M2A Capsule Endoscopy – A Painless Voyage in the Small Bowel and Beyond

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The M2A video capsule endoscope is a wireless capsule (11 x 27 mm) comprised of a light source, lens, CMOS imager, battery and a wireless transmitter. The slippery coating of the capsule allows easy ingestion and prevents adhesion of contents while the capsule moves via peristalsis from the mouth to the anus. The battery provides 7–8 hours of work during which the capsule photographs two images per second (50–60,000 images altogether) that are transmitted to a recorder worn on a belt. The recorder is downloaded into a computer and seen as a continuous video film. Since its development additional support systems have been added – a localization system, a blood detector and a double picture viewer, all meant to assist the interpreter.

The full range of indications for CE will become apparent with time as more and more diseases and implications are studied. Initially CE was invented to address the need for a better diagnostic tool for small bowel pathologies.

The most obvious and the first indication to be tested was obscure gastrointestinal bleeding, which occurs in 5–10% of patients with any type of GI bleeding. Many peer-reviewed articles compared CE to push enteroscopy and other modalities in patients with obscure GI bleeding [1–4]. The added value of enteroscopy was in the range of 25–30%, while that of CE was significantly better (50–67%). This led Cave [5] to propose an algorithm in which CE was the first method to evaluate the small bowel in a patient with GI bleeding and negative gastroscopy and colonoscopy. The closer the study is performed to the time of actual bleeding, the greater the diagnostic yield. Recently it was found that a second CE in patients with obscure GI bleeding and a negative first study increased the diagnostic yield by 20% [6].

A second obvious indication is suspected Crohn's disease. A few studies demonstrated the superiority of CE compared to small bowel follow-through and entero-computed tomography in Crohn patients [7–9]. The diagnostic yield of CE ranged between 43 and 71%, significantly better than small bowel follow-through or entero-CT. Moreover, CE diagnosed Crohn's disease in 6–9% of patients with obscure GI bleeding [10]. In patients with undetermined colitis the use of CE changed the diagnosis to Crohn's disease in 50% of patients [10].

Other indications for CE include evaluation of celiac disease, extent of Crohn's disease, GI tumors, non-steroidal anti-inflammatory drug-induced small bowel damage, surveillance of polyposis syndromes and graft versus host disease, all of which are currently investigated.

We recently looked at CE in real life. We looked at the charts of the first 160 patients referred for CE by various doctors to four centers in Israel. We found CE to be of value in patients with obscure GI bleeding (65%), Crohn's disease (55%) and chronic diarrhea (100%), but not in patients with chronic abdominal pain.

Future developments and indications will probably include: monitoring of small bowel damage from drugs and NSAIDs, monitoring of mucosal healing after various treatments (Crohn's), assessing the extent of diseases (Crohn's, celiac) and possibly monitoring/surveillance of upper or lower GI damage. A recent feasibility study has shown that a new type of capsule, with a camera on each side, swallowed in the supine position was as good as conventional endoscopy in detecting esophagitis or Barrett's esophagus. If confirmed in a larger multicenter study this may lead to a friendlier, more accepted screening tool for esophageal pathologies [11].

In this issue of *IMAJ* Fireman et al. [12] report on another field yet to be explored – GI motility. They compared the effects of oral purgatives on capsule transit time. They demonstrated a significant reduction in small bowel transit time using polyethylene glycol but not sodium phosphate, as compared to the regular procedure that does not use these agents. Interestingly, though the transit time was shortened, the percentage of capsules reaching the cecum did not differ (22%), and more pathologies were detected in the regular procedure (33% versus 22% and 15%). They did not mention whether the small bowel was cleaner when a purgative was used. These are all important issues that need to be addressed in well-designed prospective studies. My personal view, supported by this study, is not to give an oral preparation as this will turn CE from an easy, patient-friendly, outpatient procedure to one that is uncomfortable, so far with no proven additional benefit. Capsule transit times can add information regarding motility and the effects of drugs on it.

The major complication with CE is capsule retention usually proximal to a stricture. This often happens despite normal small

CE = capsule endoscope
GI = gastrointestinal

NSAIDs = non-steroidal anti-inflammatory drugs

bowel X-rays. NSAID usage, ischemic bowel event, or known Crohn's disease carry higher risk for capsule retention, neccesitating surgery in less than 1% of patients. Usually there are no clinical signs or symptoms and it is visible on a plain abdominal film.

Thus, CE is a safe, valuable, non-invasive, innovative tool for the diagnosis and management of small bowel and possibly other pathologies. Newer versions of softwear allow better localization. Advanced versions will hopefully allow therapeutic modalities and rapid reading.

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A shortcut to riches is to subtract from one's desires

Plutarch (1st century AD), Greek biographer and essayist and citizen of both Athens and Rome. His works had a great influence in Europe in the 16th and 17th centuries and were the source of some of Shakespeare's plays

Few men of action have been able to make a graceful exit at the appropriate time

Malcolm Muggeridge (1903-90), well-known author, journalist, media personality and, in his later years, a leading spokesman for Christianity

Capsule

Live flavivirus vaccines – safety issues

In an E-mail article, Seligman et al. address the problem of live flavivirus vaccine. Dengue, Japanese encephalitis, tick-borne encephalitis, yellow fever, and West Nile viruses cause substantial morbidity and mortality each year. Modern transportation and the relaxation of mosquito-control measures are largely responsible for the increase of disease caused by flaviviruses. Without effective antiviral drugs, vaccination offers the best chance of decreasing the incidence of these diseases, and live virus vaccines are the most promising and cost-effective. However, flaviviruses can recombine, which raises the possibility of recombination between a vaccine strain and wild-type virus – resulting in a new virus with potentially undesirable properties. Recently, Sabchareon and colleagues reported up to 90% seroconversion rates in a phase I trial of live-attenuated dengue virus vaccines in children. Other live flavivirus vaccines have also been tested against dengue, Japanese encephalitis, and West Nile viruses. Thus far, efficacy seems promising. Safety issues with the live flavivirus vaccines need to be recognized and addressed. The theoretical possibility of untoward recombination events can never be entirely dismissed, but steps can be taken to minimize risk. The development of non-live flavivirus vaccines should be encouraged.

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