THE ROLE OF THE INSTRUMENTAL EXAMINATIONS IN DIAGNOSTICS AND STAGING OF LOCALY DISTRIBUTED STOMACH CANCER

Referat. Introduction. The diagnostics and treatment of stomach cancer is still one of most complex and actual issue, despite of morbidity decreasing tendency.

Objective. Improvement of algorithm of diagnostics of patients with complicated stomach cancer.

Materials and methods. It was shown the analysis of results of surgical treatment of 418 patients with complicated stomach cancer, which got the hospital treatment at GI «V.T. Zaycev Institute of General and Urgent Surgery of NAMS of Ukraine » from 2010 till 2019, aged 29 till 76. Course of the disease was complicated with bleeding in 252 (60,3 %) case, with stenosis in 89 (21,3 %), with perforation in 15 (3,5 %), and with its combination — in 62 (14,8 %). Radical operations were performed in 168 (40,2 %) cases, palliative and symptomatic in 250 (59,8 %) — cases. 107 patients aging 36 till 73 were examined with SCT to revealing and staging of tumor.

Results. Patiens were examinated with using of combination of instrumental methods. SCT provides to detect the primary tumor, the process spreading, differetion of tumor from the healthy tissues of stomach, local lymphatic nodal metastasis and other organs, that define staging of pathology, volum of operation and further prognosis. SCT has precission of 95–97 % at detecting of cancer, definition of stage — 77–80 %. Endoscopy allows to define the location, spreading of process, sizes of tumor and presence of complications. Panoramic x-ray provide to detect the free air in abdomen, that is main symptom of perforation, but doesn’t indicate the localization and root of perforation. Angiography allows to identify the sources of tumor’s blood supply, and also continuing bleeding direct and indirect markers, that leads to conversion of diagnostics into curative. Bleeding vessel’s embolization were performed in 7 cases as first treatment stage (the second one is operative), and in 11 cases as finishing curative method. There no any ideal oncomarker. Diagnostic precission of CA 72-4 is 28–80 % (40–46 % on the average). According to international guides [7], all patients were performed the diagnostic laparoscopy with researching of washout liquids of abdomen in uncertain cases.

Conclusion. Only complex examination of patients with stomach cancer with using combination of SCT of abdomen, FEGDS with biopsy, laparoscopy can provide total volum of examination, staging and surgical aid.

Keywords: instrumental examination, staging of stomach cancer.
at GI «V.T. Zaycev Institute of General and Urgent Surgery of NAMS of Ukraine» from 2010 till 2019, aged 29 till 76. Course of the disease was complicated with bleeding in 252 (60,3 %) case, with stenosis in 89 (21,3 %), with perforation in 15 (3,5 %), and with its combination — in 62 (14,8 %). Radical operations were performed in 168 (40,2 %) cases, palliative and symptomatic in 250 (59,8 %) — cases. 107 patients aging 36 till 73 were examined with SCT to revealing and staging of tumor. Male 244 (58,3 %), female — 174 (41,7 %).

It was shown the analysis of diagnostic accuracy and specificity of the SCT method in diagnostics of locally distributed stomach cancer. The diagnostic accuracy of the given task was considered the percentage of real tumor invasion in neighboring organs according to the research of histological preparations of removed organs among the total number of patients, who suffered combined operations. Specificity of the method of SCT was estimated as a ratio between the number of true tumor invasion in neighboring organs and the number of patients with paratumorose inflammatory infiltration according to the histological study of the micropreparations.

In order to study the possibilities of SCT in diagnostics and staging of primary tumor we tested 107 patients aged 36 to 73 years (men — 69, women — 38). The study included patients with tumor localization in different parts of the stomach (cardial — 8 patients, stomach body — 39, antral part — 33, subtotal stomach damage — 16, total impact — 11).

Results and discussion

We had data on the presence of malignant tumor of the stomach and its localization in the organ, performing the SCT of the abdomen cavity which were confirmed by the histological research. In order to determine the sensitivity of the SCT method, a comparison of the results of the studies with the data of the pre-operative FEGDS was carried out. The results are shown in Table 1.

### Table 1

| Stomach parts (patients quantity) | FEGDS data | SCT data | Sensitivity, % |
|----------------------------------|------------|----------|----------------|
| Cardial part (8)                 | 7          | 9        | 87,5           |
| Body (21)                        | 23         | 22       | 91,3           |
| Body + cardial (7)               | 5          | 6        | 71,4           |
| Body+antral (26)                 | 24         | 27       | 92,3           |
| Antral (18)                      | 19         | 17       | 94,7           |
| Subtotal damage (16)             | 18         | 15       | 88,8           |
| Total damage (11)                | 11         | 10       | 100            |
| Total / Medial sensitivity       | 107        | 107      | 89,4           |

We developed diagnostic criteria and SCT-semiotic of local invasion of stomach cancer. The status of the initial tumor T4 was diagnosed by us on the basis of the following symptoms: 1) the symptom of the absence of the hypotensive cellular layer; 2) the symptom of the paragalgal cellular infiltration; 3) the symptom of the absence of the hypotensive cellular layer between the stomach and walls of neighboring organs; 4) the thickness of the wall of the neighboring organs; 5) presence of tissue component in neighboring organs, structure change and contrast characteristics of organs at the level of stomach tumor’s invasion. The frequency of detection of these symptoms in the studied patients is shown in Table 2.

### Table 2

| Symptom                                                                 | Status T | Patients quantity | Detection percentage, % |
|------------------------------------------------------------------------|----------|-------------------|-------------------------|
| The thickness of the stomach wall, presence of angular formations       | T3, T4   | 105               | 98,1                    |
| The symptom of the paragastrial cellular infiltration                  | T3, T4   | 104               | 97,1                    |
| The symptom of the absence of the hypotensive cellular layer between the stomach and walls of neighboring organs | T4       | 106               | 99,1                    |
| The thickness of the wall of the neighboring organs                     | T4       | 102               | 95,3                    |
| Presence of tissue component in neighboring organs, structure change   | T4       | 98                | 91,5                    |

The most reliable symptom, pointing to the presence of local common stomach cancer, was a symptom of the absence of a hypotensive cellular layer between the stomach and neighboring organs, which was found in 99,1 % of patients.

In order to compare the results of SCT with the morphological situation in determining the status of T in 107 patients with cancer of the stomach, the study of operating preparations with determination of tumor invasion in neighboring organs and presence of tumor cells in the edge of resection was conducted. Depending on the results of morphological research of the removed samples, the analysis of the diagnostic accuracy and sensitivity of the method of SCT depending on the tumor location was carried out. The data is presented in Table 3.

In the group of investigated patients the results of SCT match with conclusions of histological spread of tumor in neighboring organs was marked in 89,7 %, thus accuracy of CT in diagnostics of stomach tumor distribution on neighboring organs was equal 89,7 %, specificity — 92,4 %. The maximum results of diagnostic characteristics regarding the penetration of the tumor of the stomach were measured for the colon — accuracy 94,3, specificity — 100 %; minimal — for the body and tail of the pancreas — accuracy 83,3 %, specificity — 88,0 %.

During the endoscopic examination the localization, prevalence, size of stomach tumors and complications were determined. An important element
The method of endoscopic hemostasis included the primary assessment of the source of bleeding, the endoscopic clipping of blood vessels, coagulation and cryoinfluence, the irrigation with hemostatics of blood-bleeding tumors. Achievement of temporary endoscopic hemostasis in 36 (8.16%) patients with continuing bleeding from the stomach tumor, which is allowed to conduct intensive pre-operative preparation with deferred operative intervention within 2–6 days after the hospitalization.

Panoramic X-ray of lungs is not a mandatory element of the examination of patients on stomach cancer, as according to protocols performed by the CT organs of the thorax. But the x-ray examination the abdominal cavity organs is still simple and extremely informative method of diagnostics in the diagnostics of urgent states at occurrence of perforation of stomach tumors.

An angiographic examination reveals sources of tumor blood supply, as well as direct and indirect signs of bleeding, which continues with the transition of the diagnostic stage into the therapeutic phase. Embolization of vessels that are highly blood-bleeding is performed in superselective regimes in pools of the left and right stomach arteries, stomach-gland and short arteries of the stomach, and in some cases after catheterization of vessels that live other organs, in which the tumor ingots.

The first stage of X-ray endovascular hemostasis was performed in 16 (3.8%) patients, of whom 11 (2.6%) it became an independent method of treatment (in 9 noted the absence of recurrent bleeding). It should be noted that this method was especially valuable for achieving hemostasis in patients of senile age with an expressed accompanying pathology at a high level of operational risk of performance of «open» operational couriments.

The ideal tumor marker for detecting stomach cancer hasn’t yet been found. Ca 72–4 cancer marker of the stomach (carbon antigen 72–4, ca 72–4, tag 72) — high molecular glycoprotein, component of the surface of the epithelium, expressed by various carcinomas — thick intestines, lungs, egg, endometry, pancreas, stomach, breast. The diagnostic sensitivity of the CA 72–4 test for stomach cancer is 28–80%, on average 40–46%. The level of increase of CA 72–4 is correlated with the stage of disease. After a radical operation, the CA level 72–4 is normalized (3–4 tiges). This marker has a greater sensitivity to recurrent stomach cancer compared to a RIVER or SA 19–9. The combination of all these tests increases diagnostic sensitivity and specificity of testing.

The advantages of SCT in comparison with other methods of visualization with contrast detailing, are the higher possibility to get in a short time a large number of transverse projections, which is especially valuable for localization of the region, from which in the future sample of tissue for biopsy, as well as for planning surgical intervention and next radiotherapy. The limitation of the SCT method in internal organ studies is the lack of the ability to obtain images from large areas in the long and frontal projections. This shortcoming can be overcome by using special contrast agents during the study.

Ultrasound examination allows to receive various (not only standard transverse) projection of body cross, to observe mechanical movements of organs (pulsation of vessels, intestinal peristalsis, respiratory excursions of diaphragms, kidneys, liver, and so on), there is no need to use artificial contrast substances.

Endoscopy ultrasound is widely used for estimation of the submucose spread of stomach tumor. But at large, subtotal stomach damage with spread to the surrounding organs, the diagnostic accuracy of the method decreases [6].

Radical operations were performed in 199 (47.6%) patients; in 219 (52.4%) — palliative and symptomatic (of them in 201 (48.0%) — cavernous). Postoperative complications appeared in 131 patients (31.3%), postoperative mortality made 7.9% (33 patients).

Table 3

| Nature of tumor invasion | Liver | Body, tail of pancreas | Head of pancreas | Colon | Totaly |
|-------------------------|-------|------------------------|-----------------|-------|--------|
| Patients quantity       | 6+3/1 (8) | 30/5 (25) | 33/3 (30) | 35/2 (33) | 107/11 (96) |
| Diagnostic accuracy     | 88,8 % | 83,3 % | 90,9 % | 94,3 % | 89,7 % |
| Diagnostic sensitivity  | 7/8 = 87,5 % | 22/25 = 88,0 % | 27/30 = 90,0 % | 33/33 = 100 % | 92,4 % |

Conclusions

Thus, only comprehensive examination of cancer patients with the use of SCT of the abdominal cavity, FEGDS with biopsy, performance of laparoscopy can provide a full volume of examinations, staging and full volume of the rendered aid. SCT based on clear identification of the symptoms allows to determine with high accuracy the extent of the spread of the stomach cancer to its wall, allows to diagnose the status of T, to determine the character of local spread of tumor, which opens further prospects in the performance of radical operational reconstructive and restoration operations with local distributed stomach cancer.
REFERENCES

1. Kim EY, Lee WJ, Choi D, Lee SJ, Choi JY, Kim BT, et al. The value of PET/CT for preoperative staging of advanced gastric cancer: comparison with contrast-enhanced CT. Eur J Radiol. 2011 Aug;79(2):183-8. doi: 10.1016/j.ejrad.2010.02.005. PubMed PMID: 20226612.

2. Davydov MI. Oncology. Clinical guidelines. Publishing group of GA N.N. Blokhin National Medical Research Center of Oncology. 2015;1; 680. [In Russ.]

3. Colen KL, Marcus SG, Newman E, Berman RS, Yee H, Hiotis SP. Multiorgan resection for gastric cancer: intraoperative and computed tomography assessment of locally advanced disease is inaccurate. J Gastrointest Surg. 2004 Nov;8(7):899-902. doi: 10.1016/j.gassur.2004.08.005. PubMed PMID: 15531245.

4. Barros RH, Penachim TJ, Martins DL, Andreollo NA, Caserta NM. Multidetector computed tomography in the preoperative staging of gastric adenocarcinoma. Radiol Bras. 2015 Mar-Apr;48(2):74-80. doi: 10.1590/0100-3984.2014.0021. PubMed PMID: 25987747; PubMed Central PMCID: PMC4433295.

5. Coburn N, Cosby R, Klein L, Knight G, Malthaner R, Mamazza J, et al. Staging and surgical approaches in gastric cancer: a clinical practice guideline. Curr Oncol. 2017;24(5):324-331. doi:10.3747/co.24.3736. PMID: PMC5659154 PMID: 29089800.

6. Spolverato G, Ejaz A, Kim Y, Squires MH, Poultsides GA, Fields RC, et al. Use of endoscopic ultrasound in the preoperative staging of gastric cancer: a multi-institutional study of the US gastric cancer collaborative. J Am Coll Surg. 2015 Jan;220(1):48-56. doi: 10.1016/j.jamcollsurg.2014.06.023. PubMed PMID: 25283742.

ПЕРЕЛІК ПОСИЛАНЬ

1. Kim EY, Lee WJ, Choi D, Lee SJ, Choi JY, Kim BT, et al. The value of PET/CT for preoperative staging of advanced gastric cancer: comparison with contrast-enhanced CT. Eur J Radiol. 2011 Aug;79(2):183-8. doi: 10.1016/j.ejrad.2010.02.005. PubMed PMID: 20226612.

2. Давидов М І. Онкологія. Клінічні рекомендації. 2015;1; 680.

3. Colen KL, Marcus SG, Newman E, Berman RS, Yee H, Hiotis SP. Multiorgan resection for gastric cancer: intraoperative and computed tomography assessment of locally advanced disease is inaccurate. J Gastrointest Surg. 2004 Nov;8(7):899-902. doi: 10.1016/j.gassur.2004.08.005. PubMed PMID: 15531245.

4. Barros RH, Penachim TJ, Martins DL, Andreollo NA, Caserta NM. Multidetector computed tomography in the preoperative staging of gastric adenocarcinoma. Radiol Bras. 2015 Mar-Apr;48(2):74-80. doi: 10.1590/0100-3984.2014.0021. PubMed PMID: 25987747; PubMed Central PMCID: PMC4433295.

5. Coburn N, Cosby R, Klein L, Knight G, Malthaner R, Mamazza J, et al. Staging and surgical approaches in gastric cancer: a clinical practice guideline. Curr Oncol. 2017;24(5):324-331. doi:10.3747/co.24.3736. PMID: PMC5659154 PMID: 29089800.

6. Spolverato G, Ejaz A, Kim Y, Squires MH, Poultsides GA, Fields RC, et al. Use of endoscopic ultrasound in the preoperative staging of gastric cancer: a multi-institutional study of the US gastric cancer collaborative. J Am Coll Surg. 2015 Jan;220(1):48-56. doi: 10.1016/j.jamcollsurg.2014.06.023. PubMed PMID: 25283742.
Резюме. Мета дослідження: вдосконалення діагностичного алгоритму у хворих на ускладнений місцево-поширений рак шлунку.

Матеріали та методи. Робота базується на аналізі результатів лікування 418 хворих на ускладнений місцево-розповсюджений рак шлунку, які перебували на лікуванні у «ДУ Інститут загальної та невідкладної хірургії ім. В.Т. Зайцева НАМН України» з 2010 по 2019 р., у віці від 29 до 76 років.

Результати та обговорення. СКТ дозволяє на високому рівні виявити первинну пухлину, поширення процесу, допомагає визначити ступінь малігнізації процесу, виявити метастази в регіонарні лімфатичні вузли та інші органи, що має значення при визначенні стадії процесу, обсягу оперативного втручання і по-дальшого прогнозу. Точність методу при виявленні раку становить 95–97 %, точність визначення стадії пухлини — 77–80 %.

При ендоскопічному дослідженні визначається локалізація, розповсюдженість, розміри пухлини шлунку та наявність ускладнень. Важливим елементом дослідження є виконання біопсії пухлини.

Ангіографічне дослідження дозволяє виявити джерела кровопостачання пухлини, а також прямі та непрямі ознаки кровотечі, що триває, з переходом діагностичного етапу в лікуваль-ний. Ідеального онкомаркера для виявлення рака шлунку поки не знайдено. Діагностична чутливість тесту CA 72–4 для рака шлунку становить 28–80 %, в середньому 40-46 %. У відповідності до міжнародних рекомендацій всім хворим виконували діагностичну лапароскопію з цитологічним дослідженням змивів черевної порожнини.

Висновок. Тільки комплексне обстеження хворих на рак шлунку з використанням СКТ, ФЕГДС з біопсією, лапароскопії може забезпечити повний обсяг обстеження, стадіювання та належний об’єм наданої допомоги.

Ключові слова: інструментальні дослідження, стадіювання рака шлунку.