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The role of X-ray examination in gastric cancer diagnostics

X-ray examination methods are an accessible, relatively inexpensive method of early detection of gastric cancer (GC). 1038 patients aged 12 to 92 years underwent X-ray examination of the stomach at the Kazakh Institute of Oncology and Radiology. The article presents the results of diagnostic use of X-ray examination methods.

Keywords: radiography, radioscopy, gastric cancer.

Relevance of the study. Worldwide indicators show a certain downward trend in the incidence of gastric cancer (GC): currently it ranks fourth (8.4%) in the global pattern of morbidity. However, the mortality remains high (10.4%), and GC is the second cause of death after lung cancer. One of the reasons for low survival rate is the late detection of GC [2, 3].

In the oncology pattern of the Republic of Kazakhstan, GC ranks fourth in morbidity (16.3%), and second in mortality. 2736 new cases were recorded in 2012. Of them, only 27.1% were diagnosed at an early stage, and 27.4% - at the late stages [1]. X-ray method remains one of the main methods of GC diagnostics [4].

Material and methods. 1038 (100%) patients of the X-Ray Diagnostics Department of KazIOR underwent X-ray examination of stomach and duodenum from 01.01.2015 till 01.11.2016. The treatment arm included 182 (18.0%) patients (average age – 60.4 years) diagnosed with GC by clinical and X-ray methods. The control arm included 721 patients (69.0%) with other established diseases of the gastrointestinal tract. 135 (13.0%) patients previously diagnosed with GC underwent a repeated X-ray examination, and therefore were excluded from this study.

X-ray examinations of the stomach followed a standard procedure with barium sulphate using Philips DuoDiagnost apparatus with multiple view radioscopy and radiography. X-ray examination of the stomach included three steps: 1) the study of the relief of stomach folds; 2) double contrasting of the stomach; and 3) tight filling of the stomach.

Results. Distribution of the patients by sex: The patients' distribution by sex is shown in Figure 1.

As can be seen in Figure 1, the treatment arm included 37.4% of women, and 62.6% of men vs. 55.6% of women and 44, 4% of men in the control arm. Thus, the treatment group had more GC cases in men, and the control arm – in women. In total, GC was 1.7 times more frequent in men than in women.

Distribution of the patients by age: The patient's distribution by age in the treatment and control arm was as follows (Figure 2).

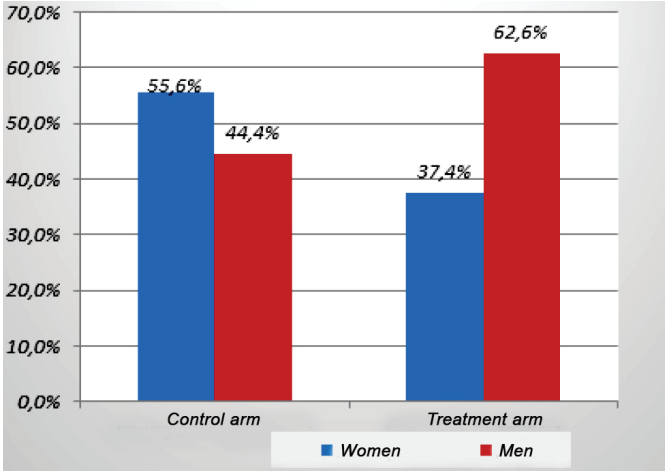


Figure 1 - Distribution of patients by sex in the treatment and control arms

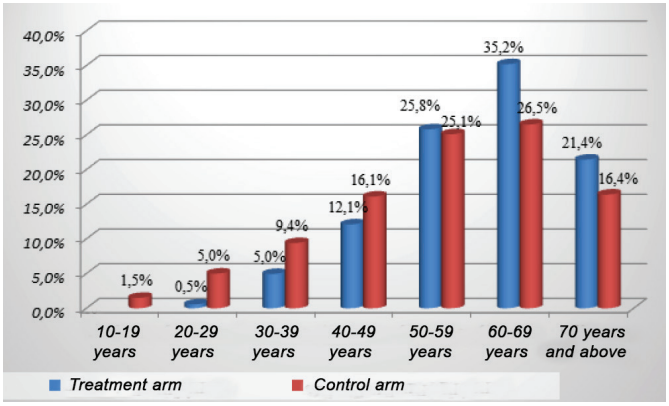


Figure 2 – Distribution of patients by age in the treatment and control arms

According to Figure 2, most of the patients (35.2%) newly diagnosed with GC were 60 to 69 years old, 25.8% of them were 50 to 59 years old what is 9.4% less, 21.4% of them were 70 years old and above, 40 to 49 y.o. – 12.1%, 30-39 y.o. – 5.0%, and 20-29 y.o. – only 0.5% of cases. In the control arm, most of the cases related to patients aged 60 to 69 (26.5%) and 50 to 59 (25.1%), a bit less – to patients aged 70 and over (16.4%) and 40 to 49 (16.1%) years. GC was rare at the age of 30-39 (9.4%), 20-29 years (5.0%) and 10-19 years (1.5%). Thus, the majority of GC cases in the treatment group related to the age of 60-69 years (35.2%) while in the control arm most of the cases fall into the age group of 50 to 69 years.

Distribution of patients by the form of growth of the neoplasm: We also analysed the results of X-ray examination in the treatment arm by the form of growth of GC. The forms were divided into three groups: endophytic, exophytic, and mixed (Figure 3).

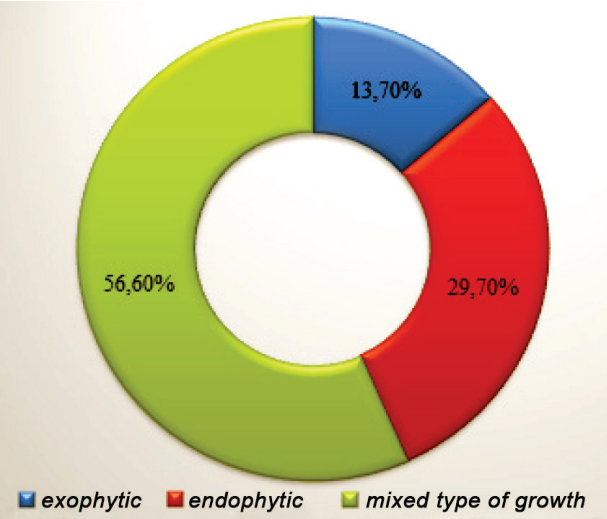


Figure 3 - Distribution of gastric cancer (GC) by the form of growth

Figure 3 above shows the distribution of GC by the form of growth: the mixed type of growth prevailed (56.6%) followed by endophytic (29.7%) and exophytic (13.7%) types of growth.

Distribution of patients by localization of the process: Next, we analysed the distribution of GC patients by localization of the process.

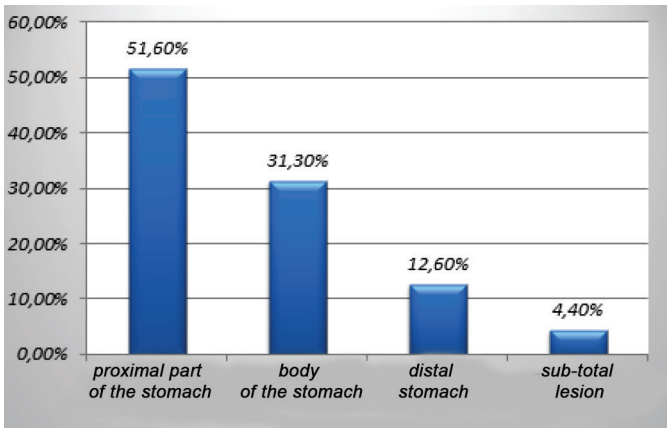
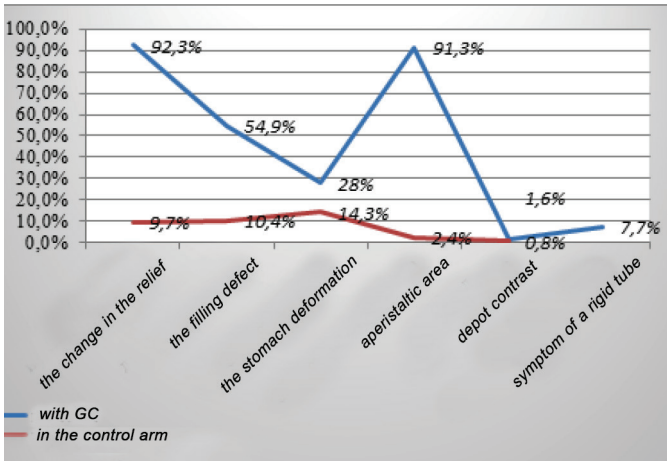


Figure 4 – Distribution of patients with gastric cancer (GC) by the localization of the process.

According to the X-ray examinations (Figure 4), the GC most often affected the proximal part of the stomach (51.6%) and the body of the stomach (31.3%), less often it was localized in the distal stomach (12 , 6%). Subtotal lesion of the stomach was observed in 4.4% of cases.

X-ray symptoms of GC. We also studied the incidence of X-ray symptoms of GC. Figure 5 shows that the most common symptoms of GC included: the change in the relief (rupture of the mucosal folds) – in 92.3%, and the aperistaltic area – in 91.3% of cases while in the control arm the change in the relief (pathological restructuring) was observed only in 9.7%, and the aperistaltic region - in 2.4% of cases. The filling defect in the treatment arm was observed in 54.9%, and the stomach deformation – in 28.0% of cases while in the control arm the filling defect was observed only in 10.4%, and the stomach deformation – in 14.3% of cases.



Figue 5 – Distribution of X-ray symptoms at gastric cancer and in the control arm

The radiological symptom, barium depot, was found in 1.6% of cases in the treatment arm, and in 0.8% of cases in the control arm. The symptom of a rigid tube was found in 7.7% of patients with GC vs. zero cases in the control arm. Thus, the rupture of folds and the presence of aperistaltic area can be considered as reliable pathognomonic symptoms of GC.

The histological type of GC growth was studied in 79 patients with GC. Most of the tumours were adenocarcinomas (68.3%), of them: low-differentiated – 35.4%, moderately differentiated – 27.9%, and highly differentiated – 5.0%. Gelatinous carcinoma and undifferentiated GC were equally common and observed in 13.9% of cases; adenosquamous gastric carcinoma was less frequent – 1.2% of cases.

Conclusions. In the study, men had GC 1.7 times more often than women. The highest GC incidence was observed at the age of 60-69 (35.2%). The mixed type of growth (56.6%) prevailed. According to the X-ray, the proximal part of the stomach was most often affected (51.6%). The rupture of the mucosal folds (92.3% of cases) and the presence of aperistaltic area (91.3% of cases) can be considered as pathognomonic symptoms of GC.

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