The 5th International Conference on Capsule Endoscopy™
Expanding Indications, Improving Outcomes

ICCE-2006 FLORIDA™
March 6-7, 2006

PROGRAM & ABSTRACTS

PLEASE VISIT OUR WEBSITE: WWW.2006ICCE.COM
The 5th International Conference on Capsule Endoscopy™
Expanding Indications, Improving Outcomes
March 6-7, 2006 • Boca Raton, Florida, U.S.A.

PROGRAM & ABSTRACTS
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WELCOME

Dear Colleagues,

We would like to extend a warm welcome to all of you that have taken time to join us in Boca Raton for the 5th Annual International Conference on Capsule Endoscopy™ (ICCE™). As capsule endoscopy is a new and evolving discipline, the work of this meeting is critical to the establishment of a baseline consensus for the utility of capsule endoscopy. This year's curriculum will expose you to valuable information which will certainly improve patient care and enhance the quality of our patients' lives.

Enjoy your time in Boca Raton, while learning from the plenary sessions, the clinical practice breakouts, the posters, the interactive learning center, and, most of all, the interaction with your peers and colleagues. We are excited to host a meeting with the scientific, interpersonal, and intellectual dynamic that is so unique to the ICCE. Your attendance and participation is precisely the component that will make ICCE 2006 a memorable event.

Sincerely,

Blair S. Lewis, MD Roberto de Franchis, MD
GENERAL INFORMATION

Conference Venue
Boca Raton Resort & Club
501 East Camino Real
Boca Raton, FL  33432, USA
Tel:  +1 561 447 3000
Fax: +1 561 447 3183
Website:  www.bocaresort.com

Language
The official language of the conference is English.

Registration and Information
Conference registration and distribution of conference materials will take place at the registration and information desk at the Boca Raton Resort. Registration will be open as follows:
- Saturday, March 4, 2006 1:00pm - 8:00pm
- Sunday, March 5, 2006 7:00am - 7:00pm
- Monday, March 6, 2006 7:00am - 7:00pm
- Tuesday, March 7, 2006 7:00am - 5:00pm

Conference Bag and Name Badge
Upon registering you will receive a conference bag containing the final Program & Abstract Book. An invitation to the social event and your name badge will be found with your registration materials. You are requested to wear your name badge to all conference functions and sessions.

ICCE™ Learning Center
The ICCE Learning Center will be open during session breaks in the Royal Palm Ballroom I-V. Here you will find the opportunity to review the latest software advancements, study specific clinical pathologies and their presentations, and utilize an interactive consultation tool. The ICCE Learning Center hours of operation are:
- Monday, March 6th
  - 7:00am - 8:00am
  - 9:40am - 10:10am
  - 12:20pm - 1:50pm
  - 3:00pm - 3:30pm
  - 5:00pm - 6:00pm
- Tuesday, March 7th
  - 7:00am - 8:00am
  - 10:05am - 10:35am
  - 11:35am - 1:10pm
  - 2:40pm - 3:10pm
  - 5:30pm - 6:30pm

Projection Equipment
Data projection is available for all presentations. Presenters are kindly requested to check their presentation in the session hall prior to their presentation time (during breaks).

Poster Presentations
The exact location of your poster can be found in the Program & Abstract Book. All posters should be mounted before 8:00am on Monday, March 6, 2006, and removed by the presenter before the end of the conference. Conference planners will not be held responsible for posters left after the conference.

Safety and Security
Please do not leave bags or suitcases unattended at any time, whether inside or outside session halls.

Conference Planners
Conferon, Inc.
3 Allied Drive, Suite 306
Dedham, MA  02026
Tel: +1 781 251 7874
Fax:  +1 781 251 7850
E-mail:  icce@conferon.com
Website:  www.2006icce.com
Participants and paid guests are invited to attend a Special Evening Dinner Reception

Please join us for a Beach Party!

7:00pm
Monday, March 6, 2006
Cappy’s Deck at the Boca Beach Club

Transportation between the Mizner Center Porte Cochere and the Boca Beach Club will be provided on a continuous basis from 6:45pm until 10:30pm.
### PROGRAM AT A GLANCE

**MONDAY, MARCH 6, 2006**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:00am - 7:00pm</td>
<td>Registration</td>
<td>Registration South</td>
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<tr>
<td>7:00am - 8:00am</td>
<td><strong>Breakfast/ICCE™ Learning Center open</strong></td>
<td>Grand Ballroom A-E/Royal Palm Ballroom I-V</td>
</tr>
<tr>
<td>8:00am - 8:30am</td>
<td><strong>Opening Session</strong>&lt;br&gt;Chairmen's Welcome and Review of ICCE Consensus 2005</td>
<td>Grand Ballroom F-J</td>
</tr>
<tr>
<td></td>
<td>Co-Chairmen:&lt;br&gt;<strong>B.S. Lewis</strong>, USA&lt;br&gt;<strong>R. de Franchis</strong>, Italy</td>
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<tr>
<td>8:30am - 9:40am</td>
<td><strong>Clinical Practice Lectures</strong>&lt;br&gt;State-of-the-art and Consensus - Preps/Prokinetics&lt;br&gt;Preps/Prokinetics Consensus Panel Co-Chairmen:&lt;br&gt;<strong>T. Ponchon</strong>, France&lt;br&gt;<strong>K. Mergener</strong>, USA</td>
<td>Grand Ballroom F-J</td>
</tr>
<tr>
<td>9:40am - 10:10am</td>
<td><strong>Coffee Break/ICCE Learning Center open</strong></td>
<td>Grand Assembly/Royal Palm Ballroom I-V</td>
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<tr>
<td>10:10am - 11:20am</td>
<td><strong>Esophageal Capsule Endoscopy Lectures</strong>&lt;br&gt;State-of-the-art and Consensus - Esophageal Capsule Endoscopy&lt;br&gt;Esophageal Capsule Endoscopy Consensus Panel Co-Chairmen:&lt;br&gt;<strong>C. Ell</strong>, Germany&lt;br&gt;<strong>G. Eisen</strong>, USA</td>
<td>Grand Ballroom F-J</td>
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### MONDAY, MARCH 6, 2006 (continued)

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<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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| 11:20am - 12:20pm | Inflammatory Bowel Disease Lectures State-of-the-art and Consensus - Inflammatory Bowel Disease Consensus Panel Co-Chairmen:  
S. Schreiber, Germany  
E. Seidman, Canada | Grand Ballroom F-J                                                    |
| 12:20pm - 1:50pm | Lunch/ICCE Learning Center open                                        | Grand Ballroom A-E/Royal Palm Ballroom I-V                            |
| 1:50pm - 3:00pm  | **Keynote Lecture:** Capsule Endoscopy: Look How Far We’ve Come  
H. Neuhaus, Germany                  | Grand Ballroom F-J                                                  |
| 2:20pm         | **Special Lecture:** ICCE Consensus in Clinical Practice                 | Grand Ballroom F-J                                                  |
| 2:30pm - 3:00pm | **Co-Chairmen’s Lectures:** Capsule Endoscopy Around the World  
The European Experience  
R. de Franchis, Italy  
The USA Experience  
B.S. Lewis, USA  | Grand Ballroom F-J                                                  |
| 3:00pm - 3:30pm | **Coffee Break/ICCE Learning Center open**                              | Grand Assembly/Royal Palm Ballroom I-V                              |
| 3:30pm - 5:00pm | Practice Integration Section I                                           | Grand Ballroom F-J                                                  |
| 5:00pm         | Adjourn                                                                | Grand Ballroom F-J                                                  |
| 5:00pm - 6:00pm | ICCE Learning Center open                                              | Royal Palm Ballroom I-V                                             |
| 7:00pm - 10:00pm| **Festive Reception - Beach Party**  
Cappy’s Deck at The Beach Club  |                                                            |

_March 6-7, 2006 • Boca Raton, Florida, U.S.A._
### TUESDAY, MARCH 7, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:00am - 5:00pm</td>
<td>Registration</td>
<td>Registration South</td>
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<tr>
<td>7:00am - 8:00am</td>
<td><strong>Breakfast/ICCE Learning Center open</strong></td>
<td>Grand Ballroom A-E/Royal Palm Ballroom I-V</td>
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<tr>
<td>8:00am - 8:05am</td>
<td>Co-Chairmen’s Comments</td>
<td>Grand Ballroom F-J</td>
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<tr>
<td></td>
<td><strong>B.S. Lewis</strong>, USA</td>
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<tr>
<td></td>
<td><strong>R. de Franchis</strong>, Italy</td>
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<tr>
<td>8:05am - 9:05am</td>
<td>Tumor Lectures</td>
<td>Grand Ballroom F-J</td>
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<td>State-of-the-art and Consensus - Small Bowel Tumors</td>
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<tr>
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<td>Small Bowel Tumors Consensus Co-Chairmen:</td>
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<tr>
<td></td>
<td><strong>G. Gay</strong>, France</td>
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<td></td>
<td><strong>W. Selby</strong>, Australia</td>
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<tr>
<td>9:05am - 10:05am</td>
<td>Bleeding Lectures</td>
<td>Grand Ballroom F-J</td>
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<td>State-of-the-art and Consensus - Bleeding</td>
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<td>Bleeding Consensus Co-Chairmen:</td>
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<td></td>
<td><strong>M. Pennazio</strong>, Italy</td>
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<td></td>
<td><strong>I. Gralnek</strong>, Israel</td>
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<tr>
<td>10:05am - 10:35am</td>
<td><strong>Coffee Break/ICCE Learning Center open</strong></td>
<td>Grand Assembly/Royal Palm Ballroom I-V</td>
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<tr>
<td>10:35am - 11:35am</td>
<td>Celiac Disease Lectures</td>
<td>Grand Ballroom F-J</td>
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<td>State-of-the-art and Consensus - Celiac Disease</td>
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<td>Celiac Disease Consensus Co-Chairmen:</td>
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<tr>
<td></td>
<td><strong>C. Cellier</strong>, France</td>
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<td></td>
<td><strong>J. Murray</strong>, USA</td>
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<tr>
<td>11:35am - 1:10pm</td>
<td><strong>Lunch/ICCE Learning Center open</strong></td>
<td>Grand Ballroom A-E/Royal Palm Ballroom I-V</td>
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<tr>
<td>1:10pm - 1:40pm</td>
<td><strong>Special Lecture</strong>: The Future of Capsule Endoscopy:</td>
<td>Grand Ballroom F-J</td>
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<td><strong>What’s Next?</strong></td>
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<td><strong>C. Gostout</strong>, USA</td>
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<tr>
<td>1:40pm - 2:40pm</td>
<td><strong>Practice Integration Section II</strong></td>
<td>Grand Ballroom F-J</td>
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<tr>
<td>2:40pm - 3:10pm</td>
<td><strong>Coffee Break/ICCE Learning Center open</strong></td>
<td>Grand Assembly/Royal Palm Ballroom I-V</td>
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<tr>
<td>3:10pm - 3:30pm</td>
<td><strong>Practice Integration Section II</strong> (continued)</td>
<td>Grand Ballroom F-J</td>
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<tr>
<td>5:10pm - 5:30pm</td>
<td>Co-Chairmen’s Summary</td>
<td>Grand Ballroom F-J</td>
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<tr>
<td>5:30pm - 6:30pm</td>
<td>ICCE Learning Center open</td>
<td>Royal Palm Ballroom I-V</td>
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The 5th International Conference on Capsule Endoscopy™
Expanding Indications, Improving Outcomes
### MONDAY, MARCH 6, 2006

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<th>Time</th>
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<tr>
<td>7:00am - 7:00pm</td>
<td>Registration</td>
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<tr>
<td>7:00am - 8:00am</td>
<td>Breakfast/ICCE™ Learning Center Open</td>
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<tr>
<td>8:00am - 8:30am</td>
<td>OPENING SESSION</td>
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<tr>
<td>Co-Chairmen: B.S. Lewis, USA, R. de Franchis, Italy</td>
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#### CLINICAL PRACTICE

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:30am</td>
<td>A DOUBLE BLIND PLACEBO CONTROLLED STUDY OF TEGASEROD TO INCREASE GASTRIC AND SMALL BOWEL TRANSIT TIMES WITH WIRELESS CAPSULE ENDOSCOOPY (WCE): PRELIMINARY DATA</td>
</tr>
<tr>
<td>Co-Author: I. Storch, I. Schmelkin, J. Barkin, USA</td>
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<tr>
<td>8:40am</td>
<td>SAFETY OF WIRELESS CAPSULE ENDOCOPY (CE) IN PATIENTS WITH CARDIAC PACEMAKERS AND IMPLANTABLE CARDIAC DEFIBRILLATORS</td>
</tr>
<tr>
<td>Co-Author: J.A. Leighton, V.K Sharma, K Srivathsan, R.I. Heigh, S.K. Gurudu, A.D. Shiff, T.L. McWane, J.K. Post, P. Erickson, J.L. Bazzell, D.E. Fleischer, USA</td>
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<tr>
<td>8:50am</td>
<td>EFFICACY OF THE NEW GIVEN AGILE PATENCY CAPSULE (DOUBLE PLUG) TO PREDICT FUNCTIONAL PATENCY OF THE SMALL BOWEL: THE ISRAELI EXPERIENCE</td>
</tr>
<tr>
<td>Co-Author: S. Adler, B. Koslowsky, E. Scapa, L. Haskel, A. Shetreet, Israel</td>
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<tr>
<td>9:00am</td>
<td>NEW AUTOMATIC MODE OF RAPID® 4 SOFTWARE REDUCES READING TIME FOR SMALL BOWEL PILLCAM STUDIES</td>
</tr>
<tr>
<td>Co-Author: M. Keuchel, F. Hagenmuller, S. Al-Harthi</td>
<td></td>
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<tr>
<td>9:10am</td>
<td>STATE-OF-THE-ART AND CONSENSUS - PREPS/PROKINETICS</td>
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<tr>
<td>Co-Chairmen: T. Ponchon, France, K. Mergener, USA</td>
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| 9:40am - 10:10am | Coffee Break/ICCE Learning Center open                                      |
MONDAY, MARCH 6, 2006

10:10am - 11:20am  ESOPHAGEAL CAPSULE ENDOSCOPY  Grand Ballroom F-J

10:10am  APPLICABILITY OF CAPSULE ENDOSCOPY IN SCREENING FOR PORTAL HYPERTENSION
R. Cheruvattath, M. Gautam, K. Chopra, V. Sharma, J. Kears, C. Corrado, S. Webster, E. Carey,
J. Rakela, H. Vargas, USA

10:20am  COST-UTILITY OF SCREENING FOR ESOPHAGEAL ADENOCARCINOMA WITH ESOPHAGEAL
CAPSULE ENDOSCOPY VS. CONVENTIONAL UPPER ENDOSCOPY
G. Eisen, J. Rubinstein, J. Inadomi, USA

10:30am  ESOPHAGEAL CAPSULE (ECE) FOR ACUTE GI BLEEDING IN THE EMERGENCY DEPARTMENT
AS A GUIDE TO MANAGEMENT: PROOF-OF-PRINCIPLE REPORT
M. Radwin, K. Roberts, P. Tailac, D. Cole, USA

10:40am  INTERIM ANALYSIS OF THE EVALUATION OF PILLCAM ESO IN THE DETECTION OF
ESOPHAGEAL VARICES
R. Eliakim, G. Eisen, R.de Franchis

10:50am  STATE-OF-THE-ART AND CONSENSUS - ESOPHAGEAL CAPSULE ENDOSCOPY
Co-Chairmen: C. Ell, Germany, G. Eisen, USA
MONDAY, MARCH 6, 2006

11:20am - 12:20pm INFLAMMATORY BOWEL DISEASE

11:20am CAPSULE ENDOSCOPIC DIAGNOSIS OF SB CROHN'S DISEASE: A PROSPECTIVE, COMPARATIVE STUDY OF CAPSULE ENTEROSCOPY, BARIUM ENTEROGRAPHY, PUSH ENTEROSCOPY AND ILEOCOLONOSCOPY

11:30am VIDEOCAPSULE ENDOSCOPY IN PEDIATRICS: A 4 YEAR EXPERIENCE
M. Dirks, F. Costea, A. Sant' Anna, N. Peretti, E. Seidman, Canada

11:40am WIRELESS CAPSULE ENDOSCOPY (WCE) IN THE EVALUATION OF SMALL INTESTINAL INFLAMMATORY DISEASE
J. Erber, W. Erber, S. Sagiv, USA

11:50am STATE-OF-THE-ART AND CONSENSUS - INFLAMMATORY BOWEL DISEASE
Co-Chairmen: S. Schreiber, Germany, E. Seidman, Canada

12:20pm - 1:50pm Lunch/ICCE Learning Center open

1:50pm - 3:00pm KEYNOTE LECTURE

1:50pm CAPSULE ENDOSCOPY: LOOK HOW FAR WE'VE COME
H. Neuhaus, Germany

2:20pm ICCE CONSENSUS IN CLINICAL PRACTICE
CAPSULE ENDOSCOPY AROUND THE WORLD

2:30pm THE EUROPEAN EXPERIENCE
R. de Franchis, Italy

2:45pm THE AMERICAN EXPERIENCE
B.S. Lewis, USA

3:00pm - 3:30pm Coffee Break/ICCE Learning Center open
### MONDAY, MARCH 6, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>3:30pm</td>
<td>INTRODUCTION TO RAPID® 4</td>
<td>I. Schmelkin, USA</td>
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<tr>
<td>3:40pm</td>
<td>REVIEW OF NORMAL VARIANTS</td>
<td>R. Chutkan, USA</td>
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<tr>
<td>3:50pm</td>
<td>DIFFERENTIATING BULGES FROM MASSES</td>
<td>M. Pennazio, Italy</td>
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<tr>
<td>4:00pm</td>
<td>HOW TO LOCALIZE A FINDING</td>
<td>M. Appleyard, Australia</td>
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<tr>
<td>4:10pm</td>
<td>TURNING A FINDING INTO MANAGEMENT</td>
<td>J.A Leighton, USA</td>
</tr>
<tr>
<td>4:20pm</td>
<td>PERFORMING CAPSULE ENDOSCOPY IN CHILDREN</td>
<td>S. Cohen, USA</td>
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<td>4:30pm</td>
<td>QUESTION AND ANSWER SESSION</td>
<td>B.S. Lewis, USA, R. de Franchis, Italy</td>
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<td>5:00pm</td>
<td>Adjourn</td>
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<td>5:00pm - 6:00pm</td>
<td>ICCE Learning Center open</td>
<td>ICCE Learning Center open</td>
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<tr>
<td>7:00pm - 10:00pm</td>
<td>Festive Reception - &quot;Beach Party&quot;</td>
<td>Festive Reception - &quot;Beach Party&quot;</td>
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<td>Cappy's Deck at The Boca Beach Resort</td>
<td>Cappy's Deck at The Boca Beach Resort</td>
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**Grand Ballroom F-J**

**Royal Palm Ballroom I-V**
TUESDAY, MARCH 7, 2006

7:00am - 5:00pm  Registration
Registration South

7:00am - 8:00am  Breakfast/ICCE Learning Center Open
Grand Ballroom A-E/Royal Palm Ballroom I-V

8:00am - 8:05am  CO-CHAIRMEN'S COMMENTS
Grand Ballroom F-J
B.S. Lewis, USA, R. de Franchis, Italy

8:05am - 9:05am  TUMORS
Grand Ballroom F-J

8:05am  CLINICAL EVALUATION OF CAPSULE ENDOSCOPY IN DIAGNOSING SMALL BOWEL TUMORS
E. Toth, J. Nielsen, A. Nemeth, O. Ljungberg, H. Thorlacius, Sweden

8:15am  CAPSULE ENDOSCOPY FINDINGS IN 20 CONSECUTIVE PATIENTS WITH PEUTZ-JEGHERS SYNDROME
M. Mozer-Bernardeau, J. Gaudin. P. D'Halluin, E. Bensoussan, K. Vahedi, G. Gay, D. Coumaros, France

8:25am  USE OF RAPID®4 QUICKVIEW V4
I. Schmelkin, USA

8:35am  STATE-OF-THE-ART AND CONSENSUS - SMALL BOWEL TUMORS
Co-Chairmen: G. Gay, France, W. Selby, Australia
**TUESDAY, MARCH 7, 2006**

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room</th>
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<tbody>
<tr>
<td>9:05am</td>
<td><strong>BLEEDING</strong></td>
<td>Grand Ballroom F-J</td>
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</table>
| 9:05am   | PREDICTORS FOR POSITIVE OUTCOMES IN CAPSULE ENDOSCOPY FOR THE INDICATION OF OBSCURE GI BLEEDING  
| 9:15am   | CAPSULE ENDOSCOPY FINDINGS AND CLINICAL OUTCOMES IN PATIENTS WITH OBSCURE GI BLEEDING  
**M. Riccioni**, S. Shah, A. Bizzotto, P. Lecca, C. Spada, S. Rausei, G. Costamagna, Italy |                      |
| 9:25am   | CAPSULE ENDOSCOPY FOR OBSCURE GI BLEEDING: A REPORT OF 100 CONSECUTIVE CASES TO INVESTIGATE LONG TERM CLINICAL OUTCOMES  
**M. Appleyard**, A. Walsh, Australia |                      |
| 9:35am   | STATE-OF-THE-ART AND CONSENSUS - BLEEDING  
Co-Chairmen: **M. Pennazio**, Italy, **I. Gralnek**, Israel |                      |
| 10:05am  | **Coffee Break/ICCE Learning Center open**   | Grand Assembly/Royal Palm Ballroom I-V |
TUESDAY, MARCH 7, 2006

10:35am - 11:35am CELIAC DISEASE

10:35am
THE NATURE, LOCATION AND EXTENT OF SB MUCOSAL LESIONS IN CELIAC DISEASE AS OBSERVED BY WIRELESS CAPSULE ENDOSCOPY (WCE)
A. Muhammad, C.S. Pitchumoni, USA

10:45am
VIDEO CAPSULE ENDOSCOPY FOR THE DIAGNOSIS OF CELIAC DISEASE: FINAL RESULTS FROM A MULTICENTER INTERNATIONAL STUDY

10:55am
FIRST CAPSULE ENDOSCOPY STUDIES IN CYSTIC FIBROSIS: DESCRIPTION OF CF ENTEROPATHY

11:05am
STATE-OF-THE-ART AND CONSENSUS - CELIAC DISEASE
C. Cellier, France, J. Murray, USA

11:35am - 1:10pm Lunch/ICCE Learning Center open

1:10pm - 1:40pm SPECIAL LECTURE
THE FUTURE OF CAPSULE ENDOSCOPY: WHAT'S NEXT?
C. Gostout, USA
TUESDAY, MARCH 7, 2006

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<th>Time</th>
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<tbody>
<tr>
<td>1:40pm - 2:40pm</td>
<td>PRACTICE INTEGRATION SECTION II</td>
<td>Grand Ballroom F-J</td>
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<tr>
<td>1:40pm</td>
<td>PERFORMING CE-ESO</td>
<td>D. Faigel, USA</td>
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<tr>
<td>2:00pm</td>
<td>DIAGNOSING INFLAMMATORY LESIONS</td>
<td>I. Gralnek, Israel</td>
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<td>2:20pm</td>
<td>FINDINGS PARTICULAR TO THE PEDIATRIC POPULATION</td>
<td>E. Seidman, Canada</td>
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<td>2:40pm - 3:10pm</td>
<td>Coffee Break/ICCE Learning Center open</td>
<td>Grand Assembly/Royal Palm Ballroom I-V</td>
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The 5th International Conference on Capsule Endoscopy™

Expanding Indications, Improving Outcomes

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PREDICTORS FOR POSITIVE OUTCOMES IN CAPSULE ENDOSCOPY FOR THE INDICATION OF OBSCURE GASTROINTESTINAL BLEEDING

Eric Lam¹, Stacey Shapira¹, Harry Dhaliwal¹, Henry Chung¹, Joanna Law¹, Victor Wong² Jaber Al Ali¹, Robert Enns¹

¹St. Paul's Hospital, Canada, ²University of Western Ontario, Canada

Introduction: Capsule endoscopy (CE) is primarily used for visualization of the small bowel mucosa in patients with obscure gastrointestinal bleeding. The yield of positive findings will depend on the patient group selected for evaluation. Theoretically, careful patient selection will improve the diagnostic yield, thereby maximizing resource utilization. The purpose of this study is to determine if there are any risk factors or patient characteristics that can help predict which patients are likely to have positive findings before undergoing capsule endoscopy.

Methods: Risk factors and patient characteristics were identified and multivariable logistic regression was employed for the factors associated with a positive capsule study. Among the factors analyzed (using a prospectively collected database) were indication for procedure, comorbidities, history of NSAIDs, alcohol, smoking, anti-platelet or other anticoagulants, use of a proton pump inhibitor, steroid use, use of SSRI, presence of abdominal pain, change in bowel pattern, presence of red blood per rectum, history of melena, number of previous endoscopies, presence of other forms of small bowel imaging and transfusion requirements prior to the procedure. Results: This study involved a single centre Canadian assessment of 306 patients who underwent CE between 12/01 and 11/05 for the indication of obscure bleeding (overall positive yield 55%). The patients ranged from 18 - 95 years of age (mean age of 64.8 yr). For the investigation of obscure GI bleeding, the transfusion requirements prior to the capsule endoscopy of > 10 units had an OR = 2.90 (95% CI 1.33 – 6.30) and the use of between 6 – 10 units had an OR = 2.52 (95% CI 1.09 – 5.8). The presence of diabetes was associated with a negative capsule study OR = 0.46 (95% CI 0.22 – 0.95). There was a trend towards a positive capsule study in patients using oral steroids OR = 3.53 (95% CI 0.86 – 14.4).

Conclusion: Unlike other studies, we have found that very few factors are associated with a positive capsule study in the setting of obscure GI bleeding. The yield in overt and occult bleeding was similar; only those patients who need large transfusion requirements were more likely to have sources of blood loss identified by CE. The presence of diabetes was negatively correlated with identifying a bleeding source in the small bowel; we postulate that these patients may be more likely to have anemia for other reasons.
THE ROLE OF WIRELESS CAPSULE ENDOSCOPY IN THE DIAGNOSIS OF INPATIENT GI BLEEDING

Michael Fine, Mimi Takami, Laurel Fisher

University of Michigan, USA

Background: The role of capsule endoscopy for evaluation of small intestinal source of occult gastrointestinal blood loss is well established. The sensitivity of WCE for detecting bleeding lesions in the small bowel is significantly better than any other imaging modality. The role of WCE in the setting of acute gastrointestinal hemorrhage, requiring hospitalization, is less clear. While studies have confirmed that standard endoscopy within 48 hrs of admission for GI bleeding decreases morbidity and shortens the length of hospital stay, similar studies have not yet been directed at the role or outcome of WCE in this setting. Methods: In this pilot study, we performed a retrospective chart review of WCE studies performed on inpatients at the UMMC. We evaluated the indication for the study, the length of stay after capsule was performed, whether the capsule study was read and reported before discharge of the patient, and whether the WCE findings had an impact on medical decision making in the short-term. Results: 20 WCE studies were performed on inpatients at The University of Michigan Medical Center between 8/04 and 11/05. Of these, 15 were ordered to evaluate small intestine for source of GI blood loss, and 5 were ordered to rule out Crohn’s in symptomatic patients with otherwise negative workups. Of the 15 WCE studies ordered for bleeding, only 2 revealed a source in the small bowel. 4/20 studies were technically inadequate due to poor progression of the capsule. 12/20 studies were read with results available at the time of discharge. Conclusions: In this small retrospective study, the impact of WCE in providing inpatient diagnoses was limited. The frequency of technically inadequate studies was much higher than anticipated, possibly secondary to patient immobility. More inpatient studies are needed to determine whether altered patient preparation, and more highly refined indications, will enhance the usefulness of inpatient WCE.
THE RELATIONSHIP BETWEEN CAPSULE-DETECTED SMALL BOWEL ANGIODYSPLASIAS AND COLONIC AND GASTRIC ANGIODYSPLASIAS

Mimi Takami, Michael Fine, Laurel Fisher

University of Michigan, USA

Background: Wireless capsule endoscopy (WCE) allows for the direct visualization of the entire length of the small intestine, including evaluation for angiodysplasias. Both clinically significant and incidental angiodysplasias are often seen by WCE. The frequency with which patients found to have small bowel angiodysplasias and angiodysplasias located elsewhere in the GI tract, is unknown. Methods: A retrospective analysis of 100 consecutive patients who underwent traditional upper and lower endoscopy prior to WCE from January 18, 2002 to June 19, 2003 was conducted. Reasons for WCE included obscure GI bleeding and/or iron deficiency anemia (92 patients), evaluation for small bowel lesions including neoplasm (6 patients), and evaluation of abdominal pain (2 patients). In addition to WCE, all patients were evaluated with upper endoscopy with or without push enteroscopy and colonoscopy. Results: A total of 49 patients were found to have small bowel angiodysplasias by WCE. Of these 49 patients, 5 (10%) had evidence of angiodysplasias elsewhere in the GI tract. Additionally, of 8 patients with angiodysplasias outside of the small intestine on initial EGD or colonoscopy, 5 (63%) had small bowel angiodysplasias seen by WCE. Conclusions: Small bowel angiodysplasias were a frequent finding in this subpopulation undergoing WCE and were often present without any evidence of angiodysplasias on upper or lower endoscopy. Absence of angiodysplasias on traditional endoscopy does not exclude the possibility of SB vascular lesions. When angiodysplasias were found outside of the small bowel by traditional endoscopy, these patients were commonly found to have small bowel angiodysplasias. The clinical significance of these findings requires further study.
CATEGORY CLASSIFICATION OF HEMORRHAGE-RELATED CAPSULE ENDOSCOPY FINDINGS

Yukihiro Sakurai, Nobuyuki Matsuhashi, Hiroki Endo, Yasuyuki Kondo

Kanto Medical Center, NTT East, JAPAN

Background & Aims: Obscure gastrointestinal bleeding (OGIB) is the leading indication for capsule endoscopy (CE). Much more findings can be obtained by CE than other imaging measures including enteroclysis. In many cases, however, CE can detect so many findings that the interpretation of the findings becomes difficult. Not only definitive findings of hemorrhage, but also subtle findings that may or may not have been related to the hemorrhage are obtained in CE examination. Here we have attempted to evaluate the clinical usefulness of CE by defining a classification of hemorrhage-related CE findings. Patients & Methods: Study subjects were patients that underwent CE examination for OGIB in our Department from May 2004 through November 2005. A total of 57 patients, 38 males and 19 females, were enrolled (mean 59.9 y.o). 40 had a history of rectal bleeding, while 17 presented with iron deficiency anemia without apparent history of rectal bleeding. 12 had a previous history of long-term NSAID intake. One had a history of radiation therapy for her uterine cancer. The CE images were checked by two experienced endoscopists. The findings were classified into 5 categories: category A; definitive finding of bleeding source, category B; probable finding of bleeding source, which lacks direct definitive finding of hemorrhage, but strongly suggestive of bleeding source, category C; possible bleeding source, which is not strongly suggestive of bleeding source, category D; unlikely as a bleeding source, but the possibility cannot be completely ruled out, category E, findings unrelated to bleeding. A patient’s Grade was defined as the highest category classification in that patient. Cases with no positive findings or cases with findings of only category E were graded as Grade E. <Results> CE reached the cecum in 35 of the 53 cases. 16, 23, 10, 5, and 3 cases were Grade A, B, C, D, and E. We regarded Grade A and B as successful detection of bleeding source. Thus, we could detect bleeding source in 39 of 57 OGIB cases (70%). Among the 39 cases with Grade A and B, 27, 9, 2, and 1 cases presented ulcers, angiectasias, tumors, and papillary bleeding. After the CE diagnosis, bleeding could be successfully managed non-surgically in 11 of 12 grade A cases, 9 of 12 grade B cases, and 6 of 6 grade C, D, E cases, respectively, in cases that could be followed up for their outcome. Conclusion: Definitive CE findings can lead to effective intervention. Category classification is of benefit in interpreting CE findings.
Background: Obscure gastrointestinal bleeding (OGIB), overt and occult, represents approximately 5% of all GIB. Capsule endoscopy (CE) is increasingly used as a diagnostic tool for investigating these patients. Aim: To determine diagnostic yield, sensitivity and specificity, complications, and long term outcomes of CE for OGIB. Methods: We studied a cohort of 100 consecutive patients undergoing CE for investigation of OGIB at The Royal Brisbane and Women's Hospital between June 2002 and June 2004. Follow up information was obtained from review of hospital charts and from telephone conversations with patients, their families, or the referring physicians. Results: Of the 100 patients reviewed, the average follow up was 626 days, average age 63.4 years, male:female 62%:38%, overt:occult bleeding 46%:54%. Average small bowel transit time was 239 minutes with caecal views being obtained in 81%. One capsule was retained in the small bowel. The yield of positive findings was 66% (66/100), 73.9% (34/46) of the overt group and 59.2% (32/54) of the occult group. Angioectasia (58.2%) and ulceration (18.0%) were the most common diagnoses. Benign tumours comprised 6.56% (4) of the positive findings and malignant tumours 3.28% (2). Of the 66 patients with a positive finding, 70% (46/66) underwent definitive treatment based on the CE result: enteroscopy (37.3%), medical treatment (35.2%), surgery (19.6%), endoscopy (7.8%), colonoscopy (2%). Further subgroup analysis was undertaken. Group A: abnormal CE result that was definitively treated, Group B: abnormal CE result that was not treated and Group C: normal CE result. The number of investigations post CE was markedly reduced in all groups (p<0.01). Annual transfusion requirement was also significantly reduced in Group A and B (p<0.01). Admission for OGIB prior to CE was 65% of total patients. This was reduced to 28% post CE (p=0.28). Sensitivity, specificity, and positive and negative predictive values for CE in OGIB were 100%, 87%, 87.9%, and 100% respectively. Conclusions: CE is a safe and effective method for the investigation of OGIB. We feel that CE should be done early in the workup of OGIB. The best outcomes were obtained in those patients who had abnormal results that were definitively treated. Transfusion requirements and further investigations were significantly decreased and there was a trend for decreasing hospital admissions and persistent anemia post capsule endoscopy.
CAPSULE ENDOSCOPY FINDINGS AND CLINICAL OUTCOMES IN PATIENTS WITH OBSCURE GASTROINTESTINAL BLEEDING

Guido Costamagna, Stefano Rausei, Cristiano Spada, Piera Giuseppina Lecca, Alessandra Bizzotto, Syed Shah, Maria Riccioni
Catholic University of Rome, ITALY

Background: Capsule endoscopy (CE) is the preferred first line investigation in patients with obscure GI bleeding. However, the interpretation of CE findings is subject to variation resulting in differences in the reported diagnostic yield. Aim: To determine the relationship between CE findings and long-term outcome in patients with obscure GI bleeding. Methods: One hundred and thirty seven consecutive patients (77 male, 60 female; mean age 60 yrs (range 8-90) underwent CE for obscure GI bleeding (30 ongoing overt bleeding, 60 previous overt bleeding, and 47 occult bleeding) from January 2003 to November 2005. All patients had previous negative upper and lower GI endoscopy. The diagnostic yield, predictive value of CE findings, and clinical outcome were assessed. Results: The mean number of investigations prior to VCE was 4.3 (range 1-18). The small bowel was completely visualised in 103/137 (75%) patients. Capsule retention occurred in 1 patient suffering from peritoneal carcinomatosis. CE findings were positive in 56 patients (41%), suspicious in 52 (38%), and negative in 29 (21%). In order of decreasing frequency, the most common lesions seen were angiodysplasias (37.7%), ulcer or erosion (21.1%), erythematous fold (9.7%), blood within the small bowel lumen (9.1%), polyp (8.6%), suspected small bowel tumour (7.4%), and other (6.4%). Follow-up data was obtained in 74 patients; median follow-up 18.5 months (range 0-35). Of the patients with positive findings, CE diagnosis was confirmed in 27/34 (79.4%) patients (3 false positive, 2 false negative), 13 were treated surgically, 12 medically, 7 endoscopically, and 5 received no treatment; bleeding resolved in 65.5%. Of the patients with suspicious findings, CE diagnosis was confirmed in 15/26 (57.7%) patients (8 false positive, 3 false negative, 4 true positive), 3 were treated surgically, 6 medically, 2 endoscopically, and 16 received no treatment; bleeding resolved in 76.9% (70% spontaneously). Of the patients with negative CE, CE diagnosis was confirmed in 6/14 (42.9%) patients (3 false negative, 3 true negative); 10 received no treatment, 2 were treated medically, and 2 surgically; bleeding resolved in 91% (64% spontaneously).

Conclusions: Our findings confirm a high diagnostic yield of CE in patients with obscure GI bleeding. Positive findings are likely to reveal a treatable cause of bleeding whereas suspicious findings may be unrelated to the final diagnosis in the majority of patients, and in most of these cases bleeding resolves spontaneously.

March 6-7, 2006 • Boca Raton, Florida, U.S.A.
CLINICAL IMPACT OF WIRELESS CAPSULE ENDOSCOPY IN THE EVALUATION OF OBSCURE GASTROINTESTINAL BLEEDING (OGIB) IN A VETERAN POPULATION-INTERIM ANALYSIS

Chuck Katopes, Nathan Slinde, Srihari Ramanujam, Colm O’Loughlin

Medical College of Wisconsin, USA

Introduction: Wireless capsule endoscopy (WCE) allows direct visualization of the small intestinal (SI) mucosa and is the diagnostic tool of choice in the evaluation of gastrointestinal bleeding of suspected SI origin. Little data is available regarding the clinical utility of this innovative technology in the evaluation of OGIB in the veteran population. Aim: To evaluate the clinical impact of WCE in the detection of SI sources of bleeding in a veteran population. Methods: Consecutive capsule endoscopy procedures performed for OGIB at the Zablocki VAMC were retrospectively analyzed. Upper endoscopy, colonoscopy and SBFT were unrevealing for a bleeding source. Demographic information, indications for WCE, WCE findings, interventions and pt outcome were assessed. Pts received a 2l preparation with Polyethylene Glycol electrolyte lavage the day prior to the procedure. The Given video capsule endoscopy system was used in all cases. Major findings were defined as those lesions that were the likely source of bleeding. Results: 27 men, mean age 58 yr (range 34-76) underwent WCE for overt bleeding [16/27(59%)] and occult bleeding [11/27(41%)] between 12/03 and 11/05. The capsule endoscope (CE) reached the cecum in 18/27 cases (67%). Major findings were demonstrated in 17/27(63%) pts including SI malignant tumors(2), ulcerations(2), SI varices(1), multiple AVMs(9) and erosive enteropathy(3). Minor findings were revealed in 7/27(26%) including erosions(2), red spots(1) and lymphectasia(4). 9/17(53%) of major findings were revealed only by the CE. Lesions identified outside of the small bowel on WCE included colonic AVMs(2), GAVE(1), esophagitis(1), cardia adenoca(1), gastritis(1), and duodenitis(6). 2 pts had normal exams. The CE failed to pass through the pylorus in 1 case. Major findings on WCE resulted in endoscopic therapy in 7 cases, alteration in medical therapy in 6 cases, and segmental SI resection in 1 case. There were no complications. Conclusions: WCE has a high diagnostic yield and contributes significantly in the management of OGIB of this veteran population. WCE was safe and well tolerated.
THE ROLE OF WIRELESS CAPSULE ENDOSCOPY IN ACTIVE MILD TO MODERATE GASTROINTESTINAL BLEEDING OF OBSCURE ORIGIN

Nikolaos Kalantzis, Panagiotis Gabriel, Georgios Alexandrakis, Chrissostomos Kalantzis, Eleftheria Giannakouloupolou, Chris Liatsos, Periklis Apostolopoulos

Army Share Fund Hospital (NIMTS), GREECE

Introduction: The role of wireless capsule endoscopy (WCE) in the diagnosis of GI bleeding of obscure origin is well documented, whereas its role in the evaluation of patients with active mild to moderate hemorrhage, immediately after negative GI panendoscopy (gastroscopy & ileocolonoscopy), remains questionable. AIM: To estimate prospectively the diagnostic yield and clinical significance of WCE in patients with acute, mild to moderate, ongoing hemorrhage. Patients-Methods: During a 3-year period, 685 patients were referred to our hospital with acute GI bleeding. Among them, 112 cases were excluded from this study as they were characterised as severe hemorrhage, based on clinical, endoscopic and radiological findings. The remaining 573 cases were characterized as mild to moderate bleeding episodes. From the latter, urgent upper and lower GI endoscopies (the first 24 hours) revealed bleeding sites in 536 patients. In the rest 37 patients (6%) with negative endoscopic findings, abdominal CT was performed, in order to exclude any possible bowel obstruction. After negative results WCE was given (during the first 48 hours) in order to identify the bleeding site. Results: From the 37 active- mild to moderate-bleeding cases, WCE was performed in all, as no obstructive lesion was found. WCE revealed active bleeding (fresh red blood) in 34 patients (92.5%). The findings were as follows: angiodysplasias in 18 patients, ulcers in 3 patients and tumors in 2 patients. In the remaining 11 patients (32%) WCE revealed the level of active hemorrhage as follows: distal duodenum in one case (9%), jejunum in 6 cases (54%), ileum in two cases (18%) and caecum in 2 cases (18%). From the 37 bleeders, 19 responded successfully to conservative treatment, 11 underwent push enteroscopy with effective angiodysplasia APC ablation and 4 were operated. In the remaining 2 patients with caecal active bleeding, a second look colonoscopy revealed angiodysplasias that were treated endoscopically. Conclusion: Wireless capsule endoscopy seems to: a) have a high diagnostic yield in patients with acute, mild to moderate, active hemorrhage of obscure origin when performed in the first 48h of patients' admission and b) be of high clinical value regarding the decision of the appropriate therapy. Real time viewer will be a very useful tool in the management of this group of patients.
CAPSULE ENDOSCOPY IN OBSCURE GASTROINTESTINAL BLEEDING – AN INDIAN EXPERIENCE

Nageshwar D. Reddy, Venkat G. Rao, Rupa Banerjee, Manu Tandan, Sandeep Lakhtakia, Rajesh Gupta

Asian Institute of Gastroenterology, INDIA

Background: Obscure gastrointestinal bleeding (OGIB) is one of the most common indication of capsule endoscopy (CE). The diagnostic yield of CE for the suspected bleeding source is reported to be widely variable. The data on clinical impact of CE in OGIB is still emerging. There are limited data on CE in OGIB from India. We conducted a prospective study to evaluate the diagnostic yield and clinical impact of CE in patients of OGIB. Patients and methods: All consecutive patients of OGIB who underwent CE at our Institute from June 2002 to October 2005 were included in the study. Results: 154 patients, 74 with overt OGIB and 80 with occult OGIB (116 males, Mean age 47 yrs) underwent CE for indication of OGIB during this period. The yield of positive CE findings was 78% in patients with overt OGIB and 27% in patients with occult OGIB. Overall positive diagnostic yield of CE was 52%. NSAID induced lesions (15%), Angiodysplasias (14%) and aphthous ulcers (12%) were the most common positive findings. CE helped in planning further management of 79% patients with overt OGIB and 26% patients with occult OGIB. Overall, CE had a positive impact on clinical outcome in 61% patients. Conclusion: Capsule Endoscopy is an effective diagnostic technology in patients with obscure gastrointestinal bleeding with high diagnostic yield in overt obscure gastrointestinal bleeding. Capsule Endoscopy can lead to a definite treatment plan and avoid number of alternative investigations.
A COMPARISON OF CAPSULE ENDOSCOPY FOR OBSCURE GI BLEEDING BEFORE AND AFTER THE INTRODUCTION OF MEDICARE REIMBURSEMENT

Warwick Selby

Royal Prince Alfred Hospital and The University of Sydney, AUSTRALIA

Capsule endoscopy (CE) is the investigation of choice in patients with obscure GI bleeding (OGIB). Its widespread adoption will depend on the introduction of reimbursement by government or private funds. Whether this funding will influence the demographics, clinical features, prior investigations and findings at CE is unknown. Medicare reimbursement for CE in patients with OGIB was granted in May 2004. Methods: The patient characteristics and findings at CE in patients before and after reimbursement were reviewed using a prospective database recording all patients undergoing CE at a single tertiary referral centre since its introduction in May 2001. Three hundred and fifty patients had CE for OGIB. In 142 this was performed prior to May 2004 (Gp A) and in 214 after (Gp B) (Table). Results: The mean age of each group was similar but there were more women in Gp B. More patients had CE for overt bleeding prior to Medicare funding than after. There was no difference in the duration of obscure bleeding, but patients in Gp B were more likely to have required admission to hospital and to have been transfused. The number of upper GI endoscopies and colonoscopies prior to CE was similar in each group, largely because this is a requirement for reimbursement. However, significantly fewer patients in Gp B underwent SB follow-through and enteroscopy. Despite these clinical differences, the diagnostic yield of significant lesions did not differ before or after reimbursement was introduced, mostly angioectasias (35% vs 29%), tumours (10% vs 6%) and ulceration/inflammation (7% vs 7%). Conclusions: The introduction of Medicare reimbursement led to an increase in patients with apparently milder OGIB undergoing CE. However, the likelihood of finding a significant cause did not diminish. These findings support the granting of reimbursement for CE which does not lead to an increase in the frequency of non-diagnostic studies but does reduce the number of less accurate tests being performed.
<table>
<thead>
<tr>
<th></th>
<th>Pre-Medicare (gp A)</th>
<th>Post-Medicare (gp B)</th>
<th>M:F p&lt;0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>142 (75M:67F)</td>
<td>214 (89M:125F)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>63.2 ± 1.4</td>
<td>62.3 ± 1.0</td>
<td>ns</td>
</tr>
<tr>
<td>Indication: overt</td>
<td>65 (46%)</td>
<td>55 (26%)</td>
<td>Ns</td>
</tr>
<tr>
<td></td>
<td>occult</td>
<td>77 (54%)</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>159 (74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of OGIB (months)</td>
<td>29.8 ± 3.2</td>
<td>31.8 ± 3.0</td>
<td>ns</td>
</tr>
<tr>
<td>Admission required</td>
<td>100 (70%)</td>
<td>102 (48%)</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Transfusion given</td>
<td>89 (63%)</td>
<td>95 (44%)</td>
<td>p=0.001</td>
</tr>
<tr>
<td>Upper GI Endoscopy</td>
<td>2.31 ± 0.16</td>
<td>2.19 ± 0.13</td>
<td>ns</td>
</tr>
<tr>
<td>Colonoscopy</td>
<td>2.17 ± 0.15</td>
<td>2.00 ± 0.09</td>
<td>ns</td>
</tr>
<tr>
<td>SBFT</td>
<td>123 (87%)</td>
<td>82 (38%)</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Push enteroscopy</td>
<td>54 (38%)</td>
<td>33 (15%)</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>Findings: Definite/probable</td>
<td>76 (54%)</td>
<td>99 (46%)</td>
<td></td>
</tr>
<tr>
<td>Possible/normal</td>
<td>66 (46%)</td>
<td>114 (54%)</td>
<td>p=0.19</td>
</tr>
</tbody>
</table>
AN UNUSUAL CAUSE OF GASTROINTESTINAL BLEEDING IN A SMALL CHILD

Lisbeth Mathus-Vliegen1, Paul Fockens1, J Oudshoorn2, Marc Benninga1, Merit Tabbers1, Karlien Bruin1, Karoline Bruin1

1Academic Medical Center, Amsterdam, NETHERLANDS; 2University Medical Center, Utrecht

A 2 year old boy (weight 11.6 kg) was referred for video capsule endoscopy (VCE) because of recurrent obscure overt bleeding. His symptoms started at the age of 20 months, when he presented with melena and a drop in hemoglobin to 6 mmol/l. Further investigation revealed no coagulopathy. Endoscopy was not performed. A Meckel's scan was normal. A conservative course was followed. Four months later he again had melena. At the time, no further investigations were initiated because of the mild clinical course. At the age of 2 years and 5 months he was referred for further analysis because of recurrent melena. A transduodenoscopy and ileocolonoscopy revealed no abnormalities. A small bowel follow-through did not show any lesions. On the suspicion of a Meckel's diverticulum a laparoscopy was performed, which was normal. We decided to perform a VCE for visualisation of the small bowel. After bowel preparation with clear liquids and an overnight fast, the capsule was introduced endoscopically under general anaesthesia. The capsule delivery device was used to deliver the capsule into the duodenal bulb. The capsule passed uneventfully through the bowel and passed with the stools within 24 hours. On VCE, a purplish blue lesion with a central depression was seen 196 minutes after passing the pylorus (150 minutes before reaching the ileocecal valve). The lesion was suspected to be a hemangioma. The rest of the small bowel was completely normal. Surgical resection is scheduled. In conclusion, VCE was performed successfully, with no complications, in this small child. Capsule introduction was facilitated by the capsule delivery device. A hemangioma in the small bowel was identified.
USE OF WIRELESS CAPSULE ENDOSCOPY IN THE MANAGEMENT OF SEVERE HENOCH SCHONLEIN PURPURA

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Dayton Children's Hospital, USA

Introduction: Henoch Schonlein Purpura (HSP) is a multisystem vasculitis that primarily affects children. Characteristic symptoms include purpura of the lower extremities and buttocks, abdominal pain, arthralgias and hematuria. GI bleeding occurs in about 50% of children and while often self-limiting, can be significant. We report a case of HSP in which wireless capsule endoscopy (WCE) played an important role in evaluation and directing treatment. Patient: A.S. was a 12 yr old male presenting with a 3 month history of skin rashes on the lower and upper extremities. Skin biopsy was consistent with HSP. He was started on oral prednisone but on day 6 of treatment developed increasing abdominal pain, vomiting and GI bleeding with 4-6 bloody, melanotic stools. Abdominal series and CT Scan of the abdomen showed ileal and cecal thickening without evidence of intussusception or perforation. Physical examination revealed a purpuric rash on the arms, buttocks, knees, legs and feet. His ankle and knee were swollen and tender. U/A showed microscopic hematuria. Hemoglobin (12.6 gm/dl), Creatinine / Blood Urea Nitrogen (12mg/dl / 0.6mg/dl), Albumin (4.8 gm/dl), ESR (10 mm/hr), C3/C4 were normal. EGD and colonoscopy showed edematous and hyperemic gastric mucosa, punctated hemorrhage in the duodenal bulb, and areas of severe edema, ulceration and necrosis in the rest of the duodenum, jejunum, ileum and colon. The patient was admitted to the hospital and started on IV Methyl-prednisone, 20 mg every 6 hours, with improvement of the skin rash and abdominal pain. He was subsequently discharged on 80 mg of oral Prednisone but had a recurrence of abdominal pain and bleeding with attempts at steroid tapering. WCE demonstrated extensive ulcerations in each intestinal fold from the duodenum to the ileum. The patient subsequently developed severe complications of long term steroid therapy including vertebral fractures, cushingoid appearance, and hypertension, and was therefore started on cyclophosphomide. This allowed a slow tapering of prednisone. A second WCE was then performed to evaluate treatment efficacy. It demonstrated marked improvement on cyclophosphomide, with complete resolution of the previously identified lesions. Attempts at steroid tapering resulted in intermittent flares of HSP, but currently the patient is on 10 mg QD, with maintenance therapy of cyclophosphomide. Conclusion: The use of WCE in this severe case of HSP helped to identify the intensity and extent of the gastrointestinal involvement, and confirmed the efficacy of cyclophosphomide in improving the GI lesions. This is the first report of WCE endoscopy facilitating treatment decisions in HSP.
THE ROLE OF VIDEO CAPSULE ENDOSCOPY FOR EVALUATING OBSCURE GASTROINTESTINAL BLEEDING IN A TERTIARY CARE CENTER

Anthony Infantolino, Mitchell Conn, Sidney Cohen, Anthony DiMarino, Mathew Cohen, Stephanie McConnell, Kuldip Banwait

Thomas Jefferson University, USA

Introduction: In recent years video-capsule endoscopy has revolutionized the investigation of obscure gastrointestinal bleeding (OGIB). Multiple studies have shown superiority over conventional modalities, including push enteroscopy and small bowel radiography. Wireless video capsule endoscopy (VCE) is a new technology that enables us to visualize the entire small bowel mucosa. It involves swallowing a video capsule endoscope, which is painless and relatively safe. Aim: To investigate etiologies of obscure gastrointestinal bleeding in a large tertiary care institution. Methods: All charts of patient who underwent VCE between 2001 and 2005 were retrospectively reviewed. There were 466 charts available with the complete VCE reports. Results: Total of 466 patients with nondiagnostic upper and lower endoscopies underwent VCE. The mean age was 59.5 years (range 7-90). There were 265 female patients and 201 male patients. The most common indication for the procedure was OGIB in 366 patients (84.9%). The cause of OGIB was identified in 304/366 (76.8%) of patients. The most common cause of the bleeding was angioectasias, which were identified in 42.1% of patients. Gastritis was identified in 21% and small bowel ulcerations were visualized in 11% of the patients. Small bowel erosion and duodenitis were present in 9% and 8% of patients respectively. Active bleeding without any identifiable cause was seen in 8% of the patients. 4.9% of patients were diagnosed with a small bowel mass. Conclusion: VCE identifies the etiology of OGIB in majority of the patients. Angioectasias is the most common cause of OGIB. Small bowel masses are identified in nearly 5% of patients undergoing VCE for OGIB. VCE is a diagnostic modality of the choice for investigating obscure gastrointestinal bleeding.
CAPSULE ENDOSCOPY HAS A LONG TERM IMPACT OVER RECURRENT BLEEDING IN PATIENTS WITH OBSCURE GASTROINTESTINAL BLEEDING

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¹Hospital Universitario, ²Hospital San Jose, MEXICO

Introduction: Capsule endoscopy (CE) allows complete visualization of the small bowel. Its immediate clinical impact—meaning its capacity to induce therapeutic and diagnostic decision making—is from 25 to 43%. However it is unknown its long-term impact over recurrent bleeding in patients with identified lesions and a prescribed specific treatment. Objective: to determine the long-term impact of CE over recurrent bleeding in patients with OGIB. Patients and Methods: Patients with OGIB were selected, in whom CE was practiced in a period longer than 6 months prior to the inclusion in the study. Diagnostic yield (finding of any lesion) and its immediate clinical impact (capacity to induce therapeutic procedures) were established. Long-term impact over recurrent bleeding was estimated by means of the Kaplan-Meier method. Differences about frequency of re-bleeding between groups were analyzed by Chi square test. Results: 33 patients were included, 17 female and 16 male. Median age was 53 yr (18-87 yr), median follow up was 15 months (6-20 months). Diagnostic yield was 82% (27/33). The most frequent diagnostic findings included: angiodysplasias (12 patients); ulcers (9 patients) and neoplasia (6 patients). Group 1 was composed of 13 patients who received specific treatment: surgical 8 and endoscopic 5 (immediate clinical impact 39%). Group 2 was composed of 20 patients, 14 with positive CE and no treatment and 6 with negative CE. At the end of follow up, only 1 patient from Group 1 and 7 from Group 2 presented recurrent bleeding. Difference of cumulative probability of recurrent bleeding between both groups became significant after 15 months of follow up (0% vs 33%, p = 0.016). Furthermore at 20 months the cumulative probability of rebleeding was 8% in Group 1 vs 60% in Group 2 (p = 0.043). Neither patient managed surgically had re-bleeding. Conclusions: At 20 months of follow up CE had a favorable influence in patients allowing specific treatment as it had significantly reduced recurrent bleeding by 52%. This difference became significant up to 15 months of follow up. The high frequency of rebleeding in patients with positive and negative CE without specific treatment shows the need for complementary therapeutic procedures, such as double balloon enteroscopy or surgery.
Patients with specific treatment

Patients without specific treatment

p=0.043
COST-EFFECTIVENESS OF CAPSULE ENTEROSCOPY IN PATIENTS WITH OBSCURE GI BLEEDING


under the auspices of CLUB ITALIANO CAPSULA ENDOSCOPICA

Background: there is consolidated evidence that capsule enteroscopy (CE) is the most accurate diagnostic tool for assessing small bowel diseases and is now considered the gold standard for evaluating patients with obscure GI bleeding (OGIB). The costs of CE examination, however, make uncertain if the clinically relevant diagnostic gain is associated also with cost savings. Aim: to evaluate the cost-effectiveness ratio of CE in patients with OGIB. Methods: a retrospective study using an “ad hoc” questionnaire was carried out in 9 Italian gastroenterology units from 2003 to 2005. Statistical analysis was performed with the chi-square test, ANOVA one-way variance analysis, non parametric and Incremental Cost Effectiveness procedures (ICER). Data on 165 consecutive patients with OGIB were retrieved. The diagnostic yield of CE vs other imaging procedures was evaluated as measure of clinical outcome (efficacy). The values of DRG 175 (€ 1.884,00 for obscure-occult bleeding and € 2.141,00 for obscure-overt bleeding) were calculated as measure of economic outcome in the cost analysis. Results: there were 87 males (52.7%); mean age was 63.5 ± 15.0 years. Occult OGIB was recorded in 88 pts (53.3%) with a mean duration of anemia history of 22.9 ± 31.5 months. Overt OGIB occurred in 46.7% of patients, with a mean duration of anemia of 133.2 ± 314.8 days. Hospital admissions: at least one in 52.6% of patients, at least two in 25.4% and up to 9 admissions in 1.2% of obscure bleeders. Overall, 59.5% of patients had positive findings with CE as compared to 19% with other imaging procedures p<0.001. The mean cost of a positive diagnosis with CE was € 2075.18 and that of other procedures was € 3849.03, with a mean cost saving of € 1773.84 (p< 0.001) for one more positive diagnosis. Conclusions: capsule enteroscopy is an effective approach in the evaluation of patients with obscure GI bleeding. CE as significantly higher efficacy than any other small bowel imaging procedure and is associated with lower costs providing substantial cost savings procedure. The authors are indebted to Given Imaging and M.G. Lorenzatto for partial support of the study.
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THE NATURE, LOCATION AND EXTENT OF SMALL BOWEL MUCOSAL LESION IN CELIAC DISEASE (CD) AS OBSERVED BY WIRELESS CAPSULE ENDOSCOPY (WCE)

C.S. Pitchumoni, Adnan Muhammad

Saint Peter’s University Hospital, USA

Introduction: Celiac disease (CD) occurring in about 1% of US population (NIH consensus conference on CD. Bethesda 2004) may be asymptomatic for many years or have complaints like diarrhea, abdominal pain, bloating, fatigue and weight loss. Common non-GI symptoms include bone pain, anemia (iron deficiency and/or folate deficiency), dermatological condition (Dermatitis herpetiformis), arthritis, alopecia areata and infertility. CD may remain latent for years and up to 20% of patients are older than 60 when CD is first diagnosed (Hankey GL. CD in elderly. Gut 1994; 35:65-67). CD is typically diagnosed by small bowel mucosal biopsy and serological testing of antibodies (IgA anti-tTG, IgA antiendomysial). Wireless Capsule Endoscopy (WCE) has provided us an opportunity to identify the nature, location and extent of small bowel mucosal abnormalities. Aim: The aim of this study is to identify various mucosal abnormalities in patients with suspected CD with regard to their nature, location and extent of mucosal involvement. Material and Methods: In this prospective study, patients presented for evaluation of CD underwent WCE according to standard protocols. Results: Total cases: 12 (Males = 3, Females = 9). Mean age: 58 +/- 19 SD years. Geriatric cases (Age above 65 = 5) Common indications: Anemia (75%), Chronic diarrhea (25%), Abdominal pain (25%) and Weight loss (8%). More than one indication coexisted in some patients. Common findings: Scalloping (66%), Atrophy (42%), Layering or stacking of folds (42%), Mosaic pattern (33%), Nodularity (17%) and Intussusception (8%). Multiple findings coexisted.

Conclusions:
1) In CD the duodenum and the proximal intestine may be entirely normal by the EGD examination while the distal intestine may show classic features of CD. Extent of disease can be estimated by WCE, which is not possible by other modalities.
2) Anemia in the elderly (age > 65) may be the sole manifestation of CD.
3) It is not clear whether extent of disease correlates with symptomatology, but logical to presume that location and extent of disease will alter the clinical manifestations.
<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age in years / Sex</th>
<th>Indications</th>
<th>Findings in duodenum</th>
<th>Findings in Proximal Intestine</th>
<th>Findings in Distal Intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29 F</td>
<td>Abdominal pain</td>
<td>Scalloping</td>
<td></td>
<td>Intussusception</td>
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<tr>
<td>2</td>
<td>36 F</td>
<td>Anemia</td>
<td>Scalloping</td>
<td>Mosaic pattern Layering or Stacking of folds</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>38 F</td>
<td>Anemia</td>
<td>Atrophy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>39 F</td>
<td>Anemia</td>
<td>Atrophy</td>
<td></td>
<td>Nodularity</td>
</tr>
<tr>
<td>5</td>
<td>49 M</td>
<td>Chronic diarrhea</td>
<td>Scalloping</td>
<td>Layering or Stacking of folds</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>60 M</td>
<td>Anemia</td>
<td>Scalloping</td>
<td>Mosaic pattern Layering or Stacking of folds</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>61 F</td>
<td>Anemia</td>
<td>Scalloping</td>
<td>Mosaic pattern Layering or Stacking of folds</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>69 F</td>
<td>Anemia</td>
<td>Scalloping</td>
<td>Layering or Stacking of folds</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>70 M</td>
<td>Anemia</td>
<td>Atrophy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>80 F</td>
<td>Chronic diarrhea</td>
<td>Mosaic pattern</td>
<td></td>
<td>Scalloping</td>
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<td>11</td>
<td>85 F</td>
<td>Anemia</td>
<td>Atrophy</td>
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<td>Scalloping</td>
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<tr>
<td>12</td>
<td>86 F</td>
<td>Anemia</td>
<td>Atrophy</td>
<td></td>
<td>Nodularity</td>
</tr>
</tbody>
</table>

Note: Areas of small bowel is divided into duodenum, proximal intestine and distal intestine on the basis of following criteria:

1) Location of capsule as seen on the image of abdomen divided into 4 quadrants shown on the WCE software.
2) On the basis of gastric and small bowel transit times, (keeping in mind that it may vary from patient to patient).
VIDEO CAPSULE ENDOSCOPY FOR THE DIAGNOSIS OF CELIAC DISEASE: FINAL RESULTS FROM A MULTICENTER INTERNATIONAL STUDY

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Background: Celiac Disease (CD) is characterized by a variable degree of villous atrophy in the proximal small bowel. The current gold standard for diagnosis is the histological examination of endoscopic biopsies from the duodenum taken during upper GI endoscopy. Videocapsule endoscopy (VCE) examines the entire small bowel mucosa with a 8-fold magnification, which allows visualization of mucosal villi. Aim: To evaluate the potential of VCE in detecting villous atrophy in patients with suspected CD. Methods: Consecutive patients with symptoms suggesting CD and a positive serology (positive anti-gliadin and/or anti-endomisium and/or anti-tissue transglutaminase antibodies) were eligible for the study. Upper GI endoscopy and VCE were performed within 1-15 days of each other in all patients. At least 3 duodenal biopsies were taken during endoscopy and oriented on filter paper for histological examination. Duodenal biopsies were classified according to modified Marsh’s criteria. Capsule findings were evaluated for the presence of lesions compatible with CD (scalloping of duodenal folds, fissures, flat mucosa, mosaic appearance, etc.) by Gastroenterologists unaware of the upper GI endoscopy and pathology results. Duodenal histology was considered as the gold standard. Interobserver agreement for the diagnosis of CD by VCE was evaluated by kappa statistic. Results: Forty-three patients have been enrolled in the study. Duodenal histology was normal in 11, while 32 patients had mucosal changes compatible with celiac disease (Marsh III: 28; Marsh II:3; Marsh I: 1. The comparison of duodenal histology and VCE findings is reported in the table. Sensitivity, specificity, positive and negative predictive values of VCE for the diagnosis of CD were 87.5%, 90.9%, 96.5%, 71.4% respectively. The positive and negative likelihood ratios were 9.6 and 0.14 respectively. The only "false positive" case had positive anti-endomisium antibodies, histology-proven Dermatitis Herpetiformis and patchy mucosal lesions on VCE. Since Dermatitis Herpetiformis is known to have patchy mucosal involvement of the small bowel mucosa, this case may be considered a false negative of histology. Eighteen of the 27 patients (66.6%) diagnosed as celiacs by both techniques had extension of the mucosal changes seen at capsule endoscopy beyond the proximal third of the small bowel; in three of them (11.1%) the lesions involved the entire small bowel. Patients with mucosal changes extending beyond the proximal third of the small bowel tended to have more severe symptoms than those with changes limited to the proximal third, but the difference failed to reach statistical significance. Overall agreement between observers for the diagnosis of celiac disease by capsule endoscopy ranged between 79.2 and 94.4%; the values of kappa ranged between 0.56 and 0.87, denoting fair to excellent agreement. Conclusions: VCE endoscopy appears to be sensitive and specific for the detection of villous atrophy in patients with suspected CD.
<table>
<thead>
<tr>
<th>VCE findings</th>
<th>Normal</th>
<th>Consistent with CD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Consistent with CD</td>
<td>1</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>32</td>
<td>43</td>
</tr>
</tbody>
</table>
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THE IMPACT OF CAPSULE ENDOSCOPY ON THE OUTCOME OF PATIENTS WITH GI SYMPTOMS CORRELATED TO THEIR INDICATION: REVIEW OF 55 CASES

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¹Bangkok Hospital, ²Chulalongkorn University, THAILAND

Objective: To determine the impact of capsule endoscopy on the outcome of patients with GI symptoms correlated to their indication.

Methods: Fifty-four patients of Bangkok hospital with mean age + standard deviation of 51.5± 17.2 years were retrospectively analyzed. They were divided into two group: 28 Thai patients (group 1) and 26 foreigner patients in group 2. All patients have been subjected to gastroscopy, colonoscopy, and there was no any evidence to be identified for the cause of their symptoms. Capsule endoscopy (CE.) was performed with the Given M2A video capsule system. By using strict criteria, studies were classified as having positive findings, findings of uncertain significance, and no findings. Results: The most common indications were Obscure GI bleeding (N=29;53.7%), chronic abdominal pain (N=13;24.1%), chronic diarrhea (N=8;14.8%) and the rest was other indications. Positive findings with diagnostic yield, and findings without diagnostic yield were identified in 19 / 54 of patients (35.2%) and 54.8%, respectively (p > 0.05). There was no any significant difference the aspect of sex age, nation and the CE findings. The most common lesions seen were small hemorrhagic spot (N=21), angiodysplasia (N=12), small bowel ulcer (N=7), with 80 % of them had history of NSAIDs or Aspirin use. The rest of them (N=14) showed normal small bowel study. Obscure GI bleeding was successful identified the causes in about 51.7% (N=15). Conclusions: Capsule endoscopy increases the diagnostic yield which related to the indications of patients. The obscure small-bowel bleeding is the most appropriated indication and get the high diagnostic yield from CE.
INITIAL EXPERIENCE WITH CAPSULE ENDOCOPY IN A SINGLE SPECIALTY COMMUNITY BASED ADULT GASTROENTEROLOGY PRACTICE

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Capsule endoscopy (CE), a procedure initially used in academic centers, is now expanding into private practice. We reviewed our initial experience in a community based single specialty gastroenterology practice. CE was used in the work-up of suspected small bowel disease after negative conventional endoscopy. Patients were referred from within the practice and from outside gastroenterologists. Results: The study included 100 consecutive patients ranging in age from 18 to 81 (62% females) requiring CE. The most frequent indication was iron deficiency anemia/occult GI bleed followed by indeterminate colitis t/o Crohn’s disease, diarrhea, abdominal pain, refractory sprue. The completion rate was 97% (a capsule remained in the stomach, two cases of non natural excretion required surgery). In one case, the capsule impacted in the esophagus because of an unsuspected stricture and emergency EGD was performed to advance it into the stomach. In a patient with gastroparesis, EGD was performed after ingestion of the capsule to advance it into the 2nd portion of the duodenum. Average gastric emptying time was 23.26 min; average small bowel transit time was 222.74 min. There were positive findings in 90% of the studies (97% of cases referred for anemia and 43.75% for other indications). The most frequent findings were AVMs (56% cases) followed by small bowel masses, metastatic melanoma, NSAIDs induced enteropathy, celiac sprue, Crohn’s stricture. In 12 patients the findings were within reach of the conventional endoscope (gastritis, esophagitis, GAVE, portal hypertensive colopathy, Dieulafoy lesion in the cecum). Active bleeding was seen in three cases that required emergent enteroscopy (2) or colonoscopy. In 13 cases a change in management resulted from the findings on CE (surgery for removal of small bowel tumors or bleeding metastases, change in medications for treatment of Crohn’s enteritis, gluten free diet for sprue, emergent endoscopy for active bleeding). Conclusion: Capsule enteroscopy can be easily implemented in a busy private gastroenterology practice and avoids unnecessary referrals to academic centers for push enteroscopy. The difference between the high rate of positive findings and the small rate of change in management reflects nonspecific findings that cannot always be attributed as the etiology of patients’ signs or symptoms. The most important outcome is reassurance of both patient and physician that no life threatening condition has been missed. For indications other than anemia/occult GI bleed the yield is low; CE tends to be used only when the test is available in-house (no patients were referred by outside GEs for nonbleeding indications).
CAPSULE ENDOSCOPY IN CHILDREN

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In recent years, video capsule endoscopy (VCE) has become widely accepted as a tool in the diagnosis of small bowel pathology in adults. The experience in the pediatric population however, is more limited. The FDA approved the use in children over 10 years of age. Incidentally, use in younger children has been described. We here describe our experience with VCE in 15 children. In our group, the average age was 11 years, 4 patients were younger than 10 years. The majority of investigations were performed on suspicion of inflammatory bowel disease (IBD, 67%). Twenty percent was performed for obscure GI bleeding (OGIB), the rest for reasons such as diarrhea and weight loss (figure 1). All patients had an extensive endoscopic work-up prior to VCE. In 4 patients, the capsule was introduced endoscopically, the other children swallowed the capsule without difficulty. The youngest patient who swallowed the capsule was 8 years old. In two patients there was delayed passage of the capsule, in both cases it passed spontaneously on day 6 and 8 respectively. Two investigations were insufficient: one due to inadequate bowel preparation, the other due to malfunction of the data recorder. In 2 of 3 children with OGIB a definite diagnosis was made. In both children a resection was performed. In children suspected of having IBD, IBD was diagnosed in 40%. In 30% IBD was neither confirmed nor ruled out, in 30% IBD became improbable after VCE. However, in suspected IBD ruling out IBD is as important for further patient management as confirming the diagnosis. Thus, 70% of VCE for this indication were clinically useful. In our group, a definite diagnosis was made in 40%, a possible diagnosis in 20%. VCE was normal or non-diagnostic in the remaining 40% (figure 2). In conclusion, in our experience, VCE is a safe and useful procedure, even in children under 10 years of age. In young children, endoscopic placement of the capsule through the pylorus is necessary. The diagnostic efficacy in children and adults seems comparable.
Figure 1

Indications VCE in children

Figure 2

Diagnosis VCE in children
A SURVEY OF CLINICAL EXPERIENCE OF VIDEO-CAPSULE ENDOSCOPY IN A UNIVERSITY HOSPITAL

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Purpose: Wireless video capsule endoscopy (VCE) is a new technology that enables us to visualize the entire small bowel mucosa. It involves swallowing a video capsule endoscope, which is painless and relatively safe. Its use has been established for suspected small bowel bleeding, and the role of capsule endoscopy in the investigation of inflammatory bowel disease, iatrogenic disease, polyposis syndromes and celiac disease is evolving. Aim: To describe the overall experience of video capsule endoscopy in a large tertiary care center. Methods: All charts of patient who underwent VCE between 2001 and 2005 were retrospectively reviewed. There were 466 charts available with the complete VCE reports. Results: There were 466 patients who underwent VCE. The mean age was 59.5 years (range 7-90). There were 265 female patients and 201 male patients. The most common indication for the procedure was obscure gastrointestinal bleeding (84.9%), followed by abdominal pain (8.8%), Crohns (7.1%), diarrhea (5.4%) and abnormal imaging (3.2%). A possible cause of obscure gastrointestinal bleeding was identified in 76.8% of patients. VCE identified a possible cause of abdominal pain and diarrhea in 41.8% and 28% respectively. 16% of patients with diarrhea were found to have newly diagnosed Crohns. 57.6% of patients with colonic Crohns disease were found to have small bowel involvement. The etiology of abnormal imaging was found in 60% of patients. Small intestinal mass was identified in 3.6% of patients and 88.3% of these patients presented with obscure gastrointestinal bleeding. Conclusion: VCE is a clear choice for evaluation of obscure gastrointestinal bleeding VCE is an important tool in diagnosing previously unrecognized Crohns disease. VCE is an important tool in diagnosing upper gastrointestinal involvement in established colonic Crohns disease. VCE is an important supplementary diagnostic tool in investigating not only obscure gastrointestinal bleeding but also Crohns disease.
Background Capsule endoscopy (CE) has allowed significant advances in the diagnosis and management of small bowel disease in both adults and children. This technology helps clarify and guide future treatment strategies in patients with established diagnoses. It is a valuable adjunctive tool to conventional endoscopy, but the risk of this procedure in the pediatric population has not been established. Few studies have been done to evaluate the usefulness and safety of CE in the pediatrics.

Method: We retrospectively reviewed the records of all children who underwent CE at NY Presbyterian-Weill Cornell between December 2004 and November 2005. Results: There were 20 studies from 19 patients, 10 males and 9 females, mean age 14.8 years (8-19y) and mean weight of 57kg (27-94kg). The indications for CE were: known Crohn's Dis with poor response to therapy (6), Crohn's Dis to determine future therapy (1); Chronic Abdominal pain (CAP) with neg SBFT and anemia (1), CAP and diarrhea (3), CAP and Down's synd (1); CAP with neg colonic biopsies and abnormal appearing mucosa (1), UC with poor response to treatment (1); indeterminate Colitis (3), chronic secretory diarrhea (1), CAP with negative abdominal CT (1). All patients were screened with the Jelly Bean Test; it was confirmed that the patient was able to swallow a 20x15mm jellybean prior to CE (M2A capsule is 26x11mm (Fig 1)). Only 1/19 patients had the capsule placed endoscopically due to fear of swallowing. 10 patients had negative SBFT within 1 month prior to CE, 3 had previous neg SBFT (<9 mos prior), 4 had previous neg SBFT (>9 mos prior), and 2 patients had normal bowel findings on abdominal CT. Based on CE findings, the treatment course was altered on 9 patients. Two of the 20 CEs had questionable adverse events: 1 patient had delayed passage from the stomach (>8hrs)(Fig 2) that was not present by day 5 checked by KUB and 1 patient had delayed passage from the GI tract due to a rectosigmoid stricture (Fig 3). Both capsules were passed naturally.

Conclusions: CE is a valuable tool for diagnosis and management of GI disease. The risk of questionable adverse events in our population was 10%. Both situations resolved with no harm and led to better treatment outcomes in both of those patients. Although a small bowel study does not eliminate the possibility of a retained capsule, one should be cautious with anyone who has thickening or narrowing on CT or small bowel series. Checking their ability to swallow first by the Jelly Bean Test can reduce the chances of difficulty to at the time of the procedure. CE is safe and helpful in the clarification and management in pediatric gastrointestinal diseases.
PATENCY CAPSULE COULD PREVENT PILLCAM SB RETENTION IN PATIENTS WITH SUSPECTED SMALL BOWEL OBSTRUCTION

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Introduction: Although WCE is an easy and safe diagnostic procedure, important concern exists regarding its retention in patients with suspected small bowel obstruction. AIM: To delineate whether the patency system could prevent capsule retention in patients with risk of small bowel obstruction or stenosis. Patients – Methods: From January to December of 2005, 84 patients were evaluated with PillCam SB for suspected small bowel disease. From these, patency capsule was given in 21 of them due to possibility of capsule retention according to patients’ medical history and their clinical signs and symptoms. Ten patients were evaluated for small bowel Crohn's disease, nine patients were previously operated, two patients had recent history of ileus whereas five patients were concomitant chronic NSAID’s users. Written consent was obtained from all patients. Results: Patency capsule was excreted intact in 19/21(90%) patients and then PillCam SB was given uneventfully. In the remaining two patients, patency capsule was retained. In the first patient, who had history of small bowel resection due to ileal atresia at birth, patency capsule retention was observed in the distal small bowel causing temporary abdominal pain. Its disintegration was observed in the sixth day and surgical exploration was followed revealing benign postoperative stenosis. In the second patient, who had history of total hysterectomy due to malignancy and radiation treatment, patency capsule was retained in an ileal loop. In the fourth day due to acute ileus, caused by patency capsule impaction, and despite the fact that the capsule was not disintegrated, the patient was operated identifying postradiation stenosis. It should be pointed out that both patients had recent history of ileus. Conclusions: Patency system could safely prevent capsule retention in patients at risk of small bowel obstruction or stenosis. Especially, in patients with a recent medical history of small bowel ileus, patency system is strongly advised before PillCam SB is given.
EFFICACY OF THE NEW GIVEN® AGILE™ PATENCY CAPSULE (DOUBLE PLUG) TO PREDICT FUNCTIONAL PATENCY OF THE SMALL BOWEL: THE ISRAELI EXPERIENCE.

Binyamin Koslowsky¹, Lia Haskel¹, Eitan Scapa², Samuel Adler³, Ariella Shetreet³

¹Bikur Holim Hospital, ²Assaf Harofeh Hospital, Sharei Zedek Hospital, ISRAEL

Introduction: Capsule endoscopy is the most sensitive imaging technique for demonstrating pathology of the small bowel. A serious concern with the use of capsule endoscopy is the prospect of capsule retention. In healthy volunteers the risk is negligible. The risk is measurable in patients with Crohn’s disease, NSAID induced enteropathy and other small bowel diseases. Yet it is precisely these patients who are candidates for PillCam™ examination who are at highest risk. Small bowel series are notoriously unreliable in predicting functional patency. A normal CT enteroclysis study indicates patency but this test is invasive and time consuming. A slow dissolving patency capsule with a single dissolving plug was developed. Passage of an intact patency capsule indicated safe PillCam™ passage. The reports with this patency capsule were mixed. Delvaux indicated that the slow release of the single plug patency capsule could lead to impaction in a small bowel stricture requiring surgical intervention. For this reason a newly modified patency capsule (radio-opaque), identical in size to PillCam with two dissolving heads (time plugs) was tested. Methods: Any patient with x-ray evidence of narrowing of the small bowel or clinical suspicion of partial small bowel obstruction was invited to swallow the patency capsule. If passed intact the patient underwent a PillCam™SB study. Results: 26 patients (21 With x-ray evidence of narrowed small bowel, 5 patients with clinical findings of partial small bowel obstruction) swallowed the Given® AGILE™ patency capsule. 14 Patients passed the capsule intact within 4 to 34 hours (median 23 hours). All patients who passed the patency capsule intact had a following PillCam™SB study. No PillCam™ capsule retention were observed, nor any adverse event such as abdominal pain were reported. One case of small bowel obstruction occurred probably related to the patency capsule. The case was resolved within 24 hours by medical management only. The scanner accurately detected 19 patency capsules when the patient came for next day examination. The absence of a signal from the Given® patency scanner indicated that the patency capsule had passed the intestinal tract. Conclusions: 1. Passage of an intact patency capsule indicates functional patency of the small bowel and provides assurance that a PillCam™ examination can be performed safely. 2. The Given® AGILE™ patency capsule remains intact for at least 30 hours. 3. Absence of a scanner signal indicates that the patency capsule was excreted. 4. Absence of a scanner signal within 30 hours of ingestion of the Given® AGILE™ patency capsule, or visualizing an intact capsule that was excreted, indicates that a PillCam™SB examination will not lead to capsule retention. 5. Obstructive symptoms may occur and can be managed medically.
EXPERIENCE WITH WIRELESS CAPSULE ENDOSCOPY (WCE) IN THE GERIATRIC POPULATION

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Introduction: Wireless Capsule Endoscopy (WCE) has provided a new diagnostic modality for visualization of the entire small bowel mucosa. WCE has been used with a wide spectrum of clinical indications including localization of obscure (occult and overt) GI bleeding, IBD (Crohn’s disease), suspected small bowel polyp or tumor, chronic diarrhea, unexplained abdominal pain and Celiac disease. Aim: The aim of this study is to identify WCE findings in patients above the age of 65 years who presented with different indications and compare them with other age groups. Material and Methods: The material for this study is the analysis of data of 333 WCE examinations performed by us at a University teaching hospital. Patients were divided into three age groups as listed in the table along with their common indications and findings.

Results:
1) The most common indication in the geriatric population is anemia (50% in age > 65, 18% in age <50 and 37% in age between 50-64).
2) The most common finding in the geriatric population is lymphangiectasia (32% in age > 65, 17% in age <50 and 17% in age between 50-64) followed by small bowel erosions.
3) The oldest patient in our study was 93 years of age.
4) Patients in the age group above 65 had following problems:
   a) Difficulty in swallowing (1 case).
   b) Placement of capsule by EGD into the jejunum because of Billroth 2 surgery (1 case). c) Incomplete study because of motility disorder (1 case).

Conclusions:
1) WCE provides a safe and valuable tool in visualizing the small bowel morphology.
2) WCE also plays a critical role in the geriatric gastroenterology in the evaluation of various small bowel mucosal abnormalities.
3) The prevalence of lymphangiectasia increases as age advances.
4) WCE makes it possible to diagnose Celiac disease in the geriatric population.
Indications for WCE in different age groups. Total number of cases (N = 333).

<table>
<thead>
<tr>
<th>Indications for WCE</th>
<th>Age &lt; 50 years (N = 95)</th>
<th>Age 50-64 years (N = 78)</th>
<th>Age 65 and above (N = 160)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia</td>
<td>17 (18%)</td>
<td>29 (37%)</td>
<td>80 (50%)</td>
</tr>
<tr>
<td>GI bleeding</td>
<td>14 (15%)</td>
<td>26 (33%)</td>
<td>63 (39%)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>27 (28%)</td>
<td>12 (15%)</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>IBD (Unspecified)</td>
<td>9 (9%)</td>
<td>2 (3%)</td>
<td>0</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>17 (18%)</td>
<td>3 (4%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Chronic diarrhea</td>
<td>13 (14%)</td>
<td>4 (5%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Unexplained weight loss</td>
<td>0</td>
<td>0</td>
<td>1 (0.6%)</td>
</tr>
<tr>
<td>R/O small bowel polyp</td>
<td>2 (2%)</td>
<td>2 (3%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: More than one indication existed in a few patients.

<table>
<thead>
<tr>
<th>Findings seen by WCE</th>
<th>Age &lt; 50 years</th>
<th>Age 50-64 years</th>
<th>Age 65 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric Ulceration</td>
<td>5 (5%)</td>
<td>5 (6%)</td>
<td>16 (10%)</td>
</tr>
<tr>
<td>Gastric Erosion</td>
<td>8 (8%)</td>
<td>12 (15%)</td>
<td>28 (18%)</td>
</tr>
<tr>
<td>Small bowel Ulceration</td>
<td>22 (23%)</td>
<td>21 (27%)</td>
<td>34 (21%)</td>
</tr>
<tr>
<td>Small bowel Erosion</td>
<td>24 (25%)</td>
<td>23 (29%)</td>
<td>44 (28%)</td>
</tr>
<tr>
<td>Small bowel Polyp</td>
<td>6 (6%)</td>
<td>6 (8%)</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>Celiac disease (Atrophy, Mosaicm, Scalloping, Layering and Intussusception)</td>
<td>5 (5%)</td>
<td>2 (3%)</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Lymphangiectasia</td>
<td>16 (17%)</td>
<td>13 (17%)</td>
<td>51 (32%)</td>
</tr>
<tr>
<td>Small bowel nodularity</td>
<td>4 (4%)</td>
<td>6 (8%)</td>
<td>10 (6%)</td>
</tr>
<tr>
<td>Active bleeding without identifiable lesion</td>
<td>4 (4%)</td>
<td>5 (6%)</td>
<td>17 (11%)</td>
</tr>
<tr>
<td>Small bowel mass</td>
<td>0</td>
<td>2 (3%)</td>
<td>0</td>
</tr>
<tr>
<td>AVM</td>
<td>4 (4%)</td>
<td>9 (12%)</td>
<td>21 (13%)</td>
</tr>
</tbody>
</table>

Note: More than one finding was seen in a few patients.
Introduction: Capsule endoscopy (CE) and Double-balloon enteroscopy (DBE) are valuable tools as endoscopic examination for the entire small bowel. Small bowel tumor is diagnosed definitely by histopathological findings, however, to our knowledge, there is no study on comparison of CE and DBE findings with histopathological finding of tumor. The objective of this study is to compare endoscopic findings with histopathological findings of the tumor in patients who underwent CE and DBE. Patients: Between June 2004 and October 2005, 76 patients (42 men and 34 women; mean age 55.1 ± 18.4 years, range 17 – 92 years) underwent CE and DBE for small bowel disorders. For known or suspected neoplasm, 14 patients underwent CE. Full and informed consent was obtained from each patient. This study was conducted retrospectively with patients who were diagnosed with small bowel tumor on basis of CE and DBE findings and whose lesion was obtained from surgery or endoscopic therapy. Methods: Treated tumors were evaluated pathologically and the results were compared with CE and DBE findings to investigate characteristics of tumor diagnosis using CE and DBE. Based on these results, characteristics of CE and DBE in diagnosis of small bowel tumor were specified. Acknowledge of procedure: In 62 patients, no specific bowel cleansing was given before CE procedures and in other 14 patients, bowel preparation agent was used and the small bowel mucosa was cleansed. The CE findings were evaluated by an experienced endoscopist. When the lesion as the small bowel disorder could be detected on DBE, biopsy specimens were taken whenever possible. If therapies were required and practicable, argon-plasma coagulation, injection, clipping or polypectomy were applied. Results: In 10 patients, small bowel tumors were diagnosed endoscopically and treated, and assessed histopathologically. Those were consisted of 5 Peutz-Jeghers syndrome (PJS), 3 submucosal tumors (SMT; 2 gastrointestinal stromal tumor (GIST) and 1 carcinoid), one ileal cancer and one malignant lymphoma. With the diagnosis of PJS, CE underestimated the number of the polyp. With SMT, CE detected 3 of 4 lesions. DBE detected only 2 lesion, but demonstrated the concave of the top of SMT that CE could not. All 5 patients with PJS were treated by DBE. Consideration: The diagnoses of CE and DBE were compared with pathological results in 4 kinds of tumors. CE is non-invasive and painless. But in diagnosis of small bowel tumor using CE, even when a tumor is detected, only a partial image is obtained, therefore, the tumor is comprehensively diagnosed on the basis of findings obtained. The quality of CE diagnosis is obviously inferior to that of DBE. In contrast, DBE has a high ability to diagnose the small bowel tumor definitely. Conclusion: CE is utilized as initial diagnosis for small bowel tumor and DBE is suited to definite diagnosis.
WHO SHOULD REVIEW CAPSULE ENDOSCOPY?

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Background: It is yet unclear who should review capsule endoscopy video recordings (CEVR). The primary aim of this study was to investigate whether a junior doctor (JD) or an endoscopy nurse (EN) could review CEVR with the same diagnostic result as an endoscopy specialist (ES). Methods: The EN and JD, both with no CE experience, reviewed 30 CEVR twice. An ES (consultant, MD) and the Given Imaging Review Service (GIRS) each reviewed the CEVR once. The findings of GIRS served as the control. The CEVR were reviewed by using a Minimal Standard Terminology based sheet. A distinction was made between pathological and unrelated findings. Time consumption, intra- and interobserver variation, sensitivity (percentage of true negative compared to the control) and specificity (percentage of true positive compared to the control) were determined. All observers were blinded to clinical information except the ES. Mean values are reported and compared to control. Results: The EN spent longer than the JD on each first review (72 min vs. 38 min, p<0.0001), but used the same amount of time on each second review (25 min vs. 23 min, p=0.62). The EN and JD performed equally poor compared to the control with kappa values (κ) of 0.1 (p<0.0001) for all findings and about 0.07 (p<0.0001) for pathological findings. JD apparently improved from first to second review (κ=0.50), but the results were not significant (p=0.68). For the EN there was no improvement (κ=0.11, p<0.0001). By regarding the CEVR as pathological, if just one pathological finding was present, the sensitivity was 62% and specificity 100%, for both the EN and JD. For the ES the sensitivity was 79% and the specificity 100%. Conclusion: The EN and JD missed many of the pathological findings and their findings were not reproducible. Based on our results it does not seem desirable to have junior doctors or endoscopic nurses to perform capsule endoscopy reviews.
FASTER WIRELESS CAPSULE EXAM ANALYSIS USING AUTOMATIC TOOLS

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¹H.Santo António, Porto, Portugal, ²IEETA-Universidade de Aveiro, PORTUGAL

Background and Motivation: A practical limitation of wireless capsule endoscopy is its long exam annotation times. A medical specialist can take more than two hours to successfully annotate an exam and write the corresponding clinical report. Following this clear need for automatic tools, we've developed a topographic segmentation algorithm that reduces annotation times by 12% (15 minutes) using well-known computer vision techniques.

Materials and Methods: A set of 60 full exams (averaging 60,000 images each) were used for this study. Three major topographic marks (eso-gastric junction, pylorus, ileo-cecal valve) were annotated by clinical specialists, thus defining four topographic sections: entrance, stomach, small intestine and large intestine. Four support vector machine (SVM) classifiers (one per section) were trained using MPEG-7 visual descriptors (Scalable Color, Homogenous Texture) and various kernels (linear, polynomial, rbf, sigmoid). Topographic segmentation is obtained by first classifying each individual image with the SVM classifiers, and then applying a global model fitting stage (that minimizes a total classification error function) to determine the location of each topographic mark. All training and test stages used 3-fold cross validation to maximize the relevance of results.

Results: Best results were obtained using the Scalable Color descriptor and polynomial kernels. Reasonable single image classification results (84% accuracy, 83% recall) are much improved by the global model fitting stage allowing median segmentation errors of 2 images for the eso-gastric junction, 211 for the pylorus, and 1070 for the ileocecal valve. These correspond to relative errors (when compared to exam size) of respectively: 0.03%, 0.35% and 1.8%. This means that we can automatically estimate capsule transit times with relative errors smaller than 6% (gastric) and 8% (intestinal). These results are integrated into the CapView annotation software (www.capview.org), and our tests in H.Santo Antonio ² (www.hgsa.pt) show that up to 15 minutes are saved by this automation.

Conclusions: We've presented a topographic segmentation tool that reduces exam annotation times by 12%, thus showing that computer vision algorithms are a viable solution to this practical limitation of wireless capsule endoscopy.
ADAPTIVE DISPLAY SPEED CONTROL FOR DIAGNOSIS OF CAPSULE ENDOSCOPIC IMAGES

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1Osaka University, 2Osaka City University, 3Kobe Pharmaceutical University, JAPAN

Introduction: The Capsule Endoscopy (M2A, Given Imaging Ltd.) takes approximately 8 hours to go through gastrointestinal track, creates a capsule endoscopic image sequence, which has around 60,000 frames. Depending on the skill, it takes from 45 minutes to two hours to evaluate the video sequence under extreme concentration of medical doctors so as not to miss pathological abnormalities [1]. Aim: Reducing diagnostic time by controlling frame rate adaptively that relies on the difference between two consecutive frames. Method: The video sequence would be played at high speed at stable regions to save time and the speed would be decreased at rough changing that can help suspicious findings more conveniently. Data for representing and measuring difference of frames were generated by some methods of image feature extraction and similarity metric. These data were classified into groups corresponding to changing levels between two frames. The delay time of these frames was calculated by the parametric function for each classified group. The optimal parameter set was selected by experiments with seven levels of assessment, supported by four medical doctors, whose skill grade are from junior to senior. Result: In our experiments, 30 video sequences of patients were processed. For the optimal parameter set, the average diagnostic time was reduced from 8 hours down to around 30 minutes for each sequence. According to evaluation of the senior medical doctor, who has good skill for diagnostic video capsule endoscopy, the result includes: 2/30 (6%) sequences at fairly good, 9/30 (30%) at good, 11/30 (37%) at very good and 8/30 (27%) at excellent level. Conclusion: The twofold effectiveness of method is reducing diagnostic time without lost information and also assists medical doctor easily recognizing suspected regions. Further studies to significantly reduce diagnostic time and improve evaluation procedure are needed. Reference: [1] P. Swain, A. Fitscher-Ravens, “Role of video endoscopy in managing small bowel disease”, GUT 2004, Vol. 53, pp. 1866-1875.
SAFETY OF WIRELESS CAPSULE ENDOSCOPY (CE) IN PATIENTS WITH CARDIAC PACEMAKERS AND IMPLANTABLE CARDIAC DEFIBRILLATORS


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Wireless video capsule endoscopy (CE) is a new technology, which allows visualization of the entire small intestinal mucosa. It is primarily indicated for the evaluation of obscure gastrointestinal bleeding (OGIB). Data suggest that CE is very safe and associated with few adverse events. However, the potential interaction between the capsule endoscope and implantable cardiac devices such as a pacemaker (CP) and defibrillator (ICD) as well as other electromedical devices is still a concern. Aim: The primary aim of this study was to evaluate the safety of CE in patients with a CP and/or ICD who were being evaluated for OGIB or other disorders. The secondary aim was to determine whether a CP or ICD affected the video images of the capsule endoscope. Methods: Patients referred to our institution for evaluation with the CE and who had either a CP or ICD or both were entered into the study. Patients with CP had baseline electrocardiograms (ECG) and pre-procedure pacemaker checks. CE was performed in a hospital setting rather than at the outpatient clinic which is our routine and a Holter monitor was performed during CE. A post-procedure pacemaker check was performed. All ICD patients had transvenous endocardial ICDs located in the chest. Prior to CE, patients had a baseline electrocardiogram (ECG) and ICD interrogation. Thereafter, CE was performed in a hospital setting with telemetry monitoring performed simultaneously. A post-procedure ICD interrogation was carried out to evaluate changes in programmed parameters. A cardiologist and ICD nurse specialist together reviewed both the telemetry monitor and the post procedure ICD interrogation on each patient. When CE studies were reviewed, observations were made with particular reference to technical difficulties or interference with video imaging. Results: Thirty-seven capsule endoscopes were performed in 33 consecutive patients (17 males and 16 females; mean age: 75 years; range: 52-93 years) with CP and/or ICD. Twenty-six patients had a CP and 8 patients had an ICD (one patient had both). The indication for CE was OGIB in 31 patients, abdominal pain in 1 patient and weight loss in 1 patient. A cardiologist and pacemaker nurse specialist reviewed the Holter monitors, post-pacemaker checks and ICD interrogation on each patient. Occasional premature atrial contractions (PACs) and premature ventricular contractions (PVCs) were seen. One patient had a three beat run of nonsustained ventricular tachycardia (VT). Hemodynamically significant arrhythmias were not observed in any of the patients. CP and ICD functions were not altered. No interference by the CP/ICD on the CE images was seen. Conclusion: CE appears to be safe in patients with CP and/or ICD and does not appear to be associated with any significant adverse events. These devices do not interfere with CE imaging.
FIRST CAPSULE ENDOSCOPY STUDIES IN CYSTIC FIBROSIS: DESCRIPTION OF CF ENTEROPATHY

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Background: Intestinal malabsorption in patients with Cystic Fibrosis (CF) has generally been attributed to pancreatic insufficiency (PI). However, even with adequate pancreatic enzyme replacement therapy significant steatorrhea still occurs. The reasons for this are obscure, but it has been suggested that CF is associated with an enteropathy. This may explain the increased incidence of Crohn’s disease and a marked increase of small bowel cancer in this population. The introduction of capsule endoscopy (CE) has facilitated the diagnosis of small bowel disorders including tumors and small intestinal inflammatory disorders which were difficult to identify until the application of this technology. Methods: Ten patients, 18 years of age and over, with CF and PI without overt evidence of small bowel disease underwent CE. No patient had a history of prior intestinal resection. The images obtained were reviewed by two independent physicians. Stool assays of calprotectin, a marker of inflammation were obtained. Results: The patients were 18-27 years old. All had PI with moderate lung disease; one had significant liver disease. In all patients, small bowel pathology was found. The range of pathology included diffuse areas of small bowel inflammation characterized by edema, erythema, mucosal breaks and erosions. Calprotectin was increased in all patients. Conclusions: These initial studies show a high prevalence of small intestinal mucosal pathology correlating with elevated levels of calprotectin. In the absence of other known causes of small bowel pathology it seems likely that the observed damage represents an hitherto unknown integral part of the disease, CF Enteropathy. In order to determine whether this enteropathy is independent of PI or related to another feature of this disease, further CE studies of CF patients with pancreatic sufficiency are planned as well as patients with chronic pancreatitis unrelated to CF.
RAPID® 4 QUICKVIEW V4 HAS 100% NEGATIVE AND POSITIVE PREDICTIVE VALUES

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Advancements in the Rapid software have made it easier for the gastroenterologist to read capsule endoscopy studies. Each new version has included features that improve reader’s confidence, while shortening review times. Rapid 4 is no exception. It includes an improved automatic mode, Automatic Mode v4, and an improved preview feature, Quickview v4. This new preview tool allows the reader to rapidly scan the study in less than 3 minutes, and will select the most unusual frames to be reviewed in a sequential fashion. The aim of this study is to determine usefulness of this feature in clinical practice, by determining the negative and positive predictive values (NPV, PPV). Methods: Between September 2005 and January 2006, 47 Pillcam SB studies were performed in an outpatient community practice in rural Massachusetts, using the new Rapid 4 software. These studies included both bleeding and non-bleeding indications. All studies were previewed using the Quickscan v4 mode, and findings were noted. The studies were then read in the usual fashion, using the Automatic Mode v4. Results were recorded. Results: There were 26 studies that had positive diagnostic findings, which included angioectasia, tumor, celiac disease, Crohn’s disease and Nsaid injury. In each of these 26 cases, the Quickview v4 preview tool identified all significant pathology. In none of these positive studies was the Quickview v4 tool negative. The Quickview V4 scan was negative in all of the 21 negative studies. Thus, both the negative and positive predictive value was 100%. Discussion: The Quickview v4 preview tool appears to be a very accurate feature of the new Rapid 4 software. It was able to predict with 100% accuracy both the negative and positive studies, in a matter of a few minutes of clinician review. In the 47 cases presented, the Quickview was able to identify all significant pathology rapidly, and able to predict the negative studies in all cases. This is a valuable tool for the practicing physician, and along with the new automatic mode, diagnoses can be made more rapidly, and therapy instituted earlier. However, the Quickview v4 feature alone should not be used as a replacement for a careful, complete review by the physician, and although these findings are promising, more studies need to be performed to validate these results.
SUCCESSFUL VIDEOCAPSULE STUDY IN CHILD WITH A CARDIAC PACEMAKER LOCATED IN THE ABDOMINAL WALL

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Pacemaker location in the abdominal wall is considered a contraindication to videocapsule endoscopy (VCE). One case of VCE in an adult patient with such a pacemaker was reported, without cardiac dysfunction. We report the successful use of VCE in a child with transfusion dependent obscure GI hemorrhage and abdominal wall pacemaker. Case history: A 14 year old female with congenital heart disease (single ventricle, transposition of the great arteries) and a Fontan procedure performed 11 years prior was referred for recurrent obscure gastrointestinal bleeding of 3 years duration. A Medtronic Kappa 720 pacemaker had been placed 6 years earlier. A protein-losing enteropathy was documented by an elevated stool alpha-1 antitrypsin (3.12 g/L) and severe hypoalbuminemia (18g/L). No bleeding disorder was identified. Underlying rhythm was junctional at a rate of 72 - 76 bpm, with pacemaker programmed in DDD mode at 70 bpm. Her medications included hydrochlorothiazide, spironolactone, and enalapril. She had become transfusion dependent in the preceding 2 weeks for recurrent melena, requiring 3 units of packed RBCs to maintain a Hb > 90g/L. Esophagogastroduodenoscopy (EGD), and colonoscopy with visualization of the terminal ileum 1 week prior did not identify the source of bleeding. Angiography suspected a jejunal source, while tagged red cell scintigraphy alluded to a site in the RLQ. Ultrasound of the abdomen with Doppler revealed a large, heterogeneous liver, without signs of portal hypertension. Due to the lack of clarity of the location of bleeding and her poor tolerance to invasive procedures (due to a decline in O2 saturation to < 70%), we elected to perform VCE with close monitoring despite the presence of the back-up cardiac pacemaker located on the abdominal wall (left costal margin). Interference induced by the M2A videocapsule was ruled out prior to swallowing by placing it on the abdominal wall of the patient in close to the pacemaker. Analysis with the programmer magnet revealed normal function of the pacemaker which was then programmed in VVI mode for a backup rate at 30 bpm. The capsule was attracted by the programmer magnet and briefly inactivated prior to swallowing. VCE findings: The exam proceeded with close cardiac monitoring, without any complications for the 8-hour duration. Fresh bleeding was clearly detected in the lumen of the proximal and mid-jejunum. Although no specific lesion was identified, a vascular origin was suspected. A push enteroscopy is planned. Conclusions: VCE can be successfully and safely performed in selected patients with implanted epicardial abdominal pacemakers. Dysfunction of the capsule appears to be more likely than problems with cardiac pacing.
NEW AUTOMATIC MODE OF RAPID® 4 SOFTWARE REDUCES READING TIME FOR SMALL BOWEL PILLCAM STUDIES

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Aims: Time consuming evaluation of a video capsule endoscopy PillCam SB study is still a major obstacle. The standard Rapid 3 software already provides an automatic vision modus, using variable speeds of image presentation during evaluation, i.e. higher speeds for redundant consecutive images. A new software version Rapid 4 additionally omits redundant images partially. The aim of this prospective study was to compare the times required for reading a PillCam small bowel study with both software versions. Furthermore, a potential loss of relevant findings was investigated. Methods: 40 consecutive PillCam SB examinations were independently evaluated by two gastroenterologists in parallel, randomly assigned to read the studies either with Rapid 3 or Rapid 4 version in automatic modus. The times required for reading the examination were separately recorded for esophagus and stomach, for small intestine and for colon. Wilcoxon test was used for statistical analysis. The detection rates for blood, for lesions with high bleeding potential or with high diagnostic value (ulcers, angiectasias, tumor, varices, polyps, villous atrophy) and lesions with low bleeding potential or diagnostic value (red spots, single small erosions) were compared for both software versions. In case of discrepant findings of the both investigators, a third gastroenterologist decided. Results: Mean time required for reading small intestinal images was 41.9 ± 16.9 min with the standard RAPID 3 software and 30.5 ± 13.0 min with the new RAPID® 4 version (p< 0.0001), respectively. Total reading time, including esophagus, stomach, small intestine and colon was 52.4 ± 16.4 min with Rapid 3 and 36.9 ± 13.4 min with Rapid 4 (p<0.0001). Reading times did not differ significantly between the two investigators. Lesions of high diagnostic relevance were detected in the small bowel (18 cases), 2 in the stomach (2) colon (3). Findings of low diagnostic value were found in the small bowel in 9 cases. 12 lesions were missed in total (polyps, nodule, submucous tumor, invagination, erosions, red spots), equally distributed between the two investigators and the two software versions. Discussion: The application of a new feature for automatic viewing speed modus in the Rapid 4 software significantly reduces reading time for a small bowel PillCam procedure. In a limited number of studies, no loss of relevant findings was observed. Larger studies are required for confirmation.
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COST-UTILITY OF SCREENING FOR ESOPHAGEAL ADENOCARCINOMA WITH ESOPHAGEAL CAPSULE ENDOSCOPY VERSUS CONVENTIONAL UPPER ENDOSCOPY

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Background: Esophageal adenocarcinoma is rising in incidence, and screening with conventional upper endoscopy to decrease cancer mortality is recommended. Esophageal capsule endoscopy (ECE) has recently been shown to be accurate in detecting Barrett’s esophagus, the accepted precursor of this malignancy. Aim: To compare the cost-effectiveness of screening by ECE with screening by conventional upper endoscopy for esophageal adenocarcinoma. Methods: A Markov model of hypothetical 50 year-old Caucasian men with symptoms of gastroesophageal reflux was constructed to calculate outcomes associated with Barrett’s esophagus and esophageal cancer. The model incorporated direct medical costs and patient preferences for health states (utilities), and followed the patients until age 80 or death. The primary outcome was the incremental cost-effectiveness ratio, and was analyzed from the perspective of a third-party payer. Other outcomes included were life expectancy, quality-adjusted life expectancy, and proportion of cancer deaths averted. Results: Screening by conventional upper endoscopy prevented 60.4% of cancer deaths, at a cost of $10,213 per quality-adjusted life-year gained compared to no screening. ECE prevented 60.0% of cancer deaths, and provided 1.5 fewer quality-adjusted days and at greater incremental cost per quality-adjusted life-year than conventional upper endoscopy. ECE would need to be greater than 99.9% sensitive for Barrett’s esophagus in order to be the preferred strategy. Conclusions: Screening for esophageal adenocarcinoma with either conventional endoscopy or ECE result in nearly identical outcomes, but conventional endoscopy is the preferred strategy. Both strategies appear cost-effective and the model does not take into account patient or health care provider preferences or adherence.
CAPSULE ENDOSCOPY PRIMARY CARE EXPERIENCE

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Objectives: To study primary care setting and diagnostic ability of capsule endoscopy pill and small bowl. Background: GI problems are the most common in primary care almost 44%. Most common being GERD, Esophagitis, portal hypertension, GI bleed occult anemia from GI bleeding. Methods: We studied a typical primary care practice adult setting having common GI problems. All ages 10 plus and male and female patients were tested. Patients were selected based on reflux symptoms ranging from once a week or more and history of portal hypertension due to hepatitis C, alcoholism and anemia work up for GI bleeding occult. We looked at the data for 30 patients. Pt's were referred for endoscopy if alarming symptoms were: Dysphagia or odynophagia. Bleeding Pt's were excluded from study and referred to endoscopy if Weight loss, Early satiety, Choking (acid causing coughing, shortness of breath, or hoarseness), Anorexia, Frequent vomiting, GI bleeding. Results: We found patients with esophagi is 65%, Barret's 10%, portal hypertension 6%, gastro paresis 3%, normal 3%. General prevalence is esophagi is, Barret's, portal hypertension and occult GI bleed. Earlier studies showed for esophageal disorders sensitivity sensitivity of pill cam for esophageal disorders 92%, specificity 95%, PPV97% and NPV 88% our results show similar figures. Conclusion: Comparing the previous values for pill cam and small bowl we conclude is a good screening tool especially in primary care setting where it is most prevalent to confirm the clinical diagnosis and aid in treatment and follow up of esophageal and small bowl disease.
ESOPHAGEAL CAPSULE ENDOSCOPY (ECE) FOR ACUTE GASTROINTESTINAL BLEEDING IN THE EMERGENCY DEPARTMENT AS A GUIDE TO MANAGEMENT; A PROOF-OF-PRINCIPLE REPORT

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Objectives: Nasogastric (NG) sampling of stomach contents is routinely performed in the Emergency Department (ED) for hematochezia or melena to determine the presence of an upper tract source and its activity. The reliability of this technique is plagued with considerable sampling error and patient intolerance as well as mucosal trauma. Low negative predictive value and variable reporting of results demand development of a more accurate and acceptable procedure. We have extensively utilized ECE in the ED for acute, non-hemodynamically compromised acute gastrointestinal bleeding in place of NG sampling. The ECE information of interest in the bleeding algorithm includes: presence of bright blood, aged hematinic material or clear fluid and not specific lesions, although these can often be identified. The images, which are contained in folders in the range of 70-100 MB, are relayed to the gastroenterologist over a T1 line for reading between the hospital and the physician’s home or office. Methods: In combination with hemodynamic stability and the information obtained during ECE, an algorithmic decision is made regarding the need for emergent (within 1 hour) vs. urgent (within 24 hours) endoscopy. A modified ingestion protocol is used to enhance gastroduodenal visualization. Intravenous metoclopramide is given prior to the examination. The ED staff was easily taught to administer the exam and send the data by a dedicated T1 line. Results: 10 cases are reported having undergone this acute bleeding protocol as a pilot, proof-of-principle study. 2 cases required emergent endoscopy and both yielded lesions that required therapy (BICAP cautery and variceal banding) while in the remaining 8 patients, the endoscopy was performed urgently and safely without the need for conversion to an emergent endoscopy. The actual lesion was seen on ECE in this group in 62% compared to subsequent endoscopy. Therapy was performed in 2 patients in the urgent group (variceal banding) and 1 was discharged from the ED to return the next morning as an outpatient. Mobilization of the on-call team was avoided safely in favor of a more elective procedure the next working day. Conclusions: ECE may be a useful triage tool in the ED for acute gastrointestinal bleeding, replacing nasogastric sampling, for determination of the need for emergent upper endoscopy. The ECE information, when used in a specific algorithm, may help to risk stratify these patients and potentially save unnecessary medical costs and manpower. A prospective, randomized controlled trial will be necessary to help answer this possibility.
ESOPHAGEAL CAPSULE ENDOSCOPY IN PATIENTS REFUSING CONVENTIONAL ENDOSCOPY FOR THE STUDY OF SUSPECTED ESOPHAGEAL PATHOLOGY


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Aim: Esophageal Capsule Endoscopy (ECE) is a well-tolerated procedure which does not require sedation and has proved its value for the study of the esophagus. The aim of our study was to assess the feasibility, accuracy, safety and acceptability of ECE for the study of GERD and esophageal varices in patients that refused conventional UGIE. Patients and methods: 28 patients (15M/13F; mean age: 58.5±12.4; range: 23-87) were included in which 30 examinations were carried out. Twenty-three patients presented chronic GERD symptoms; whereas 5 patients had been diagnosed of cirrhosis and needed a screening for esophageal varices (EV). The procedures were carried out with the new PillCam ESO which harbors two viewing cupules and takes a total of 14 frames per second each. Technical data [total recording time (TRT), esophageal transit time (ETT), gastric transit time (GTT), and Z line visualization], clinical findings [erosions; Savary-Miller grade; presence and characteristics of (EV) or portal hypertension gastropathy (PHG)], and patient’s opinion (satisfaction questionnaire) were analyzed.

Results: All the patients ingested and excreted the capsule without complications. Mean TRT, ETT and GTT were 1224 s, 243.79 s (range=2-1192) and 951 s (range: 430-1151). Complete study of the Z line was possible in 23 cases (23/29; 79.3%). Esophageal erosions were seen in 58,33% (14/24) of the examinations carried out in patients with GERD, with a mean of 2.31±0.89 erosions. Nine out of 14 patients (64.29%) had grade I esophagitis and grade II esophagitis was seen in the other five cases (35.71%). Among the 5 patients with cirrhosis, small varices were visualized in one of them (1/5, 20%), while in the remaining three large varices with red spots were evidenced (3/5, 80%). In all 4 patients showing esophageal varices, portal hypertension gastropathy were found. Most of patients found the capsule easy to swallow (26/28; 92.86%), and asymptomatic (27/28; 96.43%); evaluated the procedure as comfortable (27/28; 96.43%); and would repeat it if necessary (28/28; 100%). Conclusions: ECE is an adequate alternative diagnostic method for the study of GERD and the screening of esophageal varices in patients refusing to undergo conventional UGE.
Background: Variceal hemorrhage remains a fatal complication of cirrhosis in about 20% of patients. National guidelines recommend routine screening for varices in all cirrhotic patients. Endoscopic surveillance should be carried out at 1 to 3 year intervals depending on initial findings. Traditionally, endoscopy has been used for this purpose. However sedation and other procedure related complications including perforation are well known. Capsule endoscopy (PillCam ESO™) is a novel FDA approved device to evaluate the esophagus. Although studies are ongoing, there is limited experience with its use for this indication at present. Aim: To review the findings of PillCam ESO™ used in our cohort of patients and to determine its applicability in detecting esophageal varices and portal hypertensive gastropathy. Results: We share our recent experience with the first 28 patients who underwent pill endoscopy in our institution. We expect to include 50 patients by the spring of 2006. So far we have followed 20 men and 8 women. The mean age was 56.8 ± 9.2 years. Mean platelet count was 107,800 ± 57,600/mm3 and mean INR was 1.39 ± 0.31. Eight patients had alcoholic cirrhosis, 11 patients had hepatitis C related cirrhosis, 3 patients had cryptogenic cirrhosis, 3 had autoimmune hepatitis and one patient each had polycystic liver disease and hepatic sarcoidosis. Six patients had hepatocellular carcinoma, either as a primary or secondary diagnosis. Our endoscopic findings were as follows: 10 patients had medium/large varices, 12 patients had small varices and there were no evidence of varices in 5 patients. Stigmata for high risk of bleeding could be identified in four patients. Portal hypertensive gastropathy was seen in 18 patients. We detected mucosal changes suggestive of Barrett’s esophagus in 3 patients. Erosions were seen in 2 patients. One patient could not swallow the capsule. In 2 patients, the capsule did not pass through the lower esophageal sphincter during the test. All our patients successfully studied found this procedure to be very tolerable. There have been no adverse events associated with PillCam ESO™ use so far. Conclusion: Capsule endoscopy is a simple and non-invasive procedure. Its use is well accepted by patients. There is optimal visualization of esophagus but limited visualization of the stomach. Capsule endoscopy is a reasonable, safe and comfortable alternative to EGD for screening for portal hypertension. While early in our experience, capsule endoscopy has the potential to become a powerful tool in the screening for portal hypertension.
THE DIAGNOSTIC YIELD OF PILLCAM ESO IN PATIENTS WITH CHRONIC GERD IN A COMMUNITY BASED ON PRIVATE GASTROENTEROLOGY PRACTICE

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Background: Chronic GERD is a common disorder affecting millions of Americans. 30% of patients with chronic reflux have erosive esophagitis on traditional endoscopy, while approximately 10% of chronic GERD patients have Barrett’s esophagus on EGD. Chronic reflux is a known risk factor for adenocarcinoma of the esophagus, and there has been a rise in the rate of esophageal cancer, primarily in middle-aged Caucasian men, over the past 20 years. Given Imaging’s Pillcam ESO has been shown in previous studies to have extremely high positive and negative predictive values when compared to traditional endoscopy. This study demonstrates comparable diagnostic yields of Pillcam ESO with traditional endoscopy in the outpatient, community based setting. Methods: 50 patients with chronic GERD symptoms referred to an outpatient private gastroenterology office underwent Pillcam ESO studies during April through December 2005. These patients had GERD for over 5 years, and were originally referred for traditional endoscopy, all of whom refused EGD for various reasons (fear of procedure, anesthesia or complications). Pillcam ESO was performed, using an inclination protocol of 3 minutes supine, 3 minutes at 30 degrees, and 3 minutes at 60 degrees. Images were then downloaded, studies read and findings recorded. Patients with capsule findings consistent with Barrett’s esophagus underwent EGD and biopsy at a later date. Results: Barrett’s esophagus was seen in 5 cases (10%) and confirmed on follow up EGD with biopsy. All were short segment Barrett’s. Erosive esophagitis was noted in 12 cases (24%), LA classification Grades A and B. There were no cases of Grade C or D esophagitis. 2 cases (4%) had non obstructive Schatzki’s rings; one patient (2%) had an inlet patch. One patient was noted to have esophageal varices. Discussion: This study demonstrates that the diagnostic yield of Pillcam ESO mirrors that of traditional endoscopy, when performed in chronic GERD patients who have refused EGD, in the community setting. The yield of 10% with Barrett’s esophagus and 24% with erosive esophagitis are identical to the rates seen in traditional endoscopic studies. Many patients with chronic reflux who require endoscopy are not being seen by gastroenterologists due to their fears and apprehensions of having an invasive procedure. Pillcam ESO gives physicians a valuable, accurate diagnostic tool to utilize in this group of patients, hopefully leading to an earlier diagnosis, improved treatment plan, and a better outcome.
CAPSULE ENDOSCOPY (PILL CAM ESO): IT’S UTILITY IN DIAGNOSING ESOPHAGEAL VARICES IN PATIENTS WITH CHRONIC LIVER DISEASE

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Introduction: Video Capsule Endoscopy (VCE) is a novel noninvasive technology designed primarily to provide diagnostic imaging of the GI tract and a new capsule (Pill Cam ESO) with imaging systems at both ends has been approved for the detection of mucosal disease of esophagus as a minimally invasive screening tool for esophageal diseases. Its utility in diagnosing esophageal varices in patient with chronic liver disease is still being evaluated. Cirrhosis affects 3.6 out of every 1000 adults and is responsible for 32,000 deaths annually. A major cause of cirrhosis-related morbidity and mortality is the development of variceal hemorrhage, a direct consequence of portal hypertension. Aim: The aim of this study is to evaluate the utility of Pill Cam ESO in the diagnosis and grading of esophageal varices in patients with chronic liver disease. Material and Methods: In this prospective study Pill Cam ESO was done in patients with chronic liver disease of various etiology who presented at our Institution and findings of Pill Cam ESO was interpreted by a Gastroenterologist and Hepatologist and later on patients underwent traditional endoscopy (EGD) to compare the findings with Pill ESO. Results: 1) Pill Cam ESO provides a new tool which is relatively safe and noninvasive in diagnosing esophageal diseases specially esophageal varices in patients with chronic liver disease. Accuracy of Pill Cam ESO for grading esophageal varices still needs to be established. 2) Accuracy of Pill Cam ESO for grading esophageal varices still needs to be established.
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INTERIM ANALYSIS OF THE EVALUATION OF PILLCAM ESO IN THE DETECTION OF ESOPHAGEAL VARICES

Glenn Eisen, Roberto de Franchis, Rami Eliakim

Pillcam ESO Esophageal Varices Working Group

Purpose: Esophageal varices (EV) are a serious consequence of portal hypertension (PHT), associated with a mortality rate of bleeding 20% or more. Current guidelines recommend endoscopic screening of patients with cirrhosis and therapy based on these findings. Two previous pilot studies have demonstrated that Pillcam ESO has comparable tests characteristics to upper endoscopy (EGD). This large-scale international trial was designed to validate the initial studies findings as well as a novel Pillcam grading system. Methods: Adult patients who were undergoing clinically indicated EGD for screening or surveillance of EV were asked to undergo a Pillcam study prior to the EGD. EGD was performed within 48 hrs of Pillcam study. Patients who had undergone previous esophageal band ligation were excluded. The endoscopist was not blinded to patient history/findings. A second independent investigator read each Pillcam study, blinded to patient history and EGD results. Interim analysis was planned to validate the Pillcam grading scheme before completing the 400 patient enrollment. Results: 97 patients underwent Pillcam ESO and EGD. Seventy-nine percent were undergoing screening examinations. EGD findings: 67/97 had EV; Pillcam ESO findings: 62/97 had EV. There were no capsule related complications or capsule retention in this study. Pillcam ESO as compared to EGD for detection of EV had a sensitivity of 86.6%, specificity of 86.7%, positive predictive value (PPV) of 93.5%, and negative predictive value (NPV) of 74.3%. There was 77.3% overall agreement level of EV grading between Pillcam and EGD (kappa=0.65). For medium/large varices (those in which therapy would be indicated), there was 88.7% agreement (kappa =0.7). Conclusions: This interim analysis confirms the diagnostic capabilities as well as the safety of Pillcam ESO for detecting EV in patients undergoing screening or surveillance. In addition, the novel Pillcam EV grading scale appears an accurate method to discern variceal size. Final results will be available when the trial is completed.
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WIRELESS CAPSULE ENDOSCOPY (WCE) IN THE EVALUATION OF SMALL INTESTINAL INFLAMMATORY DISEASE

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Introduction: Wireless Capsule Endoscopy (WCE) provides direct visualization of mucosal abnormalities throughout the entire small intestine. WCE may provide an earlier and more accurate diagnosis of CD. Methods: A retrospective analysis of 91 patients who underwent WCE with the PillCam Sb for the evaluation for CD between January 2003 and November 2005. 5-groups of patients were identified: 29 with abdominal pain, diarrhea, guaiac +stools, and iron deficiency anemia; 24 with abdominal pain and diarrhea; 11 with abdominal pain; 23 with indeterminate colitis; 4 with established CD. All patients underwent pan-endoscopy, most ileoscopy, and small bowel series. WCE studies were reviewed by 2 independent readers. WCE findings were classified as definite or possible for CD, non-specific, or normal. Definite findings included the presence of greater than 3 ulcers, numerous aphthous ulcers, edema, nodularity, and stricture. Findings considered as possible included the presence of a single aphthous ulcer with edema and nodularity. Non-specific inflammatory changes consisted of erythema, edema, nodularity, and mucosal breaks. IBD serologies (ASCA IgA, IgG, p-ANCA) were obtained from 54 patients. Patients on aspirin, clopidogrel, or NSAIDs were excluded. Results: There were 55 females, 36 males; average age 47.8 (range 11-82). 10/29 with abdominal pain, diarrhea, guaiac +stools, and iron deficiency anemia had definite WCE findings (5 with diffuse small intestinal involvement), 5 possible, 11 non-specific, 3 normal. 3/24 with abdominal pain and diarrhea had definite findings, 6 possible, 13 non-specific, 2 normal. 1/11 with abdominal pain alone had definite findings (diffuse small intestinal involvement), 2 possible, 8 non-specific. 4/23 with indeterminate colitis had definite findings, 6 possible, 7 non-specific, 6 normal. All 4 with established CD had non-specific inflammatory changes. 86% (19/22) of patients with +IBD serologies had definite or possible capsule findings; 11/13 with definite findings had +markers; 6/15 with possible findings had +markers; 4/25 with non-specific findings had +markers; 1 with normal findings had +markers. Conclusion: WCE plays an important diagnostic role in the evaluation of patients for CD. +WCE findings for CD strongly correlated with +IBD serologies; this combination provides a more meaningful diagnosis. The significance of non-specific inflammatory changes needs further clarification. Those with possible and non-specific findings along with + markers may have early CD. This identified group can be treated earlier, which may translate into better outcomes.
VIDEOCAPSULE ENDOSCOPY IN PEDIATRICS: A FOUR YEAR EXPERIENCE

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Background & Aim: We report our experience in 80 children who underwent videocapsule endoscopy (VCE). Patients & Methods: Prospective, single center study of consecutive cases (2001-2005) in individuals 18 years or less, referred for possible Crohn's disease (CD), gastrointestinal bleeding, polyposis or protein losing enteropathy/malabsorption. Patients referred for suspected CD had chronic abdominal pain accompanied by at least 2 of the following inclusion criteria: chronic diarrhea, anorexia & weight loss, anemia, hypoalbuminemia, positive ASCA serology. Cases for identification of a source of intestinal bleeding had negative initial workup including a colonoscopy and esophagastroduodenoscopy at minimum. VCE was performed after an overnight fast using the Given Imaging M2A capsule. Small bowel preps and prokinetics were not employed. Results: Complete data was available for 80 of the 85 patients studied (58% female). Mean age of those studied was 14.1 +/- 2.7 years (range 4-18). Weight ranged from 16-104 kg. In 2 patients (2.5%), age 4 & 17 yr, the capsule placed endoscopically in the duodenum. Mean gastric emptying and small bowel transit time was 37.7 and 212.8 minutes, respectively. The cecum was not visualized in 7.5% of cases. Overall, 21 (26.2%) had a new diagnosis of CD established by VCE, while 6 others (7.5%) had possible CD (lesions non-diagnostic). Other diagnoses were small bowel polyposis in 6 cases (7.5%), 7 (8.8%) with vascular lesions, 15 (18.5%) with non-specific changes of small bowel erosions or erythema, 2 had eosinophilic enteritis, and 1 case each with small intestinal lymphangiectasia and Celiac disease. The VCE study was normal in 17 (21%) patients. Overall, the leading indication (61.2%) was suspected Crohn's disease. A diagnosis of CD with typical lesions in the small bowel was made by VCE alone in 42.2% of the 49 patients referred for CD. 12.2% had an alternate diagnosis, and the VCE was normal in the remainder. Capsules were temporarily retained in the small bowel in 2 cases (2.5%) due to an inflammatory stricture despite recent normal small bowel follow through x-rays. In both cases, corticosteroid therapy resulted in the capsule being passed without symptoms. No other adverse events were encountered. Conclusions: VCE is a highly effective modality for diagnosing patients with symptomatic “occult” CD of the small bowel, undetected by conventional diagnostic methods, and is the leading reason for referral for a VCE in pediatrics. The overall diagnostic yield (specific positive findings) was 55%. VCE also excluded CD with precision. Clinical follow-up of the non-diagnostic studies (26% overall) is ongoing.
WIRELESS CAPSULE ENDOSCOPY (WCE) IN SUSPECTED CROHN’S DISEASE (CD) IN CHILDREN

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Aim: Review our experience with WCE in children suspected of having small bowel CD. Methods: Retrospective chart review of patients who had WCE for suspected small bowel (SB) CD. The Given Imaging PillcamTM capsule was either swallowed or placed endoscopically. The images were reviewed using RAPID™ version 3.1.9.3. Results: Between 1/05 and 11/05, there were 30 WCE performed in 27 patients (14 M: 13F) suspected of having CD, ranging in age from 4 ? yr to 19 yr (8 patients <10yr). The indications were: Debilitating abdominal pain (17), chronic diarrhea (10), indeterminate serology for CD (9), rectal bleeding (5), weight loss (5), aphthous oral ulcers (4), and other (pouchitis in 1, family history of CD in 1, and assess extent of CD in 2). Three patients had WCE twice (nondiagnostic abnormalities in first study with persistent symptoms). Twenty-two patients swallowed the capsule while eight required endoscopic placement. Out of 30 studies, 21 were complete (capsule had reached cecum); 8 were incomplete, 1 capsule remained in the stomach. The average gastric transit time was 66mins and SB transit time was 200mins in patients who swallowed the capsule compared to SB transit time of 388mins in whom capsule was placed endoscopically. 8/22 (32%) patients were anaemic while 6/18 (33%) had elevated ESR. Of the total 30 WCE studies, 14 (46%) revealed SB lesions (multiple ulcers, erosions, or inflammation) suggestive of CD, 6 (20%) revealed vascular abnormality (prominent vascularity in 4, vasculitis in 2, venous ectasia in 2), 4 (13%) showed duodenitis/enteritis, 2 (7%) revealed hyperperistalsis (and possible intermittent intussusception), 1 (3%) revealed a single ulcer, 2 (7%) studies were normal and 1 study was uninterpretable. In comparison, UGI/SBFT xrays revealed small bowel CD in 2/8 (25%), colonoscopy revealed CD in 5/26 (19%) and colonic/ileal biopsies revealed CD in 4/23 (17%) patients. Nonspecific abnormalities were detected in 7/26 (27%) of colonoscopies and 7/23 (30%) of colon/ileum biopsies. Conclusions:

1. WCE detects SB lesions suggestive of CD in more patients than conventional modalities
2. WCE is feasible in children as young as 4 yr
3. WCE may help in diagnosis of other diseases involving SB with presentation similar to CD
4. WCE performed with endoscopically placed capsule gives more SB evaluation time than swallowed capsule
5. WCE may detect evolving CD, repeating study in appropriate clinical settings may show diagnostic lesions.
CAPSULE ENDOSCOPIC DIAGNOSIS OF SMALL BOWEL CROHN'S DISEASE: A PROSPECTIVE, COMPARATIVE STUDY OF CAPSULE ENTEROSCOPY, BARIUM ENTEROGRAPHY, PUSH ENTEROSCOPY AND ILEO-COLONOSCOPY

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Introduction: Diagnosis and adequate therapy of small bowel Crohn's disease (SBCD) are frequently delayed due to the limitations associated with conventional imaging methods of the small bowel (SB). Capsule enteroscopy (CE) may change this scenario, by enabling direct visualization of the entire SB mucosa. AIMS & METHODS: The aim of our study was to investigate and compare the diagnostic value of CE, with the most common, currently available methods for evaluation of SB, such conventional barium enterography (BE), push enteroscopy (PE) and ileo-colonoscopy (IC) in SBCD. 105 consecutive patients with clinically suspected active CD, based on predefined clinical and biochemical markers were invited to a single centre, prospective and partly blinded study. Forty patients were excluded due to SB stricture on BE (10), refusing PE (17) or IC (8), capsule retention in the stomach (3), swallowing difficulty (1) and ischemic enteropathy (1). Thus, the study material consisted of 65 patients (42 women and 23 men, mean age 37 years, range 14-69). 30 patients (46%) had suspected CD, 35 patients (54%) were previously diagnosed with CD. Twenty-three patients (35%) had previous surgery performed on the SB. No patient received non-steroidal anti-inflammatory drugs. All examinations were performed within 3 months by experienced investigators. Results: Crohn's lesions (multiple erosions, ulcerations and/or strictures) in the SB were visualized by one or more methods in 38 (58%) of the 65 patients. All cases with SBCD detected on BE, PE and IC were also identified using CE except 5 (13%) cases where the capsule did not pass through the entire SB during the examination. Notably, CE alone identified 8 (21%) additional patients with CD and detected more extensive SBCD in 12 patients (31%) compared to the other methods. The sensitivity of capsule enteroscopy for detecting SBCD was 0.87, whereas the sensitivity of ileoscopy, barium enterography and push enteroscopy was only 0.58, 0.21 and 0.13, respectively. Capsule retention occurred in two (3%) patients with normal BE. One of these patients underwent successful surgery with strictureplasty and capsule removal. In the other patient, the capsule was retained for two weeks, which was resolved after steroid treatment. No other complications were observed. Intubation of ileum was unsuccessful in 9 (13%) cases examined by IC. Conclusion: CE is a safe, well-tolerated and more accurate imaging modality for visualizing Crohn's lesions in the SB than BE, PE and IC. Our data suggest that CE should be the method of choice of diagnostic imaging methods in patients with suspected, non-stricturing small bowel Crohn's disease.
Figure 1: Small bowel Crohn's lesions detected by capsule endoscopy

Diagnostic sensitivity of capsule endoscopy, ileoscopy, barium enterography and push enteroscopy for detecting small bowel Crohn's lesions.

- N = 65
- * p<0.01
- ** p<0.001
CAPSULE FINDINGS IN CROHN’S DISEASE IN REMISSION DO NOT CORRELATE WITH BIOCHEMICAL MARKERS OF INFLAMMATION


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Objective: In the treatment of Crohn’s disease, symptoms, signs and biochemical tests have been used to determine disease activity and guide management. The use of capsule endoscopy in patients with Crohn’s disease who are in remission has yet to be explored. Material and Methods: Patients with known Crohn’s disease, in remission, were prospectively evaluated with the capsule endoscopy. Results: Between August to December 2005, six patients, male:female 5:1, with an age range of 21-47 years underwent evaluation with capsule endoscopy. All patients had CDAI<150. At the time of the study, four patients were treated with 5-ASA compounds, steroids and/or Azathioprine and two patients were treated with 5-ASA compounds only. Biochemical markers, Erythrocyte Sedimentation Rate and C-Reactive Protein were not elevated in all patients. Ulcers were visualized in the small bowel in all patients. Small bowel strictures were found in three patients. Conclusions: Small bowel pathology is frequently present in patients with Crohn’s disease who are in remission. The presence of ulcers and strictures do not correlate with symptoms, signs or biochemical tests.
WIRELESS CAPSULE ENDOSCOPY GUIDED IMMUNOSUPPRESSIVE THERAPY

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Background: Capsule endoscopy has had a profound impact on our understanding of small bowel diseases because of its precise diagnostic capacities. Its utility in directly guiding therapy has been suggested but has not yet come into common use in clinical practice. Several patients whose capsule endoscopy studies were crucial in determining treatment as well as assessing efficacy, raised the question of how useful capsule endoscopy can be in directing and monitoring medical therapy. Methods: In a population of xxx patients presenting for capsule endoscopy between October 2003 and February 2004, three had clinical diagnoses requiring repeat capsule endoscopy within the next 14 months. Pt#1 (46M) with a prior diagnosis of Crohn's disease, s/p ileocolonic resection, presented with worsening symptoms of pain and loose stool, and underwent CE on 11/03. Pt #2 (39F) with colonic Crohn's, anemia and bleeding, and no mucosal defects on SBFT, underwent CE on 2/04. Pt #3 (81M) with myelodysplastic syndrome, and overt GI bleeding had CE on 10/03. All patients had findings requiring change in therapy and repeat CE study. Results: All patients had deep ulcerations suggestive of SB CD, which were likely sources of GI bleeding. Each patient was treated with appropriate immunosuppressive / anti-inflammatory medications requiring monitoring and close f/u. Repeat CE revealed improvement in all cases and data on which to base decisions about future therapy. Conclusions: Follow up CE, done to assess effectiveness of medical therapy with immunosuppressives, allows physicians to make informed decisions about continuing treatment with potentially toxic medications. The time interval between the CEs needs to be determined for most effective use of medications and CE.
<table>
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<td>Ulcers/ Strictures</td>
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<td>Large ulcer/ with + IBD serology</td>
<td>Asacol</td>
<td>No ulcers</td>
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</tbody>
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UNEXPECTED SMALL BOWEL FINDINGS IN A PATIENT WITH INFLAMMATORY BOWEL DISEASE (IBD)

Todd Witte, David Jager, Marie Borum

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Introduction: Wireless capsule endoscopy (WCE) is indicated in the evaluation for possible small bowel Crohn’s disease. As the gastroenterology community gains experience with WCE, findings are emerging that were unidentified by previous modalities. It is important to gain experience in what constitutes the range of “normal” findings on WCE. Equally important, one must consider how to manage unexpected findings that are not normal per se, but also unlikely to be pathologic. Case: A 29 year old female was referred with a 5-year history of inflammatory bowel disease (IBD). The patient reported that initial endoscopic findings were only proctitis which was treated briefly with topical medications. Per report, a later colonoscopy showed patchy pancolitis, small bowel series was normal, and IBD serologies were unrevealing. The patient had been loosely diagnosed with ulcerative colitis. Due to intolerance of mesalamine, the patient had been managed with 6-mercaptopurine (6MP) with good result. While under our care with stable disease activity, the patient conceived while on 6MP, but had a spontaneous abortion in the first trimester. Subsequently the patient stopped 6MP before conceiving again, and again spontaneously aborted in the 1st trimester. Following this, the patient complained of rectal bleeding. In an effort to clarify the extent of the patient’s disease and its activity, a colonoscopy and small bowel WCE were performed. The WCE was performed first (due to scheduling issues) and showed no ulcerations or evidence of Crohn’s disease; however there were multiple small polypoid lesions with overlying normal mucosa in the mid to terminal small bowel, all with similar appearance. Colonoscopy with deep ileal intubation the following day revealed normal colon endoscopically and by histology, with an area of ulceration of internal hemorrhoids. The representative terminal ileal “polypoid lesions” seen by WCE had the appearance of lymphoid aggregate when examined by ileoscopy, however biopsy showed no histologic abnormality. After discussion with the patient, it was decided not to pursue the WCE findings further (by surgery or double balloon endoscopy) as the polypoid lesions were felt to represent either normal mucosal folds in a polypoid appearance, lymphoid aggregate, or less likely true benign polyps. Conclusion: WCE of the small bowel is a relatively new field with findings being seen that were previously unrecognized by traditional imaging or not easily visualized by traditional endoscopy. We present a case where WCE was performed to definitively rule-out Crohn’s disease of the small bowel, and resulted in unanticipated findings of polypoid lesions. We suspect that this is unrelated to the patient’s diagnosis of IBD, and rather represents an artifact attributed to the uninsufflated small bowel, or a range of normal findings previously unrecognized.
CAPSULE ENDOSCOPY DIAGNOSED SMALL BOWEL ULCERATION: IS THIS REALLY CROHN’S DISEASE?

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Background: Capsule endoscopy (CE) is a means of evaluating the small intestine primarily for obscure GI bleeding (OGIB). We have noticed a small group of patients that have presented with OGIB (without NSAID use) with small bowel ulcerations. They had no signs or symptoms of Crohn’s disease (CD) or in fact any other small bowel disorder (besides OGIB). We sought to evaluate this group of patients more thoroughly as we believe they represent a sub-set of CD that is unique from those with stenosing, fistulizing or ulcerating disease.

Methods: All patients undergoing CE studies were reviewed with a prospectively collected database on patient demographics, indication for CE, previous investigations, transfusions, and management before and after CE. Patients were all followed long term after their CE studies.

Results: 10 patients were identified from the database (of 410 CE) with small bowel ulcerations. Of the 10 patients (mean age 52, 60% men), 7 patients were referred because of suspected occult bleeding and 3 patients because of overt bleeding. The duration of symptoms was 12-24 weeks in one patient, greater than 24 weeks in 7 patients and not documented in 2 patients. None of the patients took NSAIDs, was on any anti-platelet agents, or had a history of inflammatory bowel disease, celiac disease or other vascular abnormalities. There were no associated masses. The ulcerations were distributed throughout the small bowel and were consistent with CD. No patient had other significant comorbid disorders to suggest vasculitis, ischemia, lymphoma or other small intestine abnormality. Additionally, 3 patients were from Southeast Asia (where CD is uncommon) and all patients lacked extra-intestinal manifestations of IBD. Over a follow up mean of 16 months, no patient has progressed with obstructive, fistulizing or other GI symptoms. All patients have remained with intermittent bleeding without progression of disease. No patients have undergone surgery.
NSAID-INDUCED SMALL BOWEL DAMAGE MAY BE INDISTINGUISHABLE FROM THAT OF CROHN’S DISEASE BY WIRELESS CAPSULE ENTEROSCOPY

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Background: Introduction of wireless Capsule Enteroscopy (CE) added a new dimension into the investigation of small bowel disease. It is emerging as a first line investigation for the detection of small bowel Crohn’s disease. It also appears to be the investigation of choice for the diagnosis of NSAID-enteropathy, which affects over 50% of patients receiving these drugs long-term. Furthermore NSAID-enteropathy is associated with serious outcomes (bleeding, perforation and obstruction) as frequently as NSAID-gastropathy. Indeed it has been suggested that certain NSAID-induced small bowel damage may be indistinguishable from that of Crohn’s disease. Aim: To assess if it is possible to differentiate between Crohn’s disease and NSAID-enteropathy by CE. Methods: The pathology recorded by CE from 18 patients with established small bowel Crohn’s disease and 13 with NSAID-enteropathy were localised and quantitated by an established damage score (incorporating reddened (inflamed) folds, denuded areas, petechiae and mucosal breaks (erosions and ulcers). Four experienced clinicians who had no knowledge of the clinical or demographic details of the patients read the images independently. Each made a diagnosis of Crohn’s disease or NSAID-enteropathy (‘definite’ or ‘likely’), based on their overall impression of the images. Results: There was a high rate of concurrence (over 95%) between the investigators regarding the localisation and type of damage. The number of denuded areas and petechia did not differ significantly between the diseases (p < 0.1). The median number of mucosal breaks (median 10 (range 1 - 26) for Crohn’s disease and 2 (range 1-18) for NSAIDs) differed significantly (p < 0.05) between Crohn’s disease and NSAID treated patients. However 3 (23%) patients with NSAID-enteropathy were incorrectly labelled as ‘definite Crohn’s disease’ (3 of the 14 diagnosed as ‘definite Crohn’s disease’) and 3 (17%) patients with Crohn’s disease were incorrectly labelled as either ‘definite’ (1 of 9 diagnosed as ‘definite’) or ‘likely’ (2 of 4) NSAID-enteropathy. Conclusions: CE images of the small bowel show that NSAID-enteropathy has a similar range of pathology as seen in patients with Crohn’s disease which further corroborates the importance of the small bowel in the overall gastrointestinal damage of NSAIDs. In the absence of a clinical history experienced CE image readers arrive at an incorrect diagnosis in 20% of cases.
Typical NSAID ulcer

Typical Crohn's ulcer
The 5th International Conference on Capsule Endoscopy
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A DOUBLE BLIND PLACEBO CONTROLLED STUDY OF TEGASEROD TO INCREASE GASTRIC AND SMALL BOWEL TRANSIT TIMES WITH WIRELESS CAPSULE ENDOSCOPY (WCE): PRELIMINARY DATA

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Background and Aims: A decrease in gastric and small bowel transit time in WCE could increase completion rates and decrease physician reading time. Many agents such as erythromycin, reglan and golytely have been studied with mixed results. Two recently published retrospective case series suggest Tegaserod, a 5-HT4 partial agonist, may decrease both gastric and small bowel WCE transit, however, no prospective trials have been performed. We present preliminary data from the first double blind placebo controlled crossover study on the effect of tegaserod on gastric and small bowel transit times during WCE. Methods: Between August 2004 and November 2005 twenty-four WCE studies were performed in fourteen patients referred to our institutions for occult gastrointestinal blood loss. Patients were excluded from enrollment if they had a history of bowel resection, bowel motility disorder or were taking any medications which could affect gastrointestinal transit. All patients had a negative small bowel series within one year of entry. Each patient underwent two studies with a one-week washout period in between. The night before WCE all patients drank a half-gallon of golytely preparation. The patients were randomized to take one 6 mg tablet of tegaserod or placebo 1 hour before the first WCE. Patients were crossed over into the other arm for the second WCE. Gastric and small bowel transit times were compared using an Unpaired t-Test with Welch Correction. The number of lesions identified during each WCE study was also compared. Results: The average age of the patients enrolled was 61 (8 females and 4 males). In all WCE studies colonic visualization was obtained. The mean gastric transit time was 41m with placebo and 33m with tegaserod pretreatment (p=.73). The mean WCE small bowel transit time was 234 m with placebo and 139 m with tegaserod pretreatment (p=.0001). There were 10 lesions visualized in the placebo group and 14 lesions seen in the tegaserod group (p=ns). In two patients active bleeding was visualized on WCE. In one of these cases the bleeding was seen in both the placebo and tegaserod pretreatment WCE while in the other the bleeding was only seen in the tegaserod WCE. Conclusions: In our preliminary data, tegaserod did not have an effect on WCE gastric transit but significantly decreased WCE small bowel transit without decreasing yield. Our study shows promise for tegaserod as pre-treatment for WCE. Further, our data suggests a mechanism of action which may explain tegaserod’s role in the treatment of chronic constipation and constipation predominant IBS.
DELAYED GASTRIC PASSAGE OF WIRELESS CAPSULE ENDOSCOPY IN A PATIENT WITH NORMAL GASTRIC EMPTYING TIME

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Wireless capsule endoscopy has become a valuable diagnostic tool of the small bowel disease and has been increasingly used in pediatric patients. It is a safe procedure with rare complications—the main one has been the retention of video capsule in patients with unsuspected obstructive small bowel disease. We report one case of delayed gastric passage of wireless capsule in the presence of normal gastric emptying time. Patient is a previously healthy 13-year old girl with one-year history of anemia (hemoglobin 10.9 g/dl), fatigue, headache and intermittent generalized abdominal pain. She was initially seen by a pediatric hematologist and was started on daily iron therapy with normalization of hemoglobin and improvement of her clinical symptoms. Her ESR remained elevated (33-37 mm/hr). Her IBD marker showed positive OmpC IgA, negative ASCA and pANCA. Her EGD and colonoscopy were performed and the biopsy results were normal. Her upper GI with small bowel series (UGI/SBS) showed normal anatomy with normal transit time. She underwent wireless capsule endoscopy and the capsule remained in the stomach for the life of the battery. The patient did not detect the capsule in stool for the next several days. Abdominal x-ray was taken on the 7th day with no presence of a radiopaque foreign object. Subsequently she had a gastric emptying scan and it showed normal gastric emptying time for solids (98% emptying at 4 hours). This case suggests a poor correlation between gastric emptying time measured by nuclear medicine study and actual passage of wireless capsule. The etiology of delayed gastric passage in this case remains unclear.
Retained Capsule
VIDEO CAPSULE ENDOSCOPY IN INTESTINAL NEUROENDOCRINE TUMORS

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Neuroendocrine Tumors (NET) often originate in the small bowel but patients are diagnosed by the presence of liver metastasis. The primary tumor is difficult to locate. Few data are reported on synchronous neoplasms in patients with neuroendocrine tumors of small intestine. Aim of the study was to evaluate the diagnostic value of videocapsule endoscopy (VCE) in finding the primary or synchronous neuroendocrine tumor in the small intestine in patients with resected primary neuroendocrine tumors or with liver or lung metastasis by NET. Patients and Methods: 18 consecutive patients (M 6, F12; 50 +/-8) with histologically proven NET were enrolled in the study. 13 pts had primary intestinal NET resected, 4 had liver metastasis and 1 lung metastasis. All patients underwent abdominal CT scan, Octreoscan and VCE of small bowel. Results: In one patients with resected NET VCE was not evaluable. In 2/4 patients with liver metastasis VCE revealed an unknown small intestinal tumor. In one patients with two resected NET of small bowel VCE showed one more small intestinal tumor. In remaining patients VCE was negative. Conclusion: According our data VCE is useful in patients with metastatic NET and unknown primary or in patients with multiple intestinal NET.
CAPSULE ENDOSCOPY FINDINGS IN 20 CONSECUTIVE PATIENTS WITH PEUTZ-JEGHERS SYNDROME

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Background: Peutz-Jeghers syndrome (PJS) is an inherited gastrointestinal polyposis disorder involving small bowel (SB) in 90% of cases. When polyps size exceed 10 mm acute complications such as recurrent intussusception may occur. Other complications of SB polyps include GI bleeding and malignant transformation which is the main cause of digestive cancer in this syndrome. Nevertheless guidelines for SB management remains to be defined. The aim of this retrospective study was to evaluate the feasibility of capsule endoscopy (CE) and to assess its utility during the follow up of these patients. Method: Twenty consecutive patients with a mean age of 27 years (14-51) with PJS were examined using M2A video capsule endoscopy (Given Imaging Israel). CE was the first small bowel exploration in 5 cases. 15/20 patients had previous abdominal surgery (colectomy [3], small bowel resection(s) [7], enterotomia [3], intraoperative enteroscopy [3]). All patients were fasting for 10 hours and bowel purge was performed in 17/20 cases. Results: The imaging quality was correct in all cases and CE was well tolerated in all patients. SB involvement was observed in 19/20 with a number of polyps ranged from 5 to >100 per patient and 16/19 patients had more than10 polyps. Lesions were diffused within the SB (n=13) or localized only in the jejunum (n=6). Different macroscopic aspects were observed from sessile micropolyp to large pedunculated polyp. Largest polyps (>1cm) were mainly found in the jejunum. In 13/19 cases large polyps were secondarily removed by enteroscopy. In one case, CE failed to diagnose a malignant plan polyp of the proximal duodenum. Conclusion: Our results show that CE is safe and well tolerated in PJS. CE is useful for SB examination to diagnose and localize large polyps which could be secondarily removed by double balloon enteroscopy. CE could improve management of PJS patients.
CLINICAL EVALUATION OF CAPSULE ENDOSCOPY IN DIAGNOSING SMALL BOWEL TUMORS

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Background: Diagnosis of small bowel (SB) tumors is frequently delayed due to inherent difficulties to visualize the small intestine with current standard imaging methods. Wireless capsule endoscopy (CE) may provide early and accurate diagnosis of tumors in the SB. Aim: To determine the clinical value of CE in diagnosing SB tumors. Methods: 667 patients underwent CE between November 2001 and October 2005. Indications for CE were obscure gastrointestinal (GI) bleeding (207), suspected Crohn’s disease (370) and others (90). Standard CE was performed without bowel preparation and overnight fasting. Results: 20 patients (13 men, 7 women, median age 63, range 38-84 year) were diagnosed with a SB tumor of which 16 were later verified (14 at surgery and 2 after biopsy) and 2 patients are waiting for definitive tumor diagnosis. One cases turned out to be a Meckel’s diverticulum and another one was diagnosed to be amyloidosis. The tumor incidence was 2.7% (19/667) in all patients undergoing CE. Notably, the incidence of SB tumor in patients examined by CE on the basis of obscure GI bleeding was 7.7% (16/207). No tumors were detected in patients with suspected Crohn’s disease and tumors were found in 2/90 patients (2.2%) undergoing CE for other reasons. Tumors were located in the jejunum in 10 patients and in the ileum in 6 patients and in 2 cases were tumors located in both the jejunum and ileum. Histology revealed 4 carcinoids, 2 GI stromal tumors, 2 hemangioma, 2 hamartoma, 2 adenocarcinoma, 1 metastatic melanoma, 1 sarcoma, 1 leiomyoma, 1 adenoma and 2 remains unclear. Symptom duration prior to CE was 14 months on average (range 1-60 months) and the average number of non-diagnostic investigations prior to CE was 5.6 per patient. One additional case of carcinoma in the colon was found with CE, which had been missed on a previous colonoscopy. During a follow-up period of 20 months (1-46 months) no new tumors were detected in all studied patients. Conclusions: Tumor incidence in the SB is higher than previously thought, and that CE is a sensitive method to diagnose SB tumors. Our clinical study demonstrate that SB tumors are detected in 7.7% of patients with obscure GI bleeding, underlining the importance to consider the possibility of SB tumors and include CE in the work-up of these patients.
Small bowel tumors detected by capsule endoscopy

Figure 1: GIST

Figure 2: GIST

Small bowel tumors detected by capsule endoscopy

Figure 3: Leiomyoma

Figure 4: Melanoma

Small bowel tumors detected by capsule endoscopy

Figure 4: Carcinoid

Figure 6: Hamartoma
APPLICATION OF WIRELESS CAPSULE ENDOSCOPE IN CRONKHITE-CANADA SYNDROME AND REVIEW OF THE CHINESE LITERATURE

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Late studies have suggested that wireless capsule endoscopy (WCE) is most valuable in its ability to diagnose intestinal disease. Cronkhite-Canada syndrome (CCS) is a rare, non-inherited disorder of gastrointestinal polyposis with ectodermal changes and complications of malnutrition, which characteristic small intestinal polypi have hardly been observed directly in vivo conformed only by radiologic studies previously. Therefore an illustrative case of CCS performed WCE was presented. In recent 20 years 31 cases had been reported in China so a review was given herein. Case report: A 72-year-old Chinese man, the Han nationality, with complaints of fatigue, anorexia, edema and albuminuria evolving more than 3 months was admitted to our hospital in July 2004 revealing hypogeusia, cutaneous hyperpigmentation and onychodystrophy as well as important oedema of lower limbs. NO contributive family history but non-insulin-dependent diabetes and cerebral infarction. Hb85g/L, OB(+), Albumin17g/L while urine protein fluctuated only 0.5-0.8g/day. Serum Ca, Zn, Cu decreased seriously. Tropheyma Whippeli and plate culture of feces, thyroxine, ANA, CEA and so on were negative. Endoscopy and radiologic investigations discovered innumerable reddish, sessile and edematous polyps from stomach to rectum, which revealed hyperplastic polyps of the antrum and adenomatous proliferous polyps of the colon histopathologically while oesophagus was normal. Protein-losing enteropathy was confirmed by 99mTc-HSA scan. Thickening of gastric wall was indicated by ultrasonic and CT. After evaluating risk radiologically although anecdotal and carefully choosing purgative (Folax & senna leaf-herbal) WCE was transferred endoscopically for avoiding retardance while the patient kept on his right side for 2 hours subsequently. WCE showed a striking pattern. Some general similarities between China and the other countries were found. Discussion: GIVEN’s WCE permitted the detection of CCS in detail peerlessly. Although double-balloon enteroscopy with biopsy had been used by our colleague, the bad toleration of gerontism may limit its utility given safe and efficient. After all WCE is facility. Maybe there is mucosal polymorphism because Coumarous’ finding was different to ours. Further investigation is necessary especially after Samaha mentioned an original idea that JPS and/or PJS could be a form of CCS or vice versa. There may be racial or regional differences in CCS susceptibility but nation or folk detail information was concerned in neither Chinese nor other English language lecture. Slight albuminuria cannot explain the serious hypoprotein. Conclusion: WCE can be a potential tool in diagnosis and a preferred test in follow-up of CCS and adequate studies are necessary to determine its true role and accumulate experience, which therefore expand WCE indications and advance CCS research. Hope more staff can get elicitation and establish sharing international database which could help us remedy the limitation of case singularity and find some valuable clue.
METACHRONOUS SMALL BOWEL ADENOCARCINOMAS DETECTED BY CAPSULE ENDOSCOPY IN A PATIENT WITH HEREDITARY NON-POLYPOSIS COLORECTAL CANCER

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Capsule Endoscopy (CE) has become the standard of care for the diagnosis of obscure GI bleeding. Small bowel tumors are a rare finding in such patients, but these are of great clinical significance. Patients with Hereditary Non-Polyposis Colorectal Cancer (HNPCC) are at increased risk for small bowel tumors. We present a case of metachronous small bowel tumors diagnosed by CE in a patient with HNPCC. The patient is a 63 year-old male with know HNPCC first diagnosed at age 36. He underwent right hemicolectomy with adjuvant 5-FU chemotherapy for positive lymph nodes. At age 49 he developed synchronous cancers of the rectosigmoid area and underwent colectomy/ileoprostomy with adjuvant 5-FU and levamisole chemotherapy for positive lymph nodes. At age 61 he experienced obscure GI bleeding for about 1 year prompting CE which revealed a friable proximal jejunal mass with asymptomatic capsule retention. The capsule was removed at push enteroscopy, and biopsy of the mass revealed adenocarcinoma. CT and PET scans showed an additional pelvic mass. Resection of a large (10cm) circumferential tumor 20 cm distal to the ligament of Treitz was performed (February 2004). The pelvic mass was palpated at surgery but not resected. Pathology revealed adenocarcinoma penetrating into the mesenteric fat. Surgical margins were negative without angiolympathic spread or lymph node involvement. Initial chemo-radiation therapy (Xeloda) did not provide significant downsizing of the pelvic mass. Subsequent Folfox chemotherapy (complicated by severe neuropathy) did result in significant tumor regression. Surveillance proctoileoscopy was again normal. Recurrent anemia with guiac positive stool prompted repeat CE which showed focal duodenal ulceration worrisome for recurrence. Subsequent push enteroscopy revealed a 2 cm firm and ulcerated periampullary mass. Biopsy revealed mucinous adenocarcinoma, signet ring cell type. Pancreatoduodenectomy was performed (July 2005) with no metastatic disease seen. The pelvic mass seen on imaging and prior exploration was not appreciated. His most recent PET scan (October 2005) revealed no recurrent disease. HNPCC patients have an increased (1-4%) lifetime risk of small bowel carcinoma. CE has been useful in detecting such lesion. This is the first case of metachronous small bowel adenocarcinoma detected by CE in a patient with HNPCC. The use of surveillance CE in patients with HNPCC needs to be addressed.
"SENTINEL-PILL" SIGN: A RARE CASE OF COLONIC CAPSULE RETENTION UNMASKING AN OCCULT BLEEDING CECAL NEOPLASM

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With the explosive and widespread world-wide use of wireless capsule endoscopy as a diagnostic tool in a multitude of small bowel disorders, complications such as perforations (1) and retentions (2) are bound to occur with increasing frequency requiring surgical interventions. Capsule retention in the small bowel has been widely reported (3) and documented with a rate of 0.75% (Range 0-5%), usually requiring surgical removal. Once the capsule traverses the ileo-cecal valve in the VCR study, the consensus guidelines do not advocate for any further studies to confirm capsule elimination from the colon, with the assumption that colonic retentions do not occur or are clinically irrelevant even if they do rarely occur. We report the first unique case of a true colonic capsule retention in the literature, which fortuitously enabled the localization and therapeutic surgical resection of a previously undiagnosed occult bleeding cecal neoplasm. We reviewed the literature and discuss the potential clinical implications of such rare colonic capsule retentions. A 79-year-old African-American lady was referred for Small bowel capsule endoscopic work up of recurrent obscure gastrointestinal bleeding warranting periodic transfusions. She had negative upper endoscopy twice in the past and an incomplete “negative” colonoscopy up to the right transverse colon due to severe bowel adhesions from prior abdominal surgeries including a hysterectomy. A CT scan of the abdomen obtained twice on two different admissions over the past 1 year and a barium enema following the most recent incomplete colonoscopy were reported as unremarkable by different radiologists. The small bowel VCR study showed 2-3 non-bleeding proximal jejunal AVM’s (which were subsequently ablated at enteroscopy) and non visualization of the ileocecal valve at the end of an 8 hour study presumably due to a delayed transit. A follow-up obstructive series was recommended to the patient along with a small bowel series. She presented a month later after the VCR study to the hospital with anemia, abdominal distension and pain, and a repeat CT scan of the abdomen showed retained capsule in the right lower quadrant (Figure 1) with distended small and large bowel loops indicative of obstruction. She underwent laparotomy and lysis of bowel adhesions which was the cause of obstruction and resection of the ileo-cecal segment where the capsule was retained (Figure 2 showing intra-operative spot film of the resected segment). Gross dissection of the resected pathology specimen (Figure 3) showed the retained and impacted small bowel capsule in relation to a cavitating cecal tumor. Histopathology confirmed the presence of an invasive mucinous adenocarcinoma of the cecum, at the site of capsule impaction, with margins of the resected specimen free of tumor, and a lymph node positive status. The patient had an uneventful post-operative course and was subsequently discharged for out-patient follow-up and close monitoring in conjunction with an oncologist.

This unusual case illustrates the fact that colonic capsule retention can rarely occur and can serve as a useful “Sentinel-Pill” sign uncovering significant and serious occult colonic pathology in the vicinity of the retention. In our case it enabled the surgeon, albeit fortuitously, to home in on the occult colonic pathology and provide the patient with a definitive therapeutic approach by selectively resecting the segment of the bowel with the retained capsule. Also as more cases of colonic retentions are reported in the future, new consensus guidelines regarding the need for documenting the capsule expulsion from the colon also may need to be proposed.
Image 1: Computed (axial view) tomogram showing the retained capsule in the right lower quadrant and dilated small bowel loops.

Image 2: Intra-operative spot film of the resected ileo-cecal segment with the retained capsule endoscope.

Image 3: The resected segment of the cecum showing the retained capsule at the tumor site.
WIRELESS CAPSULE ENDOSCOPY IN PEUTZ JEGHERS SYNDROME

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Introduction: Peutz-Jeghers syndrome (PJS) is a rare hamartomatous polyposis syndrome associated with mucocutaneous pigmentation. Polyps are found in the small bowel (SB), colon, stomach and rectum respectively. Direct complications of the polyps can include intussusception, obstruction, infarction, ulceration, extrusion, malignant transformation, as well as complications from polypectomies and surgeries. Morbidity also occurs as a consequence of the high risk for both gastrointestinal (GI) and non-GI cancers. We present a case which highlights the role of wireless capsule endoscopy (WCE) in the investigation of SB pathology in PJS.

Case: A 32 year old Caucasian female with known PJS presented with intermittent abdominal discomfort and iron deficiency anemia. Medical history included diagnosis of PJS at age 14, prior intussusception, as well as multiple endoscopic and surgical resections of polyps. For the past 3 years the patient had no surveillance of the GI tract. Physical examination was significant for mild left lower quadrant tenderness, and classic pigmentation on lips, buccal mucosa and feet. On EGD a 5mm gastric hamartoma and a 1cm hamartoma in the 2nd portion of the duodenum were removed. Colonoscopy was normal. WCE revealed 19 polyps throughout the SB, ranging in size and shape. The largest polyp had an area of superficial ulceration with bleeding, and nearly obstructed the uninsufflated lumen. The capsule passed uneventfully to the cecum. During intraoperative endoscopy, intussusception was seen at the lead point of the largest polyp. 17 polyps were removed by endoscopic snare polypectomy and 4 polyps were removed by surgical enterotomy.

Conclusion: WCE is a valuable tool for evaluating SB disorders, including PJS. As the SB is most commonly affected in PJS, WCE can be used to screen & survey the SB for polyp size, growth, and associated complications including bleeding. As a cancer-susceptibility syndrome, PJS patients are also at increased risk for spontaneous SB adenocarcinoma and bi-annual SB evaluation is recommended. In our patient the intussusception was not seen on WCE, which is likely due to the intermittent nature of the problem. More polyps were seen on intraoperative endoscopy than by WCE, which highlights the difficulty of WCE for precise counting of polyps in polyposis syndromes. Finally, the pre-capsule differential diagnosis included partial obstruction from a large polyp or intussusception, and though not realized, there was pre-test concern for possible capsule retention. Availability of the Patency System may help alleviate this concern in the future.
ELUSIVE HAMARTOMATOUS POLYO CAUSING INTUSSUSCEPTION FOUND ON CAPSULE ENDOSCOPY

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Berkshire Medical Center, USA

A 36-year-old female with a history of irritable bowel syndrome developed recurrent, debilitating RLQ pain over the past two years. This pain was thought to be due to a right inguinal hernia, which was repaired, but did not resolve her symptoms. In October 2005 the intensity of her pain increased and was now associated with nausea, vomiting and fevers up to 102. An upper endoscopy and colonoscopy were performed, demonstrating only diffuse gastritis. Inflammatory bowel disease and H. pylori serologies showed borderline IBD markers and a negative H. pylori. An upper GI small bowel follow-through was performed and was unremarkable. The presumed diagnosis was probable IBS, but because of the borderline IBD markers a small bowel capsule endoscopy was performed to rule out Crohn’s disease. The capsule endoscopy showed no signs of IBD, but instead identified a pedunculated polyp with an erythematous head and a large, thick stalk in the proximal mid ileum. This was believed to be a lead point of intussusception and the patient underwent a laparoscopic small bowel resection, revealing a 1-cm hamartomatous polyp. The patient noticed an immediate difference after the surgery, and at 2 months status post laparoscopic resection, the patient is asymptomatic, and her chronic intermittent RLQ abdominal pain has completely resolved. The prevalence of sporadic hamartomatous polyps in the small bowel has yet to be determined, but a retrospective study showed an incidence of only 0.15% in the colon. Intussusception is most often due to a structural defect in the intestines that acts as a lead point, exemplified by the case above. Intussusception in adults accounts for only 5-16% of all reported cases, and is often only identified in patients with a Peutz-Jeghers syndrome because this syndrome has been reported to do so. The hamartomatous polyp in our patient was only found because she had borderline IBD markers, begging to question how many other patients diagnosed with IBS are actually suffering from relapsing intussusception. Although the incidence of intussusceptions is rare in the adult population, it still must be considered as a differential diagnosis for patients who present with colicky abdominal pain. A capsule endoscopy is clearly not warranted in every case, but should be strongly considered when other modalities have failed to find a source of unexplained pain.
CAPSULE ENDOSCOPY IN PATIENTS WITH MALIGNANT MELANOMA

Warwick Selby

Royal Prince Alfred Hospital, AUSTRALIA

Melanoma is one of the most common malignancies to metastasize to the GI tract. Over 50% of patients have small bowel secondaries at autopsy. Their frequency during life is estimated at 6-7% but the true rate has been difficult to determine because they present late and conventional investigations are poor at their detection. Capsule endoscopy (CE) should allow earlier and more accurate identification of melanoma metastatic to the small intestine. Subjects: 10 patients with known or previous melanoma were referred for capsule endoscopy (8M:2F; mean age 58.1 years). The indications was overt bleeding in 2, both with known proximal small bowel metastases, anemia in 5, abnormal investigation in 2 and abdominal pain in 1 (Table). Findings: In the two patients with recognized proximal small bowel secondaries CE demonstrated additional lesions distally, in the jejunum and ileum. In one patient it confirmed metastases suspected on CT scan. However, it also showed new small bowel secondaries in another patient with anemia. SBFT was normal in all three of these patients in whom it was performed. CT showed small bowel involvement in only one of three. All four patients in whom small bowel melanoma was found underwent surgical resection. In 6 patients CE ruled out small bowel involvement, including one with secondaries suspected on CT and another with uptake in the left side of the abdomen on PET scan. Conclusions: CE can detect the presence and extent of small bowel metastases in patients with melanoma more reliably than conventional investigations, in particular SBFT and CT scan. It should be included as part of the workup for patients with bleeding or anemia, particularly prior to surgery. A formal comparison with the newer investigation of PET scanning is currently being undertaken.
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