

ENDOSCOPIC MONITORING OF PATIENTS WITH GASTROINTESTINAL TUMORS: MODERN APPROACHES AND PROSPECTS

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Abstract

Malignant tumors of the gastrointestinal (GI) tract remain one of the leading causes of cancer morbidity and mortality worldwide. Late diagnosis persists as a major challenge, with over 60% of patients being identified at stages III–IV. Endoscopic monitoring utilizing advanced mucosal visualization technologies significantly improves early detection of neoplastic lesions and precancerous conditions. The use of HD-endoscopy, narrow-band imaging (NBI), endoscopic ultrasonography, capsule endoscopy, and artificial intelligence-assisted systems has demonstrated a 25–40% reduction in mortality according to international data. The article presents an overview of current endoscopic approaches and their impact on improving oncological outcomes.

Keywords: Endoscopy, early cancer, GI tract, screening, NBI, artificial intelligence.

Introduction

Gastrointestinal (GI) cancers continue to pose a serious challenge to modern oncology. According to the World Health Organization (WHO), more than 4.6 million new cases of GI cancer are registered worldwide each year, of which approximately 3 million are fatal. This is due not only to the aggressiveness of certain forms of the disease, but also to significant gaps in early diagnosis. One of the main reasons for the high mortality rate is late presentation of patients—when diagnosed at stages III–IV, radical treatment options are significantly limited. Furthermore, many countries lack systematic national screening programs and interdisciplinary coordination. As a result, a significant proportion of patients are examined and treated at an advanced stage of the disease. In this context, endoscopic monitoring is crucial. This refers to the targeted use of endoscopic methods at different stages of patient care: from the initial assessment of the mucous membrane and the detection of precancerous conditions to dynamic monitoring of changes and timely intervention. Endoscopic monitoring includes regular endoscopies with photographic documentation, serial biopsies, advanced imaging techniques (e.g., NBI, chromoendoscopy), and endosonographic assessment of lesion depth. Successful treatment of gastrointestinal cancer depends largely on the quality and regularity of such monitoring. A systematic approach allows for the detection of lesions at stages before they cause clinical symptoms and the use of organ-preserving endoscopic resections instead of more invasive surgeries. This directly reduces mortality, improves patient quality of life, and optimizes healthcare costs. In this case, not only technical capabilities are important, but also the organization of the process: the formation of risk groups, the



standardization of protocols, the provision of adequate personnel training and infrastructure, as well as informational and educational work among the population.

Relevance of the problem

Late diagnosis significantly limits the options for radical surgical treatment and reduces patient survival. For example, when gastric cancer is detected at an early stage, the five-year survival rate exceeds 90%, while at stage IV it is no more than 5–10%. A similar situation is observed with colorectal cancer.

Endoscopic screening programs in countries with high healthcare standards (Japan, South Korea, and the United Kingdom) have led to a significant increase in the detection rate of early cancers. This confirms the importance of implementing and optimizing endoscopic monitoring as a key element of prevention and diagnosis.

Modern methods of endoscopic monitoring

High-definition gastroscopy

The use of HD and 4K endoscopes increases the detection of small pathological foci, including neoplasms up to 5 mm.

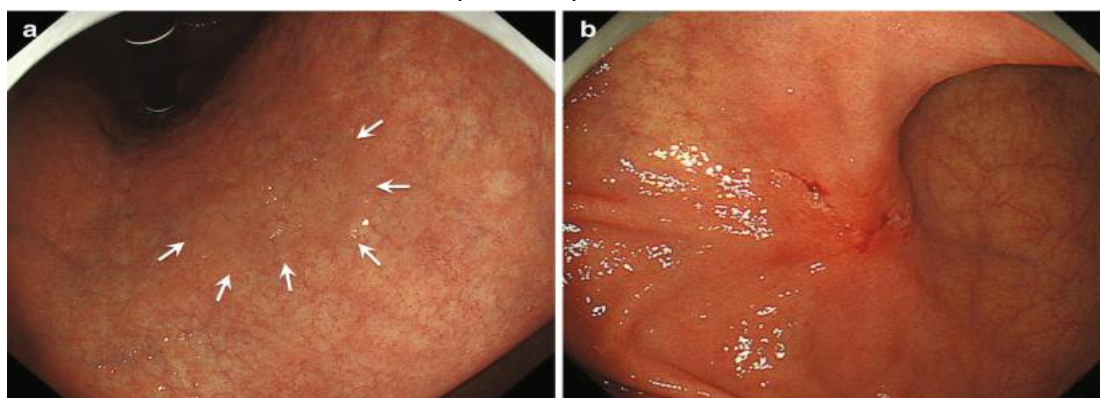


Figure 1. High-tech visualization of the gastric mucosa

Narrow Band Imaging (NBI)

Allows detection of vascular anomalies and dysplastic changes at the earliest stages without the use of additional dyes.



Figure 2. NBI endoscopy: detection of dysplasia in the esophagogastric junction area

Magnifying colonoscopy

This is effectively used to detect adenomatous polyps, the main precursor to colorectal cancer. Removal of adenomas has been shown to reduce CRC mortality by 53–60%.

Endoscopic ultrasound (EUS)

Determines the depth of tumor invasion, lymph node status, and the degree of resectability.

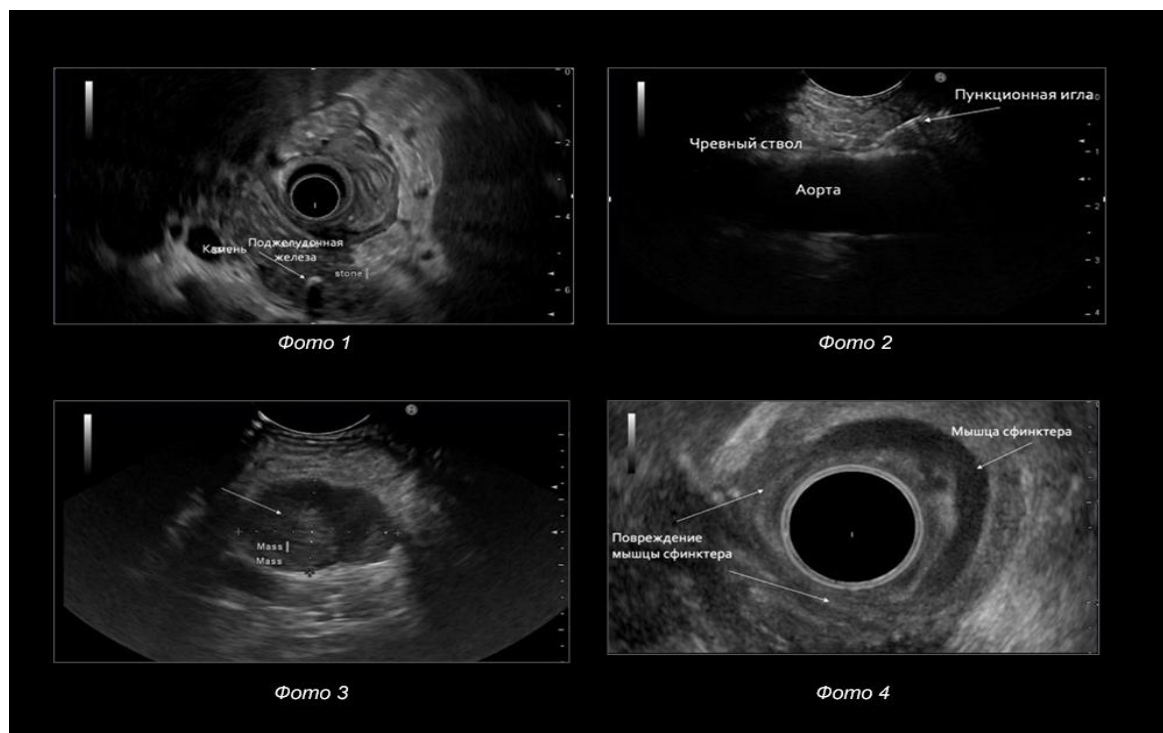
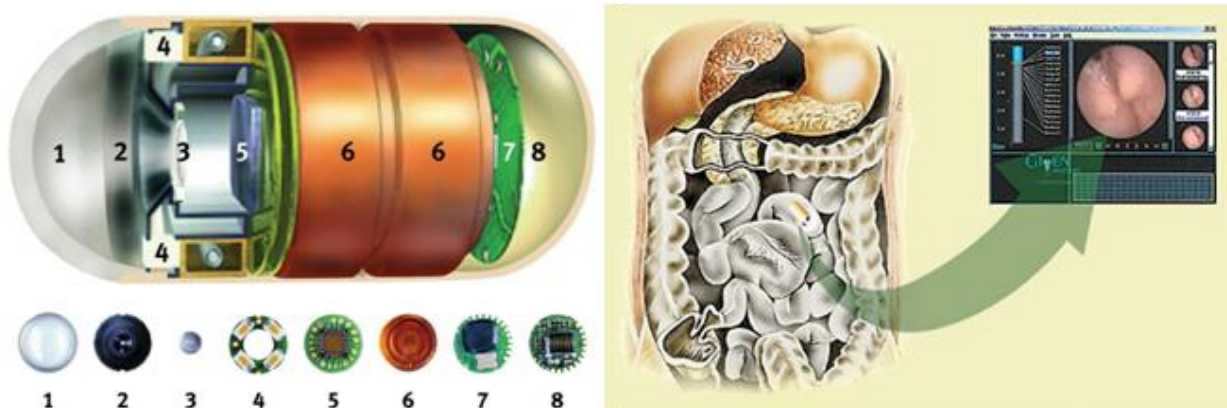


Figure 3. Endosonography of a submucosal neoplasm

Capsule endoscopy

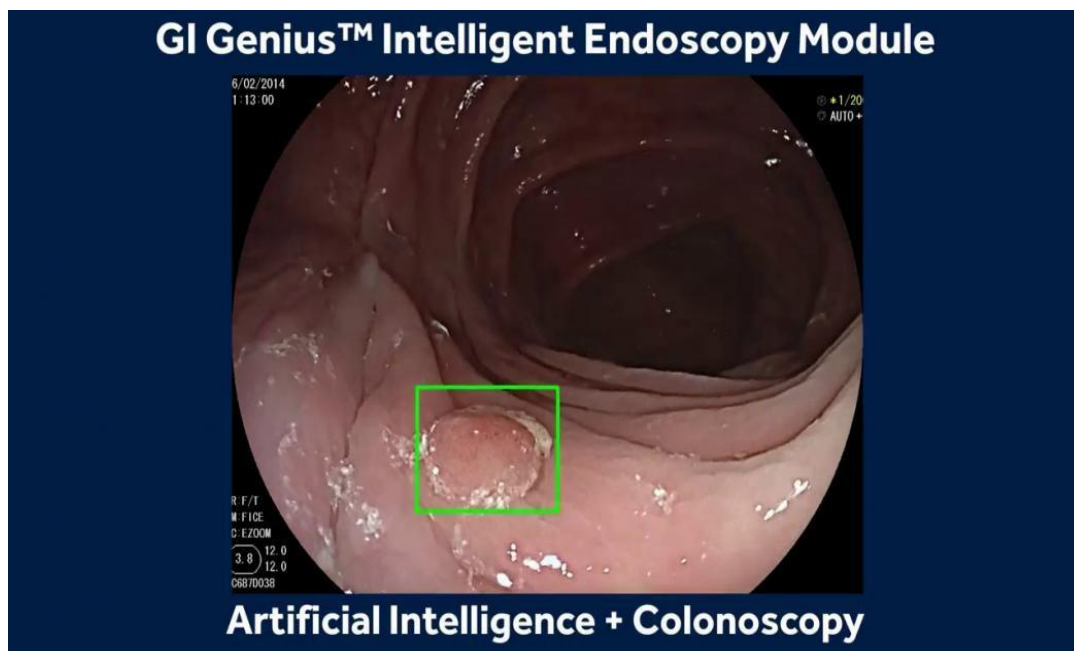
It is most effective for small intestinal pathology and occult bleeding. Diagnostic accuracy reaches 85–90%.





Artificial Intelligence in Endoscopy

AI algorithms improve polyp detection by 14–20% and reduce the risk of missing small neoplasms. CADx systems help differentiate benign from malignant lesions in real time.



Global experience shows that systemic endoscopic monitoring significantly reduces mortality:

Disease	Reducing mortality with monitoring	Source
Stomach cancer	25–35%	WHO, 2023
Colorectal cancer	40–60%	WEO, 2024
Barrett's esophagus	To 30%	AGA, 2022

Key conditions for success:

- ✓ Regular screening of risk groups
- ✓ Standardization of examination protocols
- ✓ Use of advanced technologies
- ✓ Training of endoscopists
- ✓ Centralized quality control

In countries that have implemented colorectal cancer screening programs, the early-stage detection rate has increased from 18% to 56%.

Development Prospects

In the future, further development of endoscopic monitoring is associated with the expansion of the use of innovative technologies, standardization of examination protocols, and increased accessibility of early diagnosis for broad groups of the population.



A comprehensive approach to monitoring patients with risk factors will improve oncological surveillance, optimize treatment routing, and significantly increase survival in patients with gastrointestinal cancer.

Conclusions

Endoscopic monitoring remains the most effective method for the early detection of malignant neoplasms of the gastrointestinal tract. The use of high-tech imaging techniques, including HD endoscopy, narrow-band imaging (NBI), and artificial intelligence systems, significantly improves the diagnostic accuracy of early tumor detection, enabling timely minimally invasive treatment and preventing disease progression.

Numerous studies confirm that the implementation of organized screening programs leads to a significant reduction in mortality from stomach and colorectal cancer, especially in regions with high incidence rates. The effectiveness of such programs is largely determined by the regularity of monitoring, the quality of endoscopic equipment, and the professional training of specialists.

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