DOI: 10.34921/amj.2026.2.001

MƏDƏNİN YUXARI HİSSƏSİ XƏRÇƏNGİNİN MƏRHƏLƏLƏRİNİN TƏYİNİNDƏ ULTRASƏS MÜAYİNƏSİNİN İMKANLARI

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Məqalədə mədənin yuxarı hissəsi xərçənginin diaqnostikasında sonoqrafiyanın effektivliyini araşdırmaq məqsədilə aparılmış tədqiqat işinin nəticələri əks etdirilmişdir. Mədə xərçəngi diaqnozu histoloji müayinə əsasında təsdiq edilmiş 29 pasiyentin müayinəsinin nəticələri araşdırılmışdır. Onlardan 5 nəfərdə T_2, 16 nəfərdə T_3, 8 nəfərdə T_4 mərhələli mədə xərçəngi olmuşdur; sonoqrafiya və kompüter-tomoqrafiya müayinələrinin nəticələri müqayisə edilmişdir.

KT müayinəsinin nəticələri 27 xəstədə (93,1%) mədə xərçənginə dəqiq diaqnoz qoyulması ilə nəticələnmişdir – xərçəngin T_2 mərhələsi olan 4 nəfərdə (13,8%), T_3 mərhələsində olan 15 nəfərdə (51,3%), T_4 mərhələsində olan 8 nəfərdə (27,6%). Sonoqrafiya isə 23 nəfərdə (79,3%) mədə xərçənginin dəqiq diaqnozunu qoymağa imkan vermişdir ki, onlardan da 3-nəfərdə (10,3%) proses T_2, 14 nəfərdə (48,3%) – T_3 və 6 nəfərdə (20,7%) T_4 mərhələsində olmuşdur. KT və sonoqrafiya müayinələrinin nəticələri arasında statistik etibarlı fərq aşkar edilməmişdir.

5 xəstənin qida borusunun abdominal hissəsində stenoz olduğuna görə qastroskopiya aparmaq mümkün olmamışdır. Onlardan hər birində stenoz həm sonoqrafiya, həm də KT vasitəsilə aşkar edilmişdir. Mədənin yuxarı hissəsinin xərçəngi üçün sonoqrafiyanın həssaslığı 87,5%, spesifikliyi 60,0% və dəqiqliyi 82,8% olmuşdur.

Tədqiqata əsasən belə qənaətə gəlmək olar ki, sonoqrafiya ucuz başa gəldiyinə və qeyri-invaziv üsul olduğuna görə, həm skrininq üçün, həm də mədə xərçənginin mərhələsini təyin etmək üçün əlverişli bir üsul kimi istifadə edilə bilər. Bu, fibroqastroskopiyadan istifadəedilmə imkanlarının məhdud olduğu hallarda xüsusilə əhəmiyyətlidir.

Açar sözlər: *sonoqrafiya, yuxarı mədə xərçəngi, kompüter tomoqrafiyası*
Keywords: *sonography, upper gastric carcinoma, computed tomography*
Ключевые слова: *сонография, рак верхнего отдела желудка, компьютерная томография*

POSSIBILITIES OF ULTRASONOGRAPHY IN DETERMINING THE STAGE OF UPPER GASTRIC CANCER

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The article presents the possibilities of sonography in diagnostics of upper gastric cancer. Gastric cancer was diagnosed based on histological examination of biopsy material in 29 patients, including 5 with stage T2, 16 with stage T3, and 8 with stage T4 tumors. Sonography and CT results were compared. Accurate diagnosis of stage T gastric cancer using CT was established in 27 (93.1%) patients, including 4 (13.8%) with stage T2, 15 (51.7%) with stage T3, and 8 (27.6%) with stage T4. Sonography allowed accurate diagnosis of gastric cancer stage in 23 (79.3%) patients, including 3 (10.3%) with stage T2, 14 (48.3%) with stage T3, and 6 (20.7%) with stage T4. No statistically significant differences were found between CT and sonography results. Abdominal esophageal stenosis was detected in 5 patients (17.2%),

preventing gastroscopy. In all cases, stenosis was detected by sonography and CT. Sonography's sensitivity for diagnosing upper gastric cancer was 87.5%, specificity 60.0%, and accuracy 82.8%, respectively.

Based on this study, it can be concluded that sonography, as an inexpensive, noninvasive method, can be used not only for screening but also for staging upper gastric cancer, which in some cases limits the use of fibrogastroscopy.

The effectiveness of treatment for patients with stomach cancer depends on the stage of the tumor. For very early, superficial tumors (T1a), endoscopic mucosal resection/submucosal dissection is the preferred procedure, whereas for early-stage cancers that are not amenable to endoscopic resection, surgical resection is the treatment of choice. Total/distal gastrectomy, depending on the tumor location, in conjunction with neoadjuvant chemotherapy, is the standard treatment for locally advanced GC (≥T3, any N or ≥T2, N+). For advanced unresectable/metastatic GC (35–40% of cases at the time of initial diagnosis), chemotherapy is still considered the standard treatment. Therefore, it is crucial to correctly determine the stage of disease in order to select the most effective therapeutic pathway, and imaging plays a pivotal role in this regard [2]. Gastric cancer can spread via the lymphatic system to the perigastric ligaments, mesentery, omentum and adjacent and distant organs [1].

In recent decades, diagnostic imaging, particularly cross-sectional techniques including contrast-enhanced computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET), has assumed a central role in the diagnosis of various pathologic entities. In current clinical practice, one of the most common goals is to stage cancer patients in order to best assess their treatment needs and guide them toward surgical or medical interventions [2-3].

Recent publications demonstrate the potential of sonography in diagnosing gastric cancer and determining its location. In diagnosing gastric outlet cancer, the sensitivity and accuracy of ultrasonography is comparable to CT [4-5]. Localization of gastric cardia cancer in the late stages leads to stenosis of the abdominal esophagus, which limits the capabilities of fibrogastroscopy. All this increases the relevance of using sonography for diagnosing gastric cardia and fundus cancer.

Objective: to evaluate the capabilities of sonography in the diagnosis of upper gastric cancer.

Materials and methods: The study is based on observations of 29 patients with gastric cardia and fundus cancer, aged 43 to 74 years (mean age 56 ± 5 years). Of the patients examined, stage T2 gastric cancer was diagnosed in 5 (17.2%), stage T3 in 16 (55.7%), and stage T4 in 8 (27.6%) patients, respectively. All patients underwent radiographic examination, fibrogastroscopy (FGS) with biopsy, multidetector computed tomography (MDCT), and gastric ultrasonography. Ultrasound was performed using convex transducer in the 2-5 MHz frequency range on a Philips HD-11 scanner, and computed tomography was performed on a Toshiba Aquilion 64 system.

To assess differences between quantitative indicators in the compared groups, the Student's t-test and the χ^2 test were used. Differences were considered statistically significant at $p < 0.05$. The sensitivity, specificity, and accuracy of sonography in the diagnosis of upper gastric cancer were studied.

Results. Table 1 shows the distribution of upper gastric cancer cases depending on the T stage. As can be seen from the table, upper gastric cancer at stage T2 was diagnosed in 5 (17.2±7.0%) patients, at stage T3 – in 16 (55.2±9.2%) and at stage T4 – in 8 (27.6±8.3%) patients, respectively. Gastric cancer at stage T3 was diagnosed statistically significantly more often than at stage T2 (P<0.01) and at stage T4 (P<0.05).

Table 1. Distribution of cases of upper gastric cancer taking into account the T stage of the tumor

Cancer stage			
T1	T2	T3	T4
-	n=5	n=16	n=8
-	17,2±7,0%	55,2±9,2%	27,6±8,3%
-		P<0,05 P<0,01	
	n=29		

Since computed tomography is currently the main method for determining the stage and extent of gastric cancer, we compared their results in order to evaluate the diagnostic capability of sonography (Table 2). When determining the stage of gastric cancer based on surgical data, the results of CT coincided in 27 (93.1±4.7%) cases, and USG – in 23 (79.3±7.5%) cases. At stage T2, gastric carci-

Table 2. Comparison of ultrasonography and CT results taking into account the stage of gastric cancer

Methods	Upper gastric cancer stage (n = 29)		
	T2 (n=5)	T3 (n=16)	T4 (n=8)
КТ	4 (13,8±13,2%)	15 (51,7±9,3%)	8 (27,6±8,3%)
УСГ	3 (10,3±5,6%)	14 (48,3±9,3%)	6 (20,7±7,5%)

noma was detected by CT in 4 (13.8±13.2%) cases, and by sonography – in 3 (10.3±5.6%) cases, at stage T3 – in 15 (51.7±9.3%) and 14 (48.3±9.3%) cases, at stage T4 – in 8 (27.6±8.3%) and 6 (20.7±7.5%) cases, respectively.

Table 3 presents the diagnostic performance of sonography for gastric cardia and fundus cancer. In diagnosing gastric cancer, sonography sensitivity was 87.5%, specificity 60.0%, accuracy 82.8%, positive predictive value 91.3%, and negative predictive value 50.0%.

Due to the specific direction of ultrasound waves to the object being examined, the cardiac region of the stomach, even with minimal tumor infiltration, was always visualized more clearly than the fundus. When tumor spread to the abdominal esophagus due to the development of stenosis, fibrogastroscopy was difficult and was not performed in 5 cases. In diffusely infiltrative gastric cancers with a smooth mucosal surface, the main tumor feature was thickening of the muscular layer with preserved differentiation between the serous and mucosal membranes. When stenosis of the abdominal esophagus develops, the narrowed lumen is better defined during fluid passage. Figures 1 and 2 show sonographic and CT imaging of cancer of the cardiac region of the stomach.

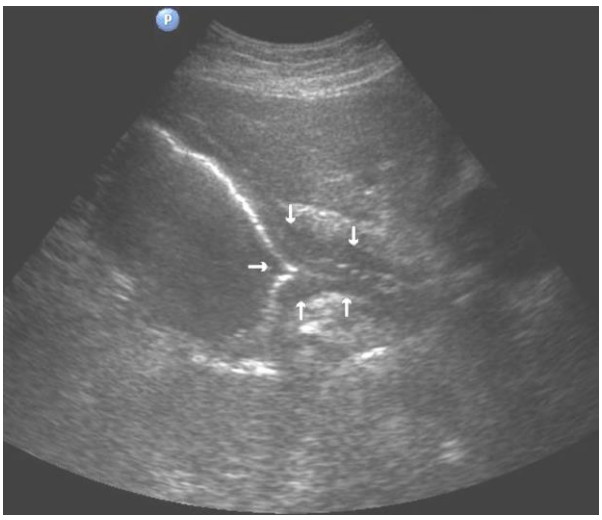


Fig. 1. Sonographic visualization of gastric cardia cancer with extension into the esophagus (vertical arrows). The horizontal arrow indicates the narrowed lumen of the abdominal esophagus.

Table 3. CT and Sonography results in the diagnosis of upper gastric cancer

CT (n=29)				USG (n=29)			
TP	FN	TN	FP	TP	FN	TN	FP
24	2	2	1	21	3	3	2
Sensitivity		92,3%		Sensitivity		87,5%	
Specificity		66,7%		Specificity		60,0%	
Accuracy		89,7%		Accuracy		82,8%	
Positive predictive value		96,0%		Positive predictive value		91,3%	
Negative predictive value		50,0%		Negative predictive value		50,0%	

Note: TP – true positive, FN – false negative, TN – true negative, FP – false positive



Fig. 2. CT visualization of gastric upper cancer.

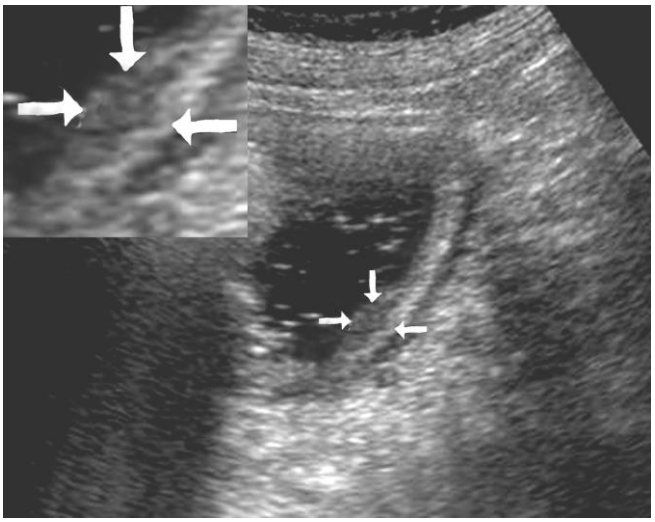


Fig. 3. Gastric fundus cancer at stage T2. Arrows indicate localized thickening of the gastric wall. Ultrasound imaging of the tumor was only possible after a targeted search for it following diagnostic testing with fibrogastroscopy and CT.

Examination of the fundus was best accomplished in the Trendelenburg position. At all stages of fundus cancer, the wall layers were undifferentiated. At stage T2, only gastric cancer already diagnosed during fibrogastroscopy could be visualized using ultrasonography (Fig. 3).

Discussion

The absence of clinical symptoms in the early stages of gastric cancer makes its timely diagnosis difficult [6]. It is known that radiography and endoscopy are the most common methods for diagnosing this pathology [7-8]. At the same time, in the last two decades, gastric cancer staging has been carried out using computed tomography. The method has several advantages over other imaging methods in detecting tumor invasion beyond the wall of these organs and determining metastases to the lymph nodes. According to some experts, even CT does not always allow differentiating between T2/T3 stages of gastric cancer. It is preferable to use various imaging methods, each of which may have several advantages over the others in each specific case [9].

A recently published meta-analysis highlights the good diagnostic value for the detection of peritoneal carcinomatosis, with pooled sensitivity and specificity values of 89% and 86%, respectively. When included studies were grouped by primary tumor, a pooled sensitivity of 97% was reported for gastrointestinal malignancies [10].

Finally, a diagnostic meta-analysis was used to determine the accuracy of CT and endoscopic ultrasound in the staging of gastric cancer. The results indicated that endoscopic ultrasound is superior to CT for T1 staging, whereas no significant differences were found for T2–T4 lesions or stage N1 [11].

In recent years, advances in ultrasound diagnostic technology have enabled the combined use of grayscale, Doppler, and elastographic modes, significantly expanding the capabilities of the method and, in some cases, offering advantages over CT and MRI [18]. Previously published studies have shown that the results of ultrasonography and CT in diagnosing gastric cancer do not significantly differ [12]. In late-stage gastric and colon cancer, stenosis of the lumen of these hollow organs prevents endoscopy [13]. In such cases, the capabilities of ultrasound examination are significantly expanded, offering an accessible, non-invasive, inexpensive, and

informative method for diagnosing gastric cancer. As a result of our research, the sensitivity, specificity, and accuracy of transabdominal ultrasonography have approached those of CT.

Conclusions

1. For upper gastric cancer, the diagnostic performance of ultrasonography is only slightly inferior to that of computed tomography, while its non-invasiveness and low cost allow it to be used for tumor staging.

2. Considering that abdominal esophageal stenosis develops in late-stage upper gastric cancer, which limits the use of fibrogastroscopy, the expanded use of ultrasonography is encouraged.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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