Gastric Cancer Staging Comparism and Role of EUS

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ABSTRACT:

BACKGROUND:

The tumor stage of gastric cancer in the preoperative period must be evaluated to choose the type of therapy so the preoperative imaging diagnosis is the basis for a tumor–stage –adapted therapy of each patient .

OBJECTIVE:

Is to compare between the preoperative staging of gastric cancer which includes the ultrasound scan, CT scan and EUS findings and the postoperative staging which include the histopathological finding and to assess the efficacy of EUS in determining the tumor and lymph node stage of tumor.

PATIENT AND METHODS:

Prospective study of 32 patients with gastric cancer admitted to the surgical word in the gastroenterology and hepatology teaching hospital, medical city, Baghdad over the period from Nov. 2005 to Nov. 2007 who underwent gastric resection , all the cases were proved to be gastric cancer by endoscopic biopsy or by histopathological examination of the gastric specimen after operative resection, and all the cases radiologically investigated in the preoperative period by abdominal ultrasound, endoluminal ultrasound and abdominal CT scan.

RESULTS:

Show that there is increase in the staging in 18 (56.25%) cases and same staging in 8 (25%) cases and decrease staging in 6 (18.75%)cases.

CONCLUSION:

Endoluminal ultrasound is most accurate preoperative investigation to determine staging of gastric malignancy. Ultrasound and CT scan although it is important in the assessment but they downstage the tumor in about half of cases. So we recommend that EUS is done for all patients with gastric cancer for accurate planning for surgery.

KEYWORDS: gastric cancer, endoluminal ultrasound

INTRODUCTION:

Gastric cancer Prognosis is correlated to the stage of the tumor at presentation[1]. It is biologically aggressive disease that is virtually incurable when discovered in it 's symptomatic phase with a 5-year survival rate of less than 20%[1,2].However, Early gastric cancers are curable lesions, With 5-year survival rates of more than 90%[3]. Therefore, Early detection and surgical resection is the treatment of choice for localized disease. At the beginning of any cancer therapy, The tumor stage must be evaluated[3]. The choice of therapy is generally determined by the specific tumor stage[1,4]. Staging of the gastric cancer which is approved by endoscopic biopsy is done preoperatively by abdominal ultrasound,endoluminal ultrasound and abdominopelvic CT scan.

Endoluminal ultrasound examination

Five layers of gastric wall can be visualized endosono-graphically [5,6,7,8]:

1. Hyper echoic layer mucosa
2. Hypo echoic layer muscularis mucosa
3. Hyper echoic layer sub mucosa
4. Hypo echoic layer muscle layer
5. Hyper echoic layer serosa

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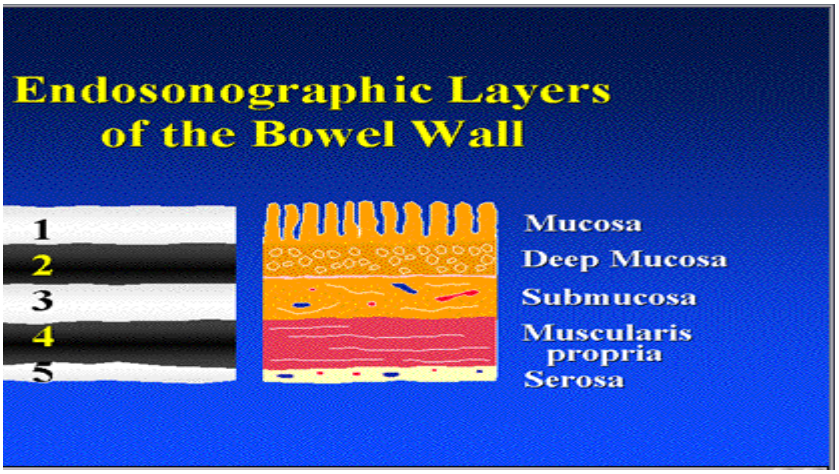

Lymph Node (N) staging [7, 8, 9, 10, 11, 12, 13, 14, 15]
Compartment I: Includes the perigastric lymph nodes (stations 1–6).
Compartment II: Iincludes lymph nodes along the left gastric artery (station 7) and common hepatic artery (station 8), around the celiac axis (station 9), at the splenic hilum (station 10), and along the splenic artery (station 11).
Compartment III : Includes lymph nodes in the hepatoduodenal ligament (station 12), at the posterior aspect of the head of the pancreas (station 13), and at the root of the mesentery (station 14).
Compartment IV: Includes lymph nodes along the middle colic vessels (station 15) and the paraaortic lymph nodes (station 16).

Surgery

Surgical removal of the tumor offers the only chance for cure [11, 12], Careful evaluation for evidence of distant metastasis will avoid unnecessary surgery [13].
Surgery is the treatment of choice for gastric cancer. The most important indicator for resectability and survival after surgery is early diagnosis and therefore early stage of disease at operation. Perioperative mortality is about 2%.
Distal (antral) tumors should be treated by subtotal gastrectomy and proximal tumors by total gastrectomy.

PATIENTS AND METHODS:

Prospective study of 32 patients with gastric cancer admitted to the surgical word in the gastroenterology and hepatology teaching hospital, Over the period from Nov. 2005 to Nov 2007 underwent gastric resection total and subtotal(billroth1 and 2) gastroctomy , total number of patients was 77 patients diagnosed with gastric malignancy, 45 patients had been excluded because 18 patients came with advance malignancy and send to chemotherapy and 27 patients came with complications and underwent palliative surgery(gastroenterostomy). (43.75 %) were males and 18(56.25 %) were females, their age range from 23 -75 years (mean age of 52 years).
The most common presenting symptom was epigastria pain.
For every case, The following had been done,
1. History taken
2. Full physical examination;
3. Investigations
a. Hematological
b. Biochemical
c. Osophagogastroduedenoscopy (OGD) to localize the site, size of the tumor, and taking biopsy from the tumor.
d. Abdominal ultrasound scan to check the liver,ascitis, and paraortic lymph node .
e. Abdominal CT scan to check the gastic thickness , Liver involvement, Ascitis, and lymph node .
f. Endoluminal ultrasound to get more information about tumor site, Size, Thickness of gastric wall and lymph node status N1 N2 N3.

So preoperative staging is recorded of each case according to TNM classification system.

RESULT:

In this prospective study 32 patients were collected during a period 24 months14 (43.75 %) were males and 18 (56.25 %) were females, Their age range from 23 -75 years (mean age of 52 years).
The data show that after using ultrasound scan, endoluminal ultrasound and CT scan in the preoperative period and compare the results with the histopathological finding in the postoperative period there is increase in the staging In 18 (56.25%)patients and same staging in 8 (25%)patients and decrease staging in 6(18.75%) patients.

Table 1: Comparism of T state between both staging

T staging	Preoperative staging Number of patients	Postoperative staging Same up down		
T1	14	3	9	2
T2	9	2	5	2
T3	7	2	4	1
T4	2	1	-	1
total	32	8	18	6
Percent	100%	25%	56.25%	18.75%

Table 2: Comparism of N state between both staging

N staging	Preoperative staging number of patients	Postoperative staging Same up down		
N1	20	4	12	3
N2	8	2	6	1
N3	4	2	-	2
Total	32	8	18	6
Percent	100%	25%	56.25%	18.75%

Table 3: Preoperative ultrasound staging of gastric cancer

Stage of tumor	Preoperative staging Number of patients	Postoperative staging Same up down		
Stage 1	18	3	12	3
Stage 2	10	2	7	1
Stage 3	2	-	1	1
Stage 4	2	1	-	1
Total	32	6	20	6
Percent	100%	18.75%	62.5%	18.75%

Table 4: Preoperative CT scan staging of gastric cancer

Stage of tumor	Preoperative staging Number of patients	Postoperative staging Same up down		
Stage 1	18	4	11	3
Stage 2	9	2	5	2
Stage 3	3	1	1	1
Stage 4	2	1	-	1
Total	32	8	17	7
Percent	100%	25%	53.125%	21.875%

Table 5: Preoperative EUS staging of gastric cancer

Stage of tumor	Preoperative staging Number of patients	Postoperative staging Same up down		
Stage 1	20	10	5	5
Stage 2	10	5	3	2
Stage 3	1	1	-	-
Stage 4	1	-	-	1
Total	32	16	8	8
Percent	100%	50%	25%	25%

Table 6: Comparism between both staging

Number of patients	Same staging	Increase staging	Decrease staging
32 patients	8 patients	18 patients	6 patients
100%	25%	56.25%	18.75%

DISCUSSION:

The accuracy of abdominal ultrasound in the preoperative staging of gastric cancer in T staging is about 50 % as study done by Neumaier et al. [16,17,18] while in our study is around 20%, and the accuracy in N staging is 55% while in our study is around 20%.

The accuracy of endoluminal ultrasound in the preoperative staging of gastric cancer in T staging is about 65 % IN study done by Lugering et al [19,20,21,22,23,24] while in our study is around 50%, and the accuracy in **N** staging is 70 % while in our study is around 50%.

The accuracy of abdominal CT scan in the preoperative staging of gastric cancer in T staging is about 40 % in early stage and 90% in late stage in study done by Minami et al [13, 16, 17] while in our study is around 25% in the early stage and 50% in late stage, and the accuracy in N staging is 55 % while in our study is around 30 %.

Points with and against EUS in T staging

Five layers of the gastric wall can be visualized endosono-graphically. The inner layer is hyper echoic. Thin hyper echoic and hypoecoic layers are alternating. The second hypoecoic layer represents the lamina muscolaris propria, if the carcinoma does not penetrate this second hypoecoic layer; It has to be classified as T1. If the third hyperechoic layer is infiltrated, the carcinoma is classified as uT3. The serosa, which is the critical pathohistological layer, cannot accurately be visualized by ultrasound because of its thinness [22,23, 24].

EUS is useful in detecting destruction of the gastric wall due to lymphoma, as well as linitis plastica and other disorders[22,23], EUS is the method of choice for staging infiltrative gastric wall disorders. Differential diagnosis of gastric fold thickening (Menetrier's disease, linitis plastica and lymphoma) is sometimes difficult, or even impossible, if no histologic abnormalities are found. In those cases, large biopsy forceps may increase diagnostic yield, or EUS-guided FNA may be considered 11,23]. MALT lymphoma can be assessed by EUS and EUS can be useful in assessing the response to Helicobacter eradication. Sub mucosal lesions of the gastrointestinal tract are best diagnosed by EUS. EUS can reliably distinguish between solid intramural lesions and extramural compressions [24]. Furthermore EUS can suggest the nature of the tumor by determining the origin of the tumor and the corresponding layer (e.g. a hypoecoic lesion in the fourth layer is pathognomonic for a stromal cell tumor). A major problem affecting endosonograpy (EUS) is caused by the definition of T2 and T3 carcinomas in the TNM system.

When the carcinoma infiltrates the subserosal fat tissue it still has to be classified as pT2 carcinoma. But sonographically the lamina muscolaris propria appears hypoechoic and the subserosal fat tissue and the serosa itself appear hyperechoic. Therefore a carcinoma which infiltrates the subserosal fat tissue is sonographically visualized as uT3. Furthermore the peritumorous desmoplatic reaction may equally appear in sonography, simulating a uT3 carcinoma as well when, Indeed, it is still a pT2 carcinoma [11,23,24].

Points with and against EUS in N staging

According to Kuntz's study tumor-infiltrated lymph nodes appear inhomogenueus and hypoechoic,similar to the primary gastric carcinoma, Whereas inflammatory enlarged lymph nodes mostly appear homogeneous and hyperechoic[11].

Other shortcomings of EUS include under staging due to microscopic nodal metastases and subtle tumor infiltration of deeper layers, which can go undetected[23,24]. Lymph nodes are detectable when their diameter exceeds 3 mm.

CONCLUSION:

Endoluminal ultrasound which is most accurate preoperative investigation to determine staging of gastric malignancy. Ultrasound and CT scan although it is important in the assessment but they downstage the tumor in about half of cases.

So we recommend that EUS is done for all patients with gastric cancer for accurate planning for surgery.

REFERENCES:

1. Tschmelitsch J, weiser MR, karpeh MS. Modern staging in gastric cancer (review). Surg Oncol 2000; 9:23–30.
2. Roukos DH. Current status and future perspectives in gastric cancer management. Cancer Treat Rev 2000;26:243–255.
3. Miller FH, kochman ML, talamonti MS, Ghahremani GG, Gore RM. Gastric cancer: radiologic staging. Radiol Clin North Am 1997; 35:331–49.

4. Schindler R, steiner PE, smith WM, dailey ME. The Classification of gastric carcinoma. Surg Gynaecol Obst 1941;73:30-39.
5. Nishi M, omori Y, miwa K. Japanese Research Society for Gastric Cancer (JRSGC): Japanese classification of gastric carcinoma. 1st English ed. Tokyo, Japan: Kanehara, 1995;3:6–15.
6. Sarela AI, Turnbull AD, coit DG, et al. Accurate Lymph Node Staging is of Greater Prognostic Importance Than Subclassification of the T2 Category for Gastric Adenocarcinoma. Ann Surg Oncol 2003;10:783-91.
7. Yoo CH, Noh SH, kim YI, Min JS. Comparison of prognostic significance of nodal staging between old (4th edition) and new (5th edition) UICC TNM classification for gastric carcinoma: International Union against Cancer. World J Surg 1999;23:492–98.
8. Willis S, truong S, gribnitz S, fass J, Schumpelick V. Endoscopic ultrasonography in the pre-operative staging of gastric cancer: accuracy and impact on surgical therapy. Surg Endosc 2000;14:951–54.
9. C Kuntz, C Herfarth. Imaging diagnosis for staging of gastric cancer. Seminars in Surgical Oncology 1999;17:96-102.
10. J Tschmelitsch, M R Weise, M S Karpeh. Modern staging in gastric cancer. Surgical Oncology, 2000;9:23-30.
11. Helmut Messmann, Klaus Schlottmann. Role of endoscopy in the staging of esophageal and gastric cancer. Seminars in Surgical Oncology 2001;20:78-81.
12. Polkowski M . Endoscopic ultrasonagraphy. Endoscop 2007;38:16-21.
13. G Angelelli et al. Role of computerized tomography in the staging of gastrointestinal neoplasms. Seminars in Surgical Oncology 2001;20:109-121.
14. Yao K ,Oishi T, mastusi T et al. Noval Magnified endoscopic findings of microvascular architecture in intramucosal gastric cancer.Gastro intes Endosc 2008;56:279-84.
15. Y. Adachi, I. Sakino, T. Matsumata, Y. Iso, R. Yoh, S. Kitano et al, Preoperative assessment of advanced gastric carcinoma using computed tomography. American Journal of Gastroenterology 92 ;1997: 872-75.
16. CE Neumaier et al. Role of ultrasonography in the staging of gastrointestinal neoplasms. Seminars in Surgical Oncology 2001;20:86-90.
17. Greene F, et al. AJCC Cancer Staging Manual, 6th edition. Springer-Verlag, new York, 2002.
18. Yagi K, Nakamura A, sekine A, endoscopic features of normal gastric mucosa. Gastroenterol Endosc 2008;10:1977-87.
19. Hori S, Tsuda K, Murayama S, et al. CT of gastric carcinoma: preliminary results with a new scanning technique. RadioGraphics 1992;12:257–68.
20. Minami M, kawauchi N, Itai Y, et al. Gastric tumors: radiologicpathologic correlation and accuracy of T staging with dynamic CT. Radiology 1992;185:173–78.
21. Greene F, et al. AJCC Cancer Staging Manual, 6th edition. Springer-Verlag, New York, 2002.
22. Miller FH, kochman ML, talamonti MS, ghahremani GG, gore RM. Gastric cancer: radiologic staging. Radiol Clin North Am 1997;35:331–49.
23. Botet JF, lightdale CJ, zauber AG, et al. Preoperative staging of gastric cancer: comparison of endoscopic US and dynamic CT. Radiology 1991;181:426–32.
24. Chong Ak, caddy GR, desmond Pv etal. Prospective study of the clinical impact of EUS. Gastrointes Endosc 2007;62:399-405.