Hydrosonography in the evaluation of colorectal polyps

Ung-Paw Ling, Jia-Yuh Chen, Chi-Jou Hwang, Chin-Kun Lin, Mei-Hwei Chang

Abstract

Prewarmed saline enemas and transabdominal ultrasound (hydrosonography) were used to evaluate 17 consecutive children with rectal bleeding before colonoscopy. Twelve patients with polyps were identified (10 by ultrasound, 10 by endoscopy): these included multiple hyperplastic polyps (1), multiple polyps (1), solitary polyps (9), and pseudopolyps (1). Ultrasound identified 11 polyps in 10 patients, missing two patients with small polyps less than 0.5 cm in diameter. The polyps were hyperechoic ovoid masses fixed to the colonic wall, with a stalk (7), submucosal infolding (5), and intraluminal floating (5). There was one false positive. Colonoscopy was refused by one patient and failed to reach beyond the distal sigmoid in another following previous surgery for malrotation. Colonoscopy was superior in identifying finer mucosal detail (colitis, ulcers, proctitis, anal fissure) and in detecting smaller polyps (sessile polyps, hyperplastic polyps). Hydrosonography of the colon is a simple, relatively non-invasive procedure that provides an alternative, radiation-free examination of the whole colon before colonoscopy. It is complementary to colonoscopy in the management of rectal bleeding in children.

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Keywords: hydrosonography, juvenile colorectal polyps.

Hydrosonography is a simple, non-invasive alternative to colonoscopy for evaluating colorectal polyps in children. It is particularly useful for those who cannot undergo colonoscopy due to anatomical or medical reasons. The technique involves the use of ultrasound to detect and characterize polyps, which are often hyperechoic and fixed to the colonic wall. Hydrosonography can detect both sessile and pedunculated polyps, and may be particularly helpful in identifying smaller lesions that are not visible on colonoscopy. This non-invasive method can provide valuable information for managing colorectal polyps in children, especially when colonoscopy is not feasible due to patient discomfort or technical limitations.
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Echogenic mass that is relatively fixed to the colonic wall. Small lesions, especially those less than 0.7 cm, could be mistaken for colonic haustra. Circumferential orientation of the haustra on transverse scan and elongation or convergence of two or more opposing folds on longitudinal scan usually differentiated them. Identification of a stalk or infolding of the submu cosa into the pedicle assisted in this aspect of investigation (fig 1).

Small polyps need to be differentiated from adherent faecal masses, which are otherwise seen as free floating, hyperechoic intraluminal masses with irregular shape and outline. This includes movement observed during postural changes, percutaneous compression, further saline infusion on subsequent scanning, and presence of air microbubbles. Colonoscopy was performed within a week of hydrosonography. When a polyp was identified, polypectomy and histological examination were performed.

Results

The normal colon appears as an echo-free tubular lumen 1.5 to 5 cm in diameter, with frequent echogenic sawtooth structures projecting into the lumen (colonic haustra). In the rectum, two to four rectal valves of Houston could be identified. Typically, these could be traced on their circumferential span on the rectal wall.

Whenever pockets of gas or accumulated faecal material prevented adequate visualisation of a particular loop of bowel, postural changes and/or further saline infusion usually permitted satisfactory sonographic examination. Particulate faecal residues, accumulating in the right colon, were observed in 13 of 17 patients (76%). None the less, the colonic wall could be readily outlined. Further infusion of saline to decrease the concentration of faecal residues always improved the clarity of colonic wall identification. After initially learning how to differentiate colonic haustra, adherent faecal masses, the ileocecal valve and the rectal valves of Houston from polyps, a satisfactory evaluation of the whole colon could be completed within 30 minutes.

Seventeen children underwent hydrosonographic investigation for rectal bleeding (table). It was well tolerated and there were no side effects. Two of them received single contrast barium enemas (patient 1 and 2). Barium enema failed to demonstrate a large splenic flexure polyp, measuring 2.5 cm in diameter, in patient 1 while patient 2 had an indeterminate rectal filling defect. Patient 3 had undergone barium enema and colonoscopic polypectomy six months previously and suffered recurrent bleeding for one month. Pre-endoscopic hydrosonography determined with certainty the presence of colorectal polyps.

Colonoscopy and hydrosonography were complementary in several patients. Patient

Clinical data of 17 patients evaluated with colon hydrosonography including 11 patients with juvenile polyps and one with pseudopolyps

<table>
<thead>
<tr>
<th>Patient No</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Duration of bleeding</th>
<th>Hydrosonography</th>
<th>Colonoscopy</th>
<th>Pathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>2-3</td>
<td>1 y*</td>
<td>2-2.5 cm polyp in descending colon. Echo follow up</td>
<td>Large polyp in descending colon</td>
<td>JP</td>
</tr>
<tr>
<td>2</td>
<td>P</td>
<td>4-0</td>
<td>1 y*</td>
<td>1-1.2 cm polyp on posterior wall of rectum</td>
<td>Rectal polyp</td>
<td>JP</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>5.5</td>
<td>1 m</td>
<td>1-1.3 cm polyp on posterior wall of rectum</td>
<td>Rectal polyp</td>
<td>JP</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>7-0</td>
<td>2 y</td>
<td>0-8 cm polyp on anterior wall of distal rectum</td>
<td>Rectal polyp</td>
<td>JP</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>3-0</td>
<td>6 m</td>
<td>1-3 cm polyp on anterior wall of proximal rectum</td>
<td>Refused colonoscopy. Echo follow up</td>
<td>NA</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>4-0</td>
<td>2 m</td>
<td>2 polyps: 1-0.5 cm in the rectum and 0.6-0.4 cm in the sigmoid</td>
<td>3 polyps: rectum, sigmoid, hepatic flexure (0.3×0.4 cm)</td>
<td>JP</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>5-0</td>
<td>1 m</td>
<td>0-9 cm polyp on anterior wall of distal rectum</td>
<td>Rectal polyp</td>
<td>JP</td>
</tr>
<tr>
<td>8</td>
<td>P</td>
<td>4-0</td>
<td>1 y</td>
<td>2-1.8 cm polyp in descending colon</td>
<td>Failed</td>
<td>NA</td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>7-0</td>
<td>1 w</td>
<td>1-6 cm polyp on posterior wall of distal rectum</td>
<td>Rectal polyp</td>
<td>JP</td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>6-0</td>
<td>3 m</td>
<td>No finding</td>
<td>Flat sessile polyp less than 0.5 cm</td>
<td>JP</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>0-7</td>
<td>1 m</td>
<td>No finding</td>
<td>Multiple hyperplastic polyps in ascending colon</td>
<td>NA</td>
</tr>
<tr>
<td>12</td>
<td>M</td>
<td>5-5</td>
<td>2 w</td>
<td>No finding</td>
<td>Multiple small ulcers from caecum to descending colon</td>
<td>NSI</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>5-0</td>
<td>1 w</td>
<td>No finding</td>
<td>Pseudopolyps</td>
<td>NSI</td>
</tr>
<tr>
<td>14</td>
<td>F</td>
<td>10-0</td>
<td>1 m</td>
<td>No finding</td>
<td>Antritis</td>
<td>NSI</td>
</tr>
<tr>
<td>15</td>
<td>M</td>
<td>5-5</td>
<td>5 y</td>
<td>Enlarged rectum</td>
<td>No finding</td>
<td>NA</td>
</tr>
<tr>
<td>16</td>
<td>M</td>
<td>2-0</td>
<td>1-3 m</td>
<td>2-5 cm polyp on anterior wall of descending colon</td>
<td>Pseudomembranous colitis, colonic ulcers, rectal pseudopolyps</td>
<td>NA</td>
</tr>
<tr>
<td>17</td>
<td>M</td>
<td>5-0</td>
<td>2 w</td>
<td>0-8 cm polyp with hazy margins in mid-rectum</td>
<td></td>
<td>NSI</td>
</tr>
</tbody>
</table>

*Barium enema showed no polyps in patient 1 and a rectal filling defect in patient 2.
†Recurrent bleeding with previous barium enema and colonoscopic polypectomy in patient 3.
‡Colonoscopy failed in patient 8 with previous operation for malignancy.
JP=juvenile polyps; NA=not available; NSI=non-specific inflammation; y=years; m=months; w=weeks.
Conventional transabdominal ultrasound cannot detect colonic polyps, due to intraluminal gas and absence of wall infiltration. The exception is when there is incidental bowel loop distension by intraluminal faecal fluid. Water enema was first proposed to overcome intraluminal gas during pelvic sonography. In recent years, hydrosonography has been applied to the diagnosis of inflammatory bowel disease, colonic tumours, and colorectal polyps. This study confirms the usefulness of hydrosonography in evaluating colonic polyps in children. It is a simple procedure performed in outpatients or as a day case. Radiation-free evaluation of the whole colon is possible before resorting to more invasive procedure such as sigmoidoscopy or colonoscopy. It provides definite precolonoscopic detection and localisation of polyps in a manner similar to colonoscopy (a sensitivity of 97% for polyps over 0.7 cm in diameter). There is also minimal discomfort and we found no side effects. Understandably, there is greater acceptance by parents and patients.

While superior in delineating fine mucosal details and detecting smaller polyps, colonoscopy cannot be used as the 'gold standard' for polyp detection. It has been reported to miss 9–12% of colonic polyps. Polyps larger than 2 cm in diameter have been missed by colonoscopy in children. This could be due to a large fold obscuring the lesion, bleeding, polyps submerged in a faecal fluid lake, redundant sigmoid or transverse colon, inadequate colon preparation, or the area could not be reached for technical reasons. In addition, the right side of the colon and caecum cannot be seen at colonoscopy in 10 to 30% of patients. The advantage of precolonoscopic detection and localisation is therefore considerable, permitting colonoscopy to be the most accurate means of examination for colorectal polyps. Hydrosonography could play an important part in this respect. Double and single contrast radiology miss less than 10% of polyps over 1 cm in diameter, but up to 29% and 30–45% of smaller polyps, respectively, in adults and children. This could account for the reduced radiological detection of polyps in the proximal colon. In addition, it is difficult to obtain stringent adherence to a colon preparation regimen for barium enema in children.

Recent reports in children indicate that colonoscopy is superior to single contrast barium enema in detecting colonic polyps. However, for colorectal polyps, the most common cause of painless, intermittent rectal bleeding in childhood, barium enema and colonoscopy are usually performed.

Discussion
Rectal bleeding is a common symptom in children, which may be alarming. Causes include abrasion, trauma, anal fissure, constipation, infectious colitis, allergic enterocolitis, or potentially life threatening events such as intussusception, Meckel's diverticulum, volvulus, or blood dyscrasias. Clinical history, physical examination, and laboratory investigation usually differentiate these. Imaging procedures may include sonography, barium enema, sigmoidoscopy or colonoscopy, technetium-99m pertechnetate scan, and angiography. However, for colorectal polyps, the most common cause of painless, intermittent rectal bleeding in childhood, barium enema and colonoscopy are usually performed.
enema (14–27%, 8.5–9%, respectively).5 7 11 39 Whether hydrosonography is superior to barium enema in precolonoscopic evaluation of colorectal polyps in children deserves further study. Interestingly, Walter et al recently reported the diagnosis of a large juvenile polyp by hydrosonography in a 4 year old boy who had a non-diagnostic barium enema and colonoscopy before a second colonoscopy.32

Hydrosonographic colonic imaging is a simple, radiation-free procedure that could play a major part in the evaluation and follow up of children with rectal bleeding.

4 Turrell R, Maynard ADL. Adenomas of the rectum and colon in juvenile patients. JAMA 1956; 161: 57-60.
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