



**Cover Picture:**  
Coronal (bone window)  
CT scans of the nasopharynx.  
(Refer to page 542-549)

# Wireless Capsule Endoscopy: Light at the End of the Tunnel for Obscure Gastrointestinal Bleeding

A F P K Leong

**INTRODUCTION**

Patients with obscure gastrointestinal (GI) bleeding present a unique challenge to gastrointestinal surgeons and gastroenterologists. Although infrequent, this group of patients are particularly difficult to manage. They may present with overt bleeding or with iron deficiency anaemia. The site of haemorrhage cannot be detected after upper gastrointestinal endoscopy and colonoscopy. The managing physician or surgeon is left with a quandary as whether to look for a less common small intestinal cause or to repeat endoscopy. The American Gastroenterological Association medical position statement published in the year 2000<sup>(1)</sup> concerning the management of obscure GI bleeding advocated escalating testing after negative endoscopy with nuclear medicine scans and angiography for patients with active bleeding. Repeat endoscopy, enteroscopy, enteroclysis or small bowel series was recommended for those not overtly bleeding. The article by W Luman et al<sup>(2)</sup> in this issue of the SMJ highlights the poor yield of the small bowel radiology when bidirectional endoscopy is negative in investigation for iron deficiency anaemia. While small bowel tumours and Crohn's disease was diagnosed in their selective series, high yields are uncommon in this setting<sup>(1)</sup>. Alternatively procedures such as push enteroscopy may be utilised but is unable to visualise the entire length of the small bowel.

Recently, wireless capsule endoscopy has been used to provide complete endoscopic examination of the small bowel to elucidate the cause of obscure GI bleeding. Several trials have shown a superior diagnostic yield from capsule endoscopy when compared with push enteroscopy<sup>(3,4)</sup>, enteroclysis<sup>(5)</sup> and barium follow-through<sup>(6)</sup>. Lesions detected by capsule endoscopy but were missed by the other modalities include angiodysplasia, focal bleeding, tumours, Meckel's diverticulum, jejunitis and small bowel ulcers. Capsule endoscopy increased the diagnostic yield to 67% in patients with obscure GI bleeding.

The wireless capsule measures 11 x 26 mm. It consists of four white light emitting diodes for illumination, a short focal length lens, a miniature complementary metal oxide silicon camera, two batteries, a radio frequency transmitter and an antenna. The capsule obtains two images per second and transmits the data to a recording device worn around the patient's waist. Once the study is completed, data from the recording device is downloaded to a computer whose software provides the imaging. The system allows for seven hours of continuous imaging. The frequency of image capture provides the reviewer with seamless endoscopic visualisation similar to that of flexible endoscopes. The time needed to evaluate the video sequence is between 45 minutes to two hours. Further, a sensor array is also placed above the abdomen and the capsule's

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location is determined by its signal strength monitored in two dimensions. A computer algorithm calculates the location based on variances in signal strength. The initial information for the algorithm was derived from fluoroscopic images obtained during a capsule examination in one volunteer.

The main complication associated with capsule use is impaction at sites of strictures or diverticula. Interestingly, this has not been reported to produce symptoms in patients. Surgical or endoscopic extraction has been required in these patients. Capsule endoscopic examination is well tolerated by patients and preferred to enteroscopy<sup>(4)</sup>. In addition to the evaluation of patients with obscure gastrointestinal bleeding, other potential indications are as an adjunct to the investigation of Crohn's disease and coeliac disease patients with weight loss.

To date more than 4,000 patients around the world have undergone capsule endoscopy. It has received FDA approval. In Singapore, it has been used in a handful patients. Cost issues aside it looks set to have wider usage. Wireless capsule endoscopy may well prove to be the light at the end of the tunnel for patients with previously difficult to diagnose small bowel pathology. **SMD**

## REFERENCES

1. American Gastroenterological Association. American Gastroenterological Association Medical Position Statement: evaluation and management of occult and obscure gastrointestinal bleeding. *Gastroenterology* 2000; 118:197-200.
2. Luman W, Ng KL. Audit of investigations in patients with iron deficiency anaemia. *Singapore Med J* 2003; 44:504-10.
3. Saurin JC, Delvaux M, Gaudin JL, et al. Diagnostic value of endoscopic capsule in patients with obscure digestive bleeding: blinded comparison with video push-enteroscopy. *Endoscopy* 2003; 35:576-84.
4. Mylonaki M, Fritscher-Ravens A, Swain P. Wireless capsule endoscopy: a comparison with push enteroscopy with gastroscopy and colonoscopy negative gastrointestinal bleeding. *GUT* 2003; 52:1122-6.
5. Liangpunsakul S, Chadalawada V, Rex DK, et al. Wireless capsule endoscopy detects small bowel ulcers in patients with normal results from state of the art enteroclysis. *Am J Gastroenterol* 2003; 98:1295-8.
6. Scapa E, Jacob H, Lewkowicz S, et al. Initial experience of wireless-capsule endoscopy for evaluating occult gastrointestinal bleeding and suspected small bowel pathology. *Am J Gastroenterol* 2002; 97:2776-9.

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