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CLINICAL UTILITY OF VIDEO CAPSULE ENDOSCOPY IN THE DIAGNOSIS OF GASTROINTESTINAL DISORDERS: A CASE REPORT AND IMAGING ANALYSIS

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ABSTRACT

This paper analyzes the usefulness of video capsule endoscopy (VCE) in diagnosing gastrointestinal disorders, with focus on the small intestine. The study presents the observational case of a 60-year-old male with chronic dyspepsia, in whom standard investigations showed no abnormalities. VCE enabled complete exploration of the digestive tract, revealing normal gastric and intestinal mucosa without bleeding, inflammation, or tumor lesions. Colon visualization was partly limited by residual content but showed no significant abnormalities. The results confirm the value of VCE as a complementary method, contributing to faster diagnosis, reduced invasive procedures, and improved patient comfort. Integrating this technology supports more efficient management of patients with nonspecific digestive symptoms and chronic gastrointestinal diseases.

INTRODUCTION

Digestion represents one of the fundamental functions of the human body, being carried out through the digestive system. This system is composed of the digestive tract itself-the oral cavity, esophagus, stomach, small intestine, and large intestine - as well as the accessory glands: the salivary glands, pancreas, and liver. Digestive processes require a complex coordination between motor and secretory activities at the level of each segment, ensuring the transformation of food into substances useful to the body (Șerban et al. 2008).

The gastrointestinal stage plays a central role, representing the site of enzymatic and mechanical actions that prepare the digestive chyme for absorption (Hăulică 2007). The stomach, located between the esophagus and the duodenum, is the most dilated segment of the digestive tract, with a sac-like shape adapted both for storage and for the mechanical and chemical preparation of food (Seres Sturm et al. 2004; Nicolescu & Albulescu 2010).

The transformations of food in the stomach result from the action of gastric juice and gastric motility (Hăulică 2007).

The small intestine is the longest segment of the digestive tract, with a dual function—secretory and absorptive—being responsible for the final digestion and absorption of nutrients (Badiu & Teodorescu Exarcu 2014). The duodenum constitutes the fixed portion, while the jejunum-ileum forms the mobile segment,

playing a predominant role in the absorption of food principles (Ranga et al. 2009). The motility of the small intestine, through segmental and peristaltic movements, ensures optimal contact of the chyme with digestive juices and its slow propulsion toward the ileocecal valve (Lutan et al. 2004).

The large intestine, extending from the ileocecal valve to the anus, is involved in digestion, absorption, excretion, and the storage of residues. Functionally, its proximal half has characteristics similar to the small intestine, while the distal half functions as a fecal reservoir (Năstăsescu & Ungureanu 1999; Nicolescu & Albulescu 2010).

Video capsule endoscopy is a modern and innovative technology for exploring the digestive tract. It is a minimally invasive procedure that involves swallowing a small capsule that captures images throughout its transit along the digestive tract. It is used primarily for the exploration of the small intestine, a segment that is difficult to assess through conventional endoscopic methods. (https://www.regina-maria.ro/articole-medicale/sanatatea-familiei/inovatii-tehnologice-endoscopia-digestiva-pentru-pacientii)

Video capsule endoscopy has multiple clinical applications, being used primarily in the evaluation of obscure gastrointestinal bleeding and in patients with iron-deficiency anemia. It is also valuable in detecting small intestine tumors, investigating transit disorders, and screening individuals at risk for polyps or colorectal cancer. The method is further recommended for the assessment of esophageal varices in patients with cirrhosis, as well as for the diagnosis and monitoring of inflammatory bowel diseases, refractory celiac disease, and polyposis syndromes. (https://digestmed.ro/s-ervicii/specialitate/gastr-oenterologie-ro/videocapsula-capsocam-plus/)

Based on advanced technology for the precise diagnosis of digestive lesions, the video capsule endoscope is a small medical device equipped with a video camera, light source, and battery, which enables the noninvasive examination of the digestive tract, particularly the small intestine, which is difficult to explore by conventional endoscopic methods. (https://www.sanador.ro/videocapsula-endoscopica)

The video capsule has the size of a pill (27 mm in length, 11 mm in diameter, 4 grams), is made of a material resistant to gastric acids and digestive enzymes, and is coated with a layer that facilitates swallowing. Inside, it contains one or two color video cameras, a light source, a radio transmitter, and a small battery. (https://www.gastroenterologia.ro/Pacienti/endoscopie_cu_video-capsula.htm)

The capsule is swallowed with water and wirelessly transmits thousands of images to a recorder worn by the patient for 12–24 hours. It is later eliminated naturally, without requiring retrieval, and the resulting images are analyzed by the gastroenterologist. (https://www.sanador.ro/videocapsula-endoscopica)

Video capsule endoscopy begins with the signing of informed consent and a custody agreement, followed by ingestion of the device under medical supervision. The capsule immediately transmits images to the recorder attached to the abdominal belt, while the patient can continue daily activities, avoiding sudden movements, the prone position, electromagnetic sources, exposure to heat or UV light, and contact with water. At the end of the examination, the equipment is disassembled, the data are downloaded and interpreted by the gastroenterologist, and the capsule is spontaneously eliminated in the stool within 8–48 hours. (https://www.gastroen-terologia.ro/Pacienti/endoscopie_cu_video-capsula.htm)

Video capsule endoscopy is a safe, noninvasive, and well-tolerated method, with multiple advantages over conventional imaging techniques. It provides direct and detailed visualization of the mucosa, allowing the identification of small lesions and inflammations, being particularly useful for the exploration of the small intestine. Unlike

colonoscopy, it does not require sedation, anesthesia, or radiation exposure, and it is better accepted by patients, including those at higher risk for classical methods. In addition, the images obtained can later be reviewed by other specialists, and its compatibility with electronic implants broadens its applicability. (https://digestmed.ro/s-ervicii/specialitate/gastroenterologie-ro/videocapsula-capsocam-plus/)

The use of video capsule endoscopy is contraindicated in certain clinical situations, such as age under 10 years, pregnancy, gastrointestinal obstructions, strictures, or fistulas. The procedure is also not recommended for patients with a pacemaker or implantable cardiac defibrillator, those with gastroparesis, or swallowing disorders. Moreover, MRI examinations are prohibited until the capsule has been completely eliminated. (https://www.gastroenterologia.ro/Pacienti/endoscopie_cu_video-capsula.htm)

Although it is a modern and effective technique, video capsule endoscopy presents some limitations. It does not allow therapeutic maneuvers or biopsy sampling, which makes it necessary to complement the investigation with colonoscopy or enteroscopy in cases of suspected lesions. Diagnostic accuracy depends on the quality of preparation and intestinal transit, while high costs limit its widespread use. (https://www.reginamaria.ro/articole-medicale/sanatatea-familiei/inovatii-tehnologice-endoscopia-digestiva-pentru-pacientii)

The most frequent risk of video capsule endoscopy is device retention, defined as its persistence in the digestive tract for more than 72 hours, reported in less than 2 % of cases. This occurs mainly in patients with strictures induced by nonsteroidal anti-inflammatory drugs, Crohn's disease, intestinal tumors, adhesions, ulcerations, or post-radiation enteritis. Other, much rarer risks include device malfunction, capsule leakage, allergic reactions, or infections, all of which are minimized by adherence to protocol. The literature reports a retention rate of 1.5 % in cases of occult bleeding, 1.4 % in suspected Crohn's disease, 5 % in confirmed Crohn's disease, and 2.1 % in the presence of neoplastic lesions. (https://digestmed.ro/s-ervicii/specialitate/gastroenterologie-ro/videocapsula-capsocam-plus/)

Therefore, video capsule endoscopy is an effective, safe, and well-tolerated method, ideal for exploring the small intestine and, in certain cases, the colon and esophagus. Although it does not allow therapeutic maneuvers, it remains a valuable tool in the diagnosis of digestive disorders when classical methods are not feasible or accepted by the patient. (https://www.gastroenterologia.ro/Pacienti/endoscopie_cu_video-capsula.htm)

MATERIAL AND METHODS

The interpretation of results obtained through video capsule endoscopy involves the analysis of images transmitted by the ingested device, which traverses the entire digestive tract and provides thousands of frames to an external receiver. This method is particularly indicated for the evaluation of the small intestine, a region that is difficult to access through upper digestive endoscopy or conventional colonoscopy.

The present descriptive observational study aims to analyze the usefulness of video capsule endoscopy (VCE) in establishing the diagnosis of a 60-year-old male patient. In 2025, he presented to the Center of Gastroenterology, Hepatology, and Digestive Endoscopy of the Central Polyclinic Craiova, part of the "Regina Maria" Health Network, with symptoms suggestive of chronic dyspeptic syndrome. Previous investigations by upper digestive endoscopy and colonoscopy revealed no lesions, and the patient, after signing informed consent, was included in the study, in the absence of strictures or suspected intestinal obstruction.

Video capsule endoscopy enabled the anatomical segmentation into esophagus and stomach, small intestine, and colon. The stages of the investigation included a complete clinical evaluation and a detailed analysis of the medical history, followed by standard paraclinical investigations (complete blood count, ESR, fecal calprotectin, transaminases, and Helicobacter pylori test). Subsequently, organic pathologies were excluded by upper digestive endoscopy and colonoscopy, after which the patient was administered the video capsule. Transit time was monitored, images were recorded over a period of eight hours, then downloaded, analyzed, and interpreted using dedicated software.

RESULTS AND DISCUSSIONS

1. Imaging analysis

The images obtained were evaluated by a gastroenterologist experienced in VCE, with the endoscopic report being favorable (Figure 1). The capsule traversed the entire gastrointestinal tract without delays or retention, with a gastric transit time of 55 minutes and 16 seconds, an intestinal transit time of 5 hours and 5 minutes (305 minutes and 13 seconds), and a total transit time of 11 hours and 56 minutes (716 minutes and 29 seconds). The first esophageal image was recorded at 00:00:00 (Figure 2), the first gastric image at 00:00:36 (Figure 3), and the first small intestine image at 00:55:52 (Figure 4), with representative sequences at 02:35:00 (Figure 5) and 04:35:00 (Figure 6). The last image from the small intestine was captured at 06:00:00 (Figure 7), followed by the first image from the colon at 06:01:05 (Figure 8) and an additional image at 09:56:00 (Figure 9).

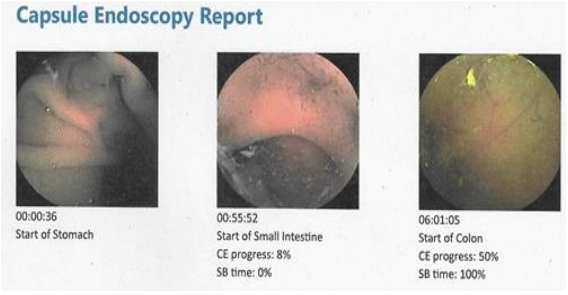

Figure 1. Endoscopic report of the patient

Figure 2. Image from the esophagus (00:00:00

Figure 3. First image of the stomach (00:00:36)

Figure 4. First image of the small intestine (00:55:52)

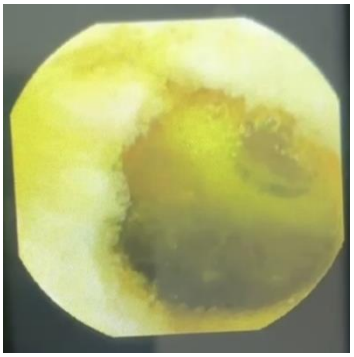

Figure 5. Image from the small intestine (02:35:00)

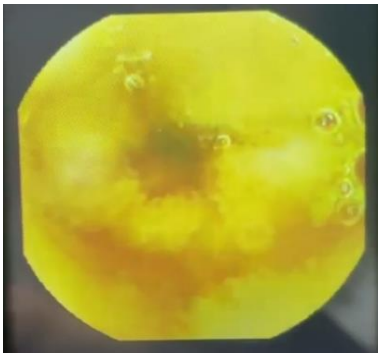

Figure 6. Image from the small intestine (04:35:00)

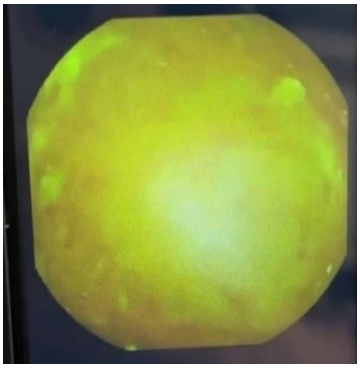

Figure 7. Last image of the small intestine (06:00:00)

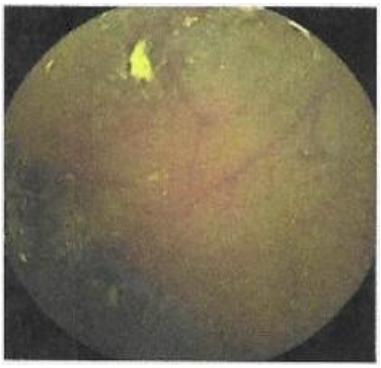

Figure 8. First image of the colon (06:01:05)

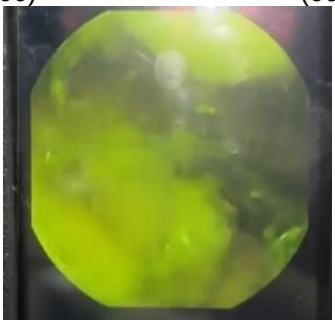

Figure 9. Image from the colon (09:56:00)

2. Interpretation

At the esophageal level, transit time was 4 seconds, with a normal appearance and no delays.

The stomach showed a transit time of 55 minutes and 16 seconds, considered within physiological limits (1–2 hours).

The small intestine was traversed in 5 hours and 5 minutes, a normal interval (2–6 hours), being completely visualized, with normal-appearing mucosa and no ulcerations, tumors, inflammation, or bleeding.

The colon presented partial visualization limited by residual content, with no significant lesions; for detailed evaluation, conventional colonoscopy is required. The image quality was good, with adequate preparation.

CONCLUSIONS

The administration of the video capsule was carried out without incidents, with complete traversal of the gastrointestinal tract. Transit time was 4 seconds for the esophagus, 55 minutes and 16 seconds for the stomach, and 5 hours and 5 minutes for the small intestine. The gastric mucosa and small intestine appeared normal, with no lesions identified, and passage through the ileocecal valve occurred approximately 6 hours after administration. The colon presented residual liquid and semi-solid content, which limited visualization, but no pathological changes were observed. The image analysis, performed by a gastroenterologist experienced in VCE, was considered complete and of good quality for the examined segments. The results suggest the absence of evident sources of bleeding or inflammation and do not indicate major pathology at the colonic level.

Video capsule endoscopy is a modern, safe, and noninvasive method, serving as a reference tool in the exploration of the small intestine. Through its accuracy in detecting lesions, the comfort it provides to the patient, and its ability to access areas inaccessible to conventional methods, VCE significantly contributes to the diagnosis and monitoring of digestive disorders. Although it does not allow interventions or biopsy sampling, it remains a valuable complement to traditional investigations, facilitating faster diagnosis and more efficient patient management.

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***https://www.sanador.ro/videocapsula-endoscopica

***https://digestmed.ro/servicii/specialitate/gastroenterologie-ro/videocapsula-capsocam-plus/