Ultrasound of the Upper Digestive Tube as an Objective Argument for Initiating the Treatment and Evaluation of Its Results for the Dyspeptic Patient

Gomotîrceanu Adriana Maria[1], Mureşan Simona[1], Gliga Mirela[2]

[1] Topmed Medical Center, Internal Medicine Department
[2] University of Medicine and Pharmacy of Tg-Mures, Internal medicine Department

Objective: The study evaluates the effectiveness of dyspeptic patients' treatment to whom we have combined abdominal ultrasound with clinical examination at the start and also at the end of the treatment. Indirectly, the value of the abdominal ultrasound use for management of dyspeptics patients was assessed.

Material and methods: Our study was a clinical prospective observational study run on 72 patients (sex ratio F / M = 41/31, mean age 48±16 years) with dyspeptic symptoms and ultrasonographic changes in the oeso-gastro-duodenal aspect. The use of NSAID was investigated. The detection of anti-Helicobacter pylori antibodies was recommended for the start of the aetiological treatment . Anti-secretive treatment was prescribed for a period of three weeks and, in some cases, prochinetic treatment or eradication treatment were associated. Patients were then submitted to a clinical and ultrasonographic follow-up, at the end of the treatment. Points were awarded for the most common five clinical simptoms and four echographic signs and a score was calculated. The change in this score was searched fo. Statistical analysis was performd with software Microsoft Excel 2007, using the T student test.

Results: We obtained a record percentage improvement in each symptom, a highly significant average improvement of all symptoms after treatment ($p < 0.01$), and a decrease in the number of symptomes on a patient after the treatment. We also obtained an obvious improvement of ultrasound objective signs at the end of the treatment ($p < 0.01$).

Conclusions: Abdominal ultrasound can be a tool in assessing diagnosis and the initiation of the treatment of dyspeptic patients, but also a method of following the evolution of objective events under treatment .

Keywords: dyspeptic patient, upper gastrointestinal tract ultrasound, treatment

Introduction

Oeso-gastro-duodenal diseases are very common, and among them the inflammatory ones have the largest share. Some studies indicate the frequency of gastritis in people aged over 35 years at a rate of approximately 50% [1]. In most cases the treatment is empirical, based solely on clinical data accessed. And perhaps this is the reason why the therapeutic success is often unsatisfactory. No matter how good clinicians we are, the symptomatology has a strong individual coloration, and sometimes it is difficult to fit correctly in classical dyspeptic syndromes such as gastritis, ulcers, biliary, pancreatic, etc. It is estimated that 25% of the population complains of dyspeptic syndromes [2]. The gastritis rate is 24 much more higher then in the remaining population. On the other hand, the gold standard in the diagnosis of the upper digestive tract diseases is endoscopy with histopathology. But the accessibility to the method is sometimes a problem – long waiting lists – and not all patients are willing to accepte it. In this context the transabdominal ultrasound may be a convenient and very useful method in detecting oesophageal-gastro-duodenal diseases [3].

The abdominal ultrasound focused on the upper digestive tract offers accurate information on the structure and the thickness of the oesophagus's walls, the stomach and the duodenum, [4] and also on the amount of fasting gastric secretion, and duodeno-gastric and gastro-duodenal reflux or the existence of stasis. This procedure is widely practiced and easily accepted by patients being non-invasive and with no irradiation potential. Unfortunately, in their daily practice, only few ultrasound practician doctors examine the upper digestive tract segments: terminal esophagus, stomach and duodenum. This exam is time consuming, requires knowledge of the anatomical and physiological grounds pertinent to these organs and a trained eye in order to detect normal structures and alterations at this level. In order to do this we need accurate medical technology and adequate conditions such as 12 hours fasting. The data obtained through this method are valuable and can quickly guide the clinician to choose the appropriate treatment.

Material and methods

This was a clinical prospective observational study run on a group of patients who presented in ambulatory for internal medicine consultation followed by a transabdominal ultrasound. The study was performed between the 10th of January 2006 and the 11th of September 2009. The inclusion criteria were: age over 18 years, dyspeptic symptoms lasting at least six weeks with oeso-gastro-duodenal ultrasound changes, the ability to follow a 3 weeks treatment and to be present for an ultrasound follow-up at the end of the treatment period. The study's exclusion criteria were: very recent dyspeptic symptoms, postprandial status on presentation, incomplete treatment or the absence at the medical follow-up . According to these criteria, we selected a group

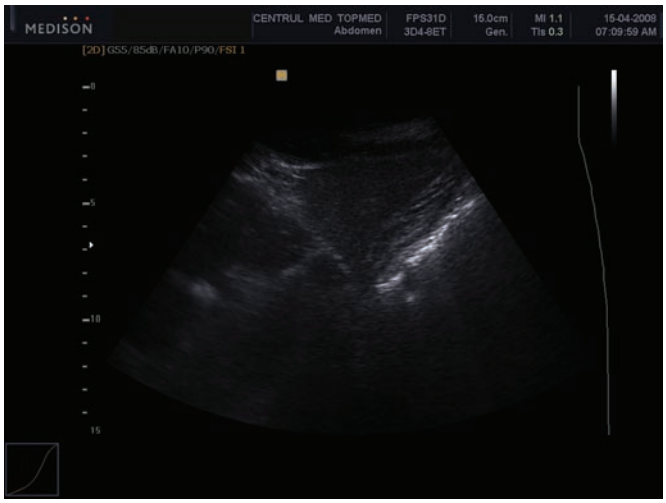

Fig. 1. Longitudinal section in epigastrum: the layers of the stomach wall, intense echogenicity of the mucosa, hypoecogenicity of the muscular layer.

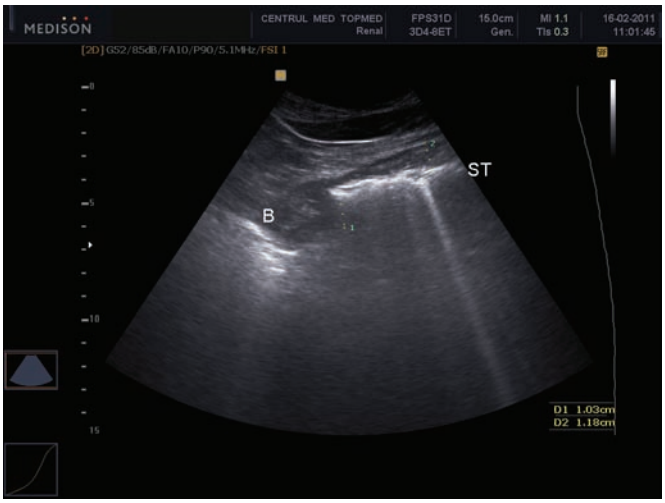

Fig. 2. Transverse section in epigastrum: B- duodenal bulb, ST- stomach; the anterior and posterior walls are measured

of 72 people, 31 men and 41 women, aged between 18 and 82 years (mean age 48 ± 16 years).

The study protocol included several steps of investigation. The first one adressed a throughly history regarding the well-known and presumed factors ready to generate dyspepsia. A special emphasis was placed on the potential role that the use of non steroidical antiinflamatory drugs (NSAID) play in the aetiology of upper digestive tract disease or the worsening of their signs and simptoms.

The second step consisted of an abdominal ultrasound. It was done with a Medison Sonoace X8, 4D equipment, color Doppler, having numerous options for image optimization. A curved array broad band transducer of 2–3.5–5 MHz was used. Patients were examined in the morning, after a full 12 hours fasting. The procedure was performed with the patient in the supine position using standard longitudinal sections in the epigastrium and skew-subcostal in the left side in order to view the terminal oesophagus and the corpus of the stomach. The transverse scan was performed for the duodenal bulb and the antrum and paraombilicale view on the right for DII. The pathological findings consisted of an echo intense-looking mucosa (Fig. 1, 2), erosive or ulcerated or with thickened folds. The thickness of the gastric wall should not exceed 5 mm, otherwise it is considered patological. It is more frequently a marker of inflammation (Fig. 3, 4). We also found abnormal gastric secretion in medium to large amount after over night fasting (Fig. 5). It was determined as volume through naso-gastric aspiration in the morning. This large amount was considered as an expression of a dissecretory state. We also noted as dismotiliy the existence of duodeno-gastric and gastroduodenal reflux and also the presence of à jeun fasting stasis, characterized by the existence of food particles floating in the liquid, often sedimented in the latch area. For step three the patients were advised to take a test in order to detect anti-Helicobacter pylori antibodies in serum. The test was based on rapid imunochromatography, detecting IgG antibodies, produced by Biolab. Sixty patients had done the test in order to introduce the eradication treatment for positive subjects. The prescribed treatment consisted of an acid-suppressive drugs for 3 weeks, associated with eradication treatment for 7–10 days in case of positive Helicotest, prokinetic drugs in some cases, avoidance of NSAID and diet.

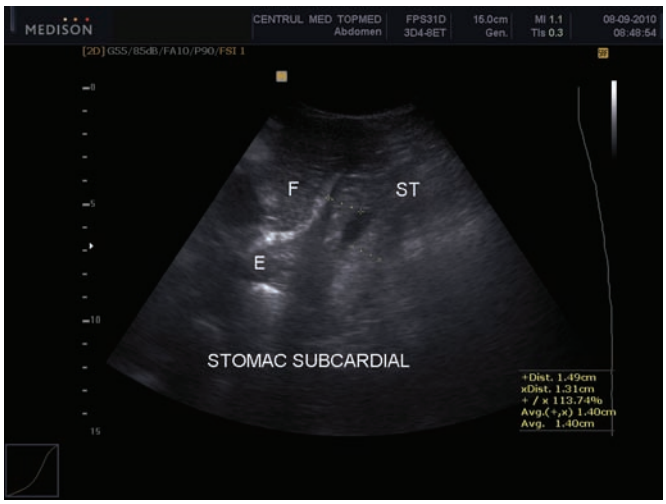

Fig. 3. Longitudinal view of the esophagus and stomach: the subcardial region – intense thickening of the walls

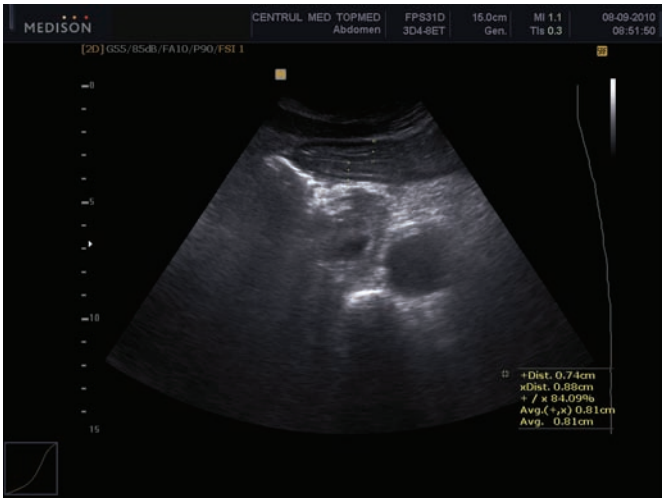

Fig. 4. Thickening of the gastric antrum – transverse section

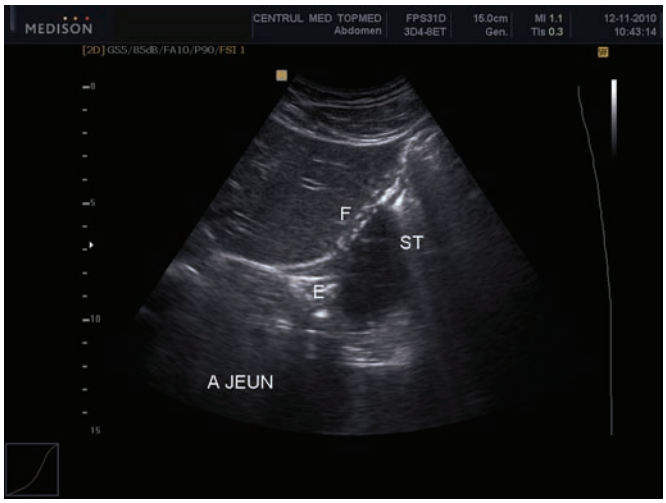

Fig. 5. Gastric content: echo free content of the stomach in a fasten status

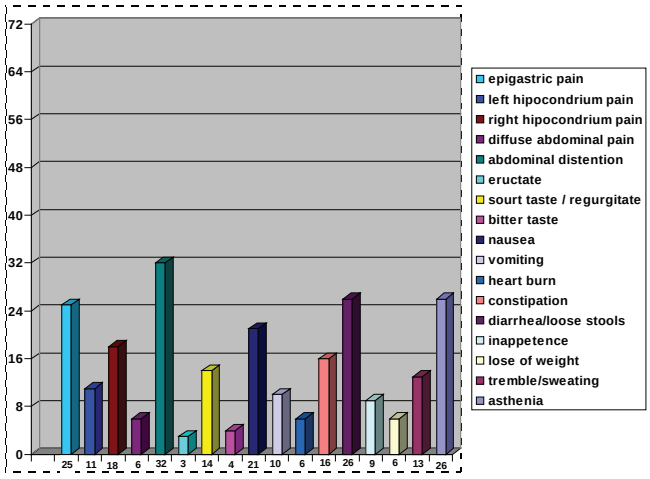

Fig. 6. The frecvency of symptoms before treatment

Step four, performed at the end of the three weeks treatment consisted in a medical follow-up – residual symptoms were evaluated, and an abdominal untrasound performed by the same physician. Persistent alterations were noted.

We analyzed the frequency of symptoms taken into account in the study group and the most common ultrasound changes before and after treatment. We loojed for the improvement due ti the treatment and its' significance. Each patient was awarded a clinical and US score before and at the end of the treatment. For each of the five following clinical signs, 1 point was given: abdominal distention, asthenia, accelerated intestinal passage - diarrhea, loose stools, eructation, pain in the right hypochondria. Each of the following echographic signs earned 1 point: fasting abnormal gastric secretion – gastric volume, hyper echoic gastric mucosa, gastric wall thickness > 10 mm and hyper echoic duodenal mucosa.

Statistical analysis was performed with software Microsoft Office Excel. We use t Student as a parametric test and we did descriptive statistics. The threshold for statistical significance was set at $p < 0.05$.

Results

The multitude of investigated symptoms and the extent to which they were found in the study group before treatment, is shown in Fig. 6. We found that the most common existing symptoms were: bloating, abdominal distension in 32 patients, asthenia in 26 patients, modified enteric transit with loose stools more than 1/day to 26 patients, epigastric pain in 25 subjects, nausea in 21 of them and right hypochondria pain in 18 patients.

After treatment, the most improved clinical manifestations and their degree of improvement in percentage were: pain in the right hypochondria in 94%, sour taste and acid regurgitation in 92%, vomiting in 90%, loss of appetite resolved in a percentage of 77% and chills, sweating and changes in enteric transit with loose stools, were resolved in the same proportion of 76%. We also noted that before treatment the patients usually had 3–4 symptoms, and after treatment they largely remained asymptomatic or they remained with one or two symptoms (Fig. 7). Sonographic changes were observed more frequently at the level of the stomach – 78.82%, in lower percentage at the duodenum – 18.54% and rarely at the terminal oesophagus accessible to ultrasound – 2.64%. The component of the detected changes is shown in Fig. 8. Thus the most frequent ultrasound signs at the stomach were gastric secretion in increased quantity, the appearance of echo-intense mucosa, gastric wall thickening up to 10 mm and the appearance of thickened mucosa. The most common alterations found at the duodenum were the echo-intense mucosa and the erosive-ulcered mucosa. Individually analyzing the improvement of sonographic

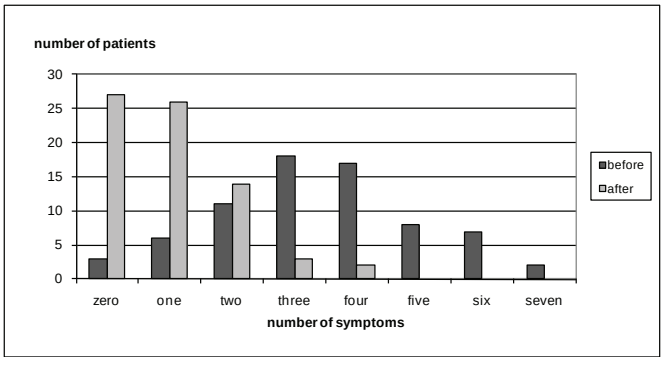

Fig. 7. The number of symptoms on a patient before and after treatment

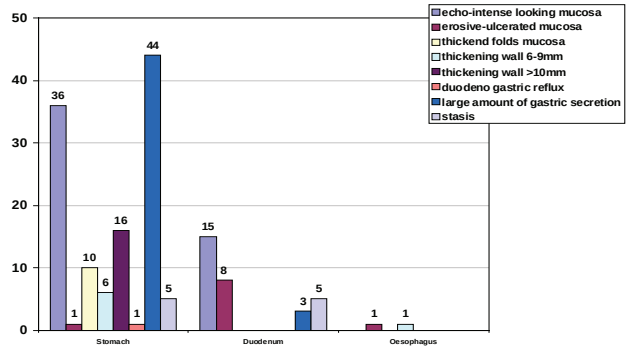

Fig. 8. The most frecvent sonographic changes at oeso gastro duodenal level

Table I. Semnification of improvement of the symptoms and ultrasonographic changes after treatment

		Before treatment		After treatment		Significant	
	Patients	Average	Dispersion	Average	Dispersion	t Stat	for
Symptoms	72	1,8056	1,0321	0,5278	0,5063	11,3804	p<0,01
Echographic changes	72	1,5417	0,5898	1,1806	0,3472	3,6292	p<0,01

signs in the stomach, the most significant remissions were noted regarding wall thickening at the rate of 43%, thickening of gastric mucosa at the rate of 40% and decreased secretion of fasting at the rate of 29%. At the duodenum, the erosive-ulcerated mucosa appearance resolved at a rate of 62% and 26% in echo-intense mucosa. We compared, using the Student test, the group's average on two global attributes: symptoms and ultrasonographic changes before and after treatment. The results reported in Table I, show that between the two evaluative moments, all recorded parameters had substantial improvements ($p < 0.01$). We can underline that, in the symptoms group, the average difference is greater than in the case of the ultrasound changes which shows a more obvious symptomatic improvement than an objective one. Regarding the etiology of dyspepsia in the study group, we could incriminate the use of NSAID in 12 cases, representing 16.66% of the subjects. The existence of anti-Helicobacter pylori antibodies was proved in 36 individuals from 60 tested, representing 60% of the cases.

Discussions

The ultrasound method is relatively less used to examine the upper digestive tract and this fact is due to belief, that it is prone to artifacts due to the air content in the digestive tract. Done carefully, by skilled physicians on proper equipment and strict fasting conditions – 12 hours, the method proves to be a valuable tool. Pathological changes can be viewed easily in the antral and the corporeal stomach, at the bulb and a little more difficult at the terminal oesophagus, the DII and the posterior gastric wall, when it comes to small lesions. But in these situations we can use optimization techniques [5].

In these circumstances an abdominal ultrasound technique can be accurate, reliable, reproductible and handy. Combined with the clinical examination of the dyspeptic patient, it may reveal anatomical changes of the mucosa and wall, at oeso-gastro-duodenal level or alterations of physiological processes of gastric secretion or motylity, reflux or stasis [6]. These data are extremely useful in initiating appropriate pathogenesis treatment [7] with acid suppressive drugs, proton pump inhibitors or H2 receptor antagonists and possibly prokinetics. The effect can be maximized by etiological treatment to eradicate Helicobacter pylori infection, and cessation of administration of NSAID.

Hard as it may seem, ultrasounds can make a distinction between functional dyspepsia and inflamatory diseade like gastritis, oesophagitis, duodenitis and functional dyspepsia. In both cases the endoscopy with biopsy is the golden standard for the differential diagnosis. The functional dyspepsia benefits from a complex treatment [8,9].

The duration of treatment of three weeks is the minimal acceptable for a curable effect, be it an in flamatory, dyskinetic or altered sectetion disease of the upper digestive tract. The improvement of symptoms and the reduction of US signs seem to support the three weeks period. A study with a longer duration of treatment compared to the minimal one with more follow-ups up to a year and endoscopy with biopsy should be performed in order to substantiate our observations. In these times of scarce resources, be them human or not, abdominal US in the hands of a skilled general practitioner, is a valuable tool. It can visualize the five layers of the stomach and it can measure them [10]. The variable results depend mainly on the skills of the physician.

Conclusions

The abdominal ultrasound is suitable for daily practice, being a simple procedure to detect the oeso-gastro-duodenal objective changes in dyspeptic patients and to initiate an appropriate treatment. It is also a means of objective follow-up of patient's evolution under treatment. If the subjective improvement is accompanied by the persistence or enlargement of the initial sonographic changes, we will recommend upper digestive endoscopy. The results give us the right to suggest the routine use of ultrasound examination in dyspeptic patients.

References

1. Borch K, Jonsson K A, Petersson F, Redeen S, Mardh S, Franzen LE. – Prevalence of gastroduodenitis and Helicobacter pylori infection in a general population sample. Relations to symptomatology and life- style. Dig Dis Sci, 2000, 45: 1322-1329
2. Pascu O. – Sindroamele dispeptice, in Pascu O, Grigorescu M, Acalovschi M, Andreica V (eds): Gastroenterologie. Hepatologie. Editura Medicala Universitara Iuliu Hatieganu, Cluj Napoca, 2008: 17-19
3. Kim HC, Shin HC, Kim HH, Park SJ,Nam DH, Bae WK, Kim IY, Jeong DS, Chung IK – The usefulness of the transabdominal ultrsonography as a screening examination in the evaluation of the patient with suspicious gastric disease. J Korean Soc Ultrsound Med, 2005, 24(1): 23-29
4. Suk KT, Lim DW, Kim MY, Park DH, Kim KH ,Kim JM, Kim JW, Kim HS, Kwan SO, Baik SK, Park SJ. – Thickening of the gastric wall on transabdominal sonography: a sign of gastric cancer. J Clin Ultrasound, 2008, 36(8): 462-466
5. Hata J, Haruma K, Manabe N, Kamada T, Kusunoki H, Tanaka T, Sato M. – Gastric cancer, in Maconi G, Bianchi Porro G (eds): Ultrasound of the Gastrointestinal Tract, Springer, Berlin, 2007, 135-142
6. Haruma K, Kusunoki H, Manabe N, Kamada T, Sato M, Ishii M, Shiotani A, Hata J. – Real-time assessment of gastro duodenal motility by ultrasonography. Digestion, 2008, 77(suppl.1): 48-51
7. Manabe N, Haruma K. – Diagnosis and treatment of dyspeptic patients in Japan. Journal Gastroenterol Hepatol, 2011, 26(Suppl 3): 27-31
8. Mizuta Y, Shikuwa S, Isomoto H, Mishima R, AkazawaY, Masuda J, Omagari K, Takoshima F, Kohno S. J Gastroenterol, 2006, 41(11): 1025-40
9. Drug V, Stanciu C. – Functional dyspepsia: recent advances (progresses) in patophysiology and treatment. Mædica J Clin Med, 2007, 4(2): 311-315
10. Nagler A, Aslanian HR, Siddiqui UD. – Endoscopic ultrasound and gastric lesions. J Clin Gastroenterol, 2011, 45(3): 215-221