as hyperplastic.

Submucosal elevation were identified in (2) patients by upper endoscopy and confirmed by EUS as leiomyoma. Later on surgical resection of these lesions was done.

One patient referred for EUS as uncinate process mass and examination done and showed normal uncinate process and CT scan repeated by another hand revealed normal uncinate process. Last patient referred for EUS as suspicious case as CT scan report not sure about the site of mass probably related to the pancreas head but EUS showed this unrelated to pancreatic head and mostly gastrointestinal stomal

tumor (GIST) proved by FNA.

Last patients had bilateral hilar lymphadenopathy detected by CXR and CT scanning. EUS showed hypoechoic rounded masses limited to hilar region (lymph nodes (6.7 × 4.5 cm) at the subcarinal space. EUS guided FNA showed metastatic carcinoma.

Group 9:-

Includes 14 patients with CBD stones detected by EUS and this finding proved by ERCP.

Discussion:

This study is the second one achieved in Iraq regarding the EUS evaluation of 75 patients with different indications referred to the Gastroenterology and hepatology center at Al-Sadder Teaching Hospital. In first group, EUS correctly diagnosed all Malignant Lesion of stomach that confirmed diagnosis of by Surgery and during follow up with biopsy. Similar finding was observed in the study done in Copenhagen by Peter Vilmann (9).

In 2nd group the EUS diagnosis was correct in all cases. In a study done by Peter Vilmann in Copenhagen (9) including 9 patients with exophytic Lesion of the stomach, 7 patients diagnosed by EUS as having Malignancy and 5 patients the tumors were invading the adjacent structures to the stomach (T4), while in the other 2 patients the staging was (T3). However, in our study most of the patients stage (T3) and no patient diagnosed stage (T4).

In 3rd group of patients divided in two subgroups: First subgroup include 6 patients with bulge like lesion, three patients, the bulge is caused by liver and splenic impression and one patient the bulge was submucosal lesion arising from muscularis propria (leiomyoma).

Second subgroup include 4 patients with acute and chronic pancreatitis complicating by pseudocyst as detected by ultrasound or CT scan and submitted to EUS examination to exclude malignancy by FNA of the cyst and examination of aspirated material verified inflammatory origin of these cysts. Similar finding were observed in the study done by William R. Brugge (7) who talked about the role of EUS in the diagnosis of cystic lesions of pancreas.

In 4th group of patients divided in two subgroups: First subgroup including (14) patients with pancreatic mass. 5 patients had pancreatic mass at the head, 6 patients at body, two at the tail and one patient was normal EUS wrongly diagnosed as pancreatic uncinate process mass.

Second subgroup including patients with periampullary tumor (14), 12 patients by EUS-FNA proved to be pancreatic tumor and the other two patients prove to be ampullary tumor.

Similar findings were observed in a study done by Greg A. Boyce (6), Rosch T and Dittler HJ (10) who

consider EUS to be more accurate modalities for local T staging and predicting vascular invasion.

In other groups for different indications, liver lesions(2), gastric polyps(2), submucosal polyps(liomyoma)

Last groups of patients with cbd stones(14) detected by EUS and confirmed by ERCP. Similar findings were observed by T. Rosch, U. Will(1) and Manoop S. Bhutani(4).

Conclusion and Recommendation:

- From this study it is concluded that it is possible to visualize various lesions of upper GI tract as well as various lesions adjacent to it by using EUS with curved array transducer.
- It seems that EUS has high diagnostic potential regarding exclusion of malignancy if normal wall layers are imaged in the oesophagus or stomach and also if no lesion suggestive of malignancy is found in the pancreas.

- EUS image alone can not reliably differentiate a benign lesion from malignant one (esophagus, stomach, pancreas).
- EUS is the most accurate modalities for T staging (wall invasion) of esophagus and stomach.
- EUS seems valuable for evaluation of hypertrophied gastric wall.
- It is documented that EUS is very useful for detecting the cause behind external compression of gastric wall and also for submucosal elevation that caused by submucosal and stromal tumors.
- Certainly we need more experience with EUS examination, more series to be published, and also we need more and advancing EUS systems.

Table 1 EUS of (7) patients with hypertrophied Gastric wall

Age	Sex	Hypertrophied gast. Folds detected by	Histopathology prior to EUS	EUS Findings	Staging	Operative Findings
55	F	Endoscopy	Gastritis	Diffuse thickening of gastric wall with loss of echo layers	T3N1	Same EUS findings (adenocarcinoma)
68	F	Endoscopy	Gastritis	Normal	-	-
29	M	Endoscopy	Gastritis	Normal	-	-
49	F	Endoscopy	Gastritis	Normal	-	-
66	M	Endoscopy	Lymphoma	Hypoechoic transmural thickening of wall	T2 N0	-
75	M	Endoscopy	Gastritis	Normal	-	-
50	F	Endoscopy	Normal	-	-	-

Table 2 EUS of (14)Patients with Suspicion of Pancreatic Cancer

Age	Sex	Lesions suspected by	Location	Size of Lesion by U/S or CT	EUS Findings	Staging by EUS	FNA Findings by EUS	Operative Findings and Follow up
55	F	CT scanning	Tail	3 cm	Body(2.9cm)+mildly dilated PD +nm CBD+ASC ITS	T3 N0	Adenocarcinoma	Same EUS Findings
52	M	CT scanning + U/S	Tail	2.5cm	Tail mass (3.5cm),nm CBD and nm PD	T3 N0	Adenocarcinoma	Same EUS Findings
29	M	CT scanning	Head	4cm	Head Mass (4.5cm) Dilated CBD + Pancreatic duct	T3 N0	Inflammatory cells only	-
66	M	CT scanning	Uncinate process	2.5 cm	Normal	-	-	-
52	F	CT scanning + U/S +MRI	Head	7.5 cm	Body Mass (8 cm) Invasion of portal vein+dilated cbd +dilated pd	T3 N0	Adenocarcinoma	-
68	M	CT scanning	Body	4.5cm	Body Mass (4.7cm) Invasion of portal vein+SMA	T4 N0	Three trial EUS guided FNA proved adenoca in third sample	Same EUS Findings
Age	Sex	Lesions suspected by	Location	Size of Lesion by U/S or CT	EUS Findings	Staging by EUS	FNA Findings by EUS	Operative Findings and Follow up
65	F	CT +U/S	Distal cholangiocarcinoma or p.head?	2.5 cm	Head Mass (2.5 cm) Dilated CBD + Pancreatic duct	T2 N0	Adenocarcinoma	Same EUS Findings
30	M	CT+U/S	Tail	4.5 cm	Body Mass (4.5 cm)	T4N0,adherent to kidney	Adenocarcinoma	Same EUS Findings
40	M	CT SCAN	Tail	4 cm	Body and tail	T4NO	Adenoca	Same as EUS
60	F	CT	Head	5cm	Head	T3NO	Adenoca	SAME EUS
45	F	CT scan	Body	4cm	Body mass(5 cm) invasion of pv	T3NO	Inconclusive	Same EUS
50	F	CT scan	Head	5 cm	Head mass(5.5 cm) dilated cbd +pd	T3NO	Adenoca	Same EUS
45	M	CT SCAN +U/S	Tail	4cm	Tail mass(5.5cm)	T4NO	Adenoca	Same as EUS
75	M	CT SCAN	Head	6cm	Head mass(6cm)+dilated CBDand PD	T3NO	Adenocarcinoma	Same EUS

Table 3 EUS of 11 Patients with Gastric Lesions Suspected of Malignancy

Age	Sex	Endoscopic Findings	Location	Histopathology Prior To EUS	EUS Findings	Staging	Operative Findings and Follow up
45	M	Ulcerated mass	ANTRUM	Adenocarcinoma	Hypoechoic tras mural thickening of wall	T3 N2	Same EUS Findings
50	F	Polypoid mass	ANTRUM	Adenocarcinoma	Hypoechoic tras mural thickening of wall	T3 N2M1	SEND FOR CHEMOTHERAPY
35	M	POLYPOID AL MASS	ANTRUM AND PYELORUS	ADENOCARCINOM A	Hypoechoic tras mural thickening of wall	T2N0	SAME EUS FINDING
43	F	Ulcerated POLYP	BODY	AdENOMATOUS POLYP WITH DYSPLASIA	Hypoechoic tras mural thickening of wall	T2N0	Same EUS Findings
66	M	VOLCANIC LIKE ULCERS	Antrum	Lymphoma	Hypoechoic tras mural thickening of wall	T2 N0	SEND FOR CHEMOTHERAPY-
40	F	Ulcerated mass	BODY	Adenocarcinoma	Hypoechoic tras mural thickening of wall	T3 N2	Same EUS Findings
50	M	Polypoid mass	BODY	BODY	Hypoechoic tras mural thickening of wall	T3 N2	-
52	M	Ulcerated mass	Body	Non – Hodgkin Lymphoma	Hypoechoic tras mural thickening of wall	T3 N2	Chemotherapy
57	M	Ulcerated mass	Body + Antrum	Adenocarcinoma	Hypoechoic tras mural thickening of wall	T3 N2	Same EUS Findings
49	F	Ulcerated mass	Lesser Curve	Non – Hodgkin Lymphoma	Hypoechoic tras mural thickening of wall	T3 N2	Chemotherapy
68	F	Polypoid mass	Antrum	Adenocarcinoma	Hypoechoic tras mural thickening of wall	T3 N1	Same EUS Findings

Table 4 EUS of 4 Patients with Suspicion of Pancreatitis

Age	Sex	Lesions suspected by	Location	Size of Lesion by U/S or CT	EUS Findings	FNA Findings by EUS
26	m	CT scanning	Head	3 cm	Hetrognous ,lobulated and cystic pancrease ,dilated pd,nm cbd,	Chronic inflammatory cells
15	M	CT scanning + U/S	Body	3.5 cm	Hetrognous ,lobulated and cystic pancrease ,dilated pd,nm cbd,	Chronic inflammatory cells(pseudocyst)
45	M	CT scanning	Head	2 cm	Hypoechoic area 2x2 cm,nm pd ,nmcbd	Inflammatory cells(focal pancreatitis)
40	F	CT SCANNING	HEAD	4 CM	Hetrognous ,lobulated and cystic pancrease ,dilated pd,nm cbd,	Chronic inflammatory cells(pseudocyst)

Summary :

This study which is the second one achieved in Iraqi dealing with (75) patients referred to the gastroenterology and hepatology teaching hospital during the period between April 2008 and October 2009

were submitted to the endoscopic ultrasonography (EUS) for different indications .

- Seven patients with hypertrophied gastric folds ,all of them were diagnosed by EUS as having malignancy .
- 11 patients with gastric lesion suspected of malignancy. In all of them EUS diagnosed the lesions as malignancy .
- Twenty six patients with pancreatic mass detected by either abdominal ultrasound or by CT scanning . The malignancy was confirmed histopathological by EUS guided FNA.
- Other indications include ; ampullary tumor (2 patients) , pancreatitis and pancreatic pseudocysts (4 patients) , external compression on the gastric wall (3 patients) , gastric polyps (2 patients) , submucosal elevations (2 patients) , common bile duct stone (14 patient) , liver lesions (2), Gastrointestinal stromal tumor (GIST) (1), hilar lymphadenopathy (1 patient) The obtained EUS diagnostic were compared with final diagnosis (surgical exploration or follow up with histopathological examination) and there was similarity between two results.
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