

Other Applications and Capsule Endoscopy: Motility Studies, Colonic Capsule and other Capsules for Small Bowel Study.

Introduction

Capsule endoscopy (CE) has proved to be an introduction, at the DDW 2000, in San Diego, California, USA, of video, wireless, capsule endoscopy (CE) of the small bowel in humans, it was clear to all that it was only, although revolutionary, the first step in a long, but promising journey, down the road of diagnosing and treatment of gastrointestinal pathology. In addition to small bowel video imaging many have looked at the new technology also as a vehicle. A vehicle which could carry proper equipment for measuring temperature and Ph, investigate gastrointestinal motility, contain biosensors for detecting oncological markers and others, and even perform ultrasonography. It might take (electronic) biopsies from the small bowel mucosa and could be used in chromo-endoscopy.

Many are hoping it will, as well, become a therapeutic tool which can release drugs at desired areas, stop bleeding or even destroy and cut out various lesions. There were anticipations for a single capsule for the whole length of the gastrointestinal tract.

We shall be concentrating in this chapter on three issues: 1. Motility studies. 2. Colonic capsule. 3. Other capsules (than PillCam) for small bowel studies.

Motility Studies

Until the introduction of capsule endoscopy (CE), studies of gastrointestinal transit times were based on indirect data obtained with radiographic techniques. Many studies were performed on the factors that affect the passage of the capsule via the esophagus, stomach and the small bowel.

The esophagus

The esophagus could be sometimes a problem of getting CE into the stomach and from there into the small bowel. In patients with various types of motility disturbances of the esophagus (eg. achalasia or diffuse

esophageal spasm, esophageal involvement in primary amyloidosis or scleroderma etc.) the capsule must be carried actively, with the help of a gastroscope, directly into the stomach or into the duodenum.

Esophageal transit time (as determined by CE) is defined as the time that separates the first image of esophagus from the first one of stomach in the upright position. This time varies approximately between 1 and 4 seconds.

There is a report (1) on 3 patients that had a delayed esophageal transit time of more than an hour. All 3 were not symptomatic and did not have any abnormalities at esophagoscopy. Esophageal manometry was performed later in one patient and revealed typical picture of achalasia.

The stomach

Gastric transit time (or emptying time), is defined as the time between the first stomach image and the first duodenal one. This has been found to be: 48.3 ± 28.7 minutes (2), and in another study (3) ranged from 0.7 to 171 min. (mean 22.6).

Ben-Soussan (1) brings 2 more definitions into the scope:

- Gastric retention - the absence of pyloric passage of capsule endoscopy during the entire recording;
- Delayed gastric emptying - if the pylorus is not crossed 2 hours after ingestion of the capsule.

Since gastric retention is a critical problem that requires a second examination, and since delayed gastric emptying can increase the risk for incomplete small bowel imaging, many researchers were looking for the factors that affect gastric passage and for the means to overcome these obstacles.

20-40% of patients suffering from diabetes, and patients with scleroderma, hypothyroidism or those who underwent vagotomy are predisposed for gastric retention or delayed gastric emptying during CE examination. Gastroparesis could be idiopathic or may accompany

► FIGURES

Figure 1: The PillCam for colon.



Figure 2: Colonic polyps detected with Pillcam Colon Capsule (By courtesy of Given Imaging, LTD).

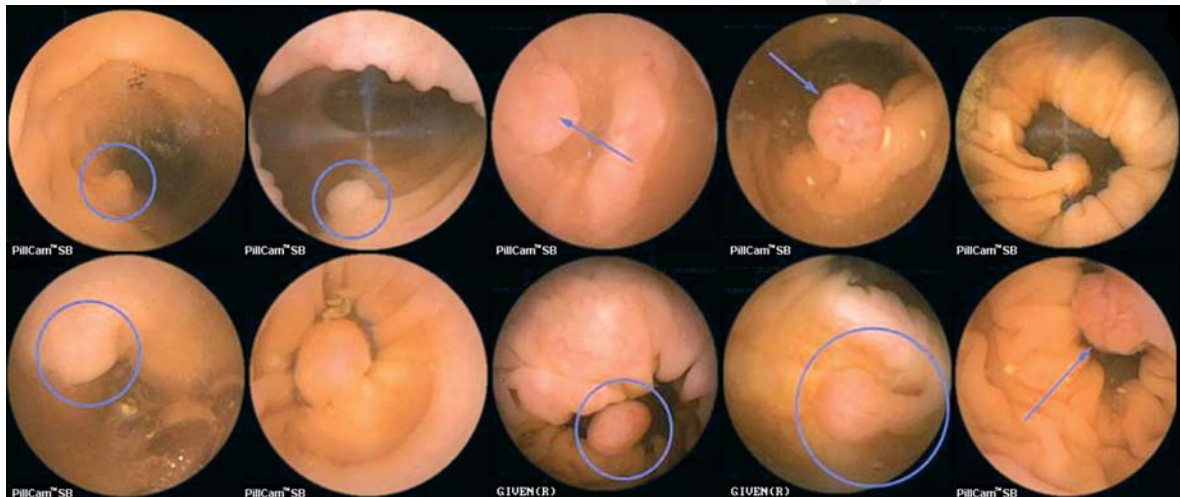


Figure 3: Diverticulosis (3 A – 3 B) and ulcerative colitis detected with Pillcam Colon Capsule (By courtesy of Given Imaging, LTD).

