Diagnostic yield in barium enema examination

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ABSTRACT

Objectives: Barium enema studies performed over a 5 year period at Asir Central Hospital were retrospectively studied for pathological diagnostic yield.

Methods: The clinical data of the cases were reviewed and the indications for the barium studies were noted. Cases with incomplete data were excluded from the review.

Results: There were 330 barium enema for this review. Six cases that did not meet the criteria for this review were excluded from the study. This retrospective analysis of 330 barium enema studies performed had a diagnostic yield for pathological findings of 64 (19.4%). There were 204 (61.8%) males and 126 (38.2%) females. Age group distribution was from 1 day to 100 years. The most common pathology found was colo-ano-rectal neoplasm, 33.8%, followed by diverticular disease, 23.1%, inflammatory bowel disease, 13.8%, and Hirschprung's disease 12.3%.

Conclusion: The single clinical feature that gave the most diagnostic yield for pathological findings was palpable abdominal mass, 50%, followed by recurrent and acute intestinal obstruction, 36.4%, chronic constipation 26.7% and rectal bleeding, 22%. To increase the diagnostic yield for pathological findings in barium enema studies, stricter indications are necessary in patients with unexplained anemia and in patients with change of bowel habits.

Keywords: Barium enema, diagnostic yield.

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Even though barium enema is routinely used in investigating many lower abdominal complaints, the diagnostic yield for pathological findings varies from different centers. In a retrospective study of the use of imaging modalities in the diagnosis of nonspecific abdominal pain in patients under 31 years, Kreitner et al reported that only 3.7% of radiographic examinations revealed abnormalities of clinical importance. In another retrospective report by Wafula on a survey of double contrast barium enema, the diagnostic yield for pathological findings varies from 41.6% in hospital outpatients to 35.6% in the general practitioner group. Also in patients who had rigid sigmoidoscopy the diagnostic yield was 42.7% compared to 32.6% in those who had no prior sigmoidoscopy.

A retrospective analysis of the barium enema studies performed here at Assir Central Hospital over a 5 year period was carried out to find out the diagnostic yield for pathological findings. The findings are reported here.

Methods. All the barium enema studies both, single and double contrast, performed at Assir Central Hospital in a 5 year period from 1408H (1988G) to 1412H (1993G) were reviewed by 2 of the authors who reviewed the actual examination for...
Table 1 - Clinical findings correlated with barium enema findings.

<table>
<thead>
<tr>
<th>Indications for the examination</th>
<th>Total No. (%)</th>
<th>Males (%)</th>
<th>Females (%)</th>
<th>Age Group</th>
<th>Mean Age</th>
<th>Positive Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Abdominal pain</td>
<td>126 (38.2%)</td>
<td>70 (55.6%)</td>
<td>56 (44.4%)</td>
<td>3 months - 100 yrs</td>
<td>44.8 yrs</td>
<td>21 (17.0)</td>
</tr>
<tr>
<td>2. Chronic constipation</td>
<td>60 (18.2%)</td>
<td>39 (65.0%)</td>
<td>21 (35.0%)</td>
<td>1 day - 98 yrs</td>
<td>32.7 yrs</td>
<td>16 (26.7)</td>
</tr>
<tr>
<td>3. Rectal bleeding</td>
<td>50 (15.2%)</td>
<td>39 (78.0%)</td>
<td>11 (22.0%)</td>
<td>4 months - 90 yrs</td>
<td>46.12 yrs</td>
<td>11 (22.0)</td>
</tr>
<tr>
<td>4. Diarrhoea</td>
<td>25 (7.6%)</td>
<td>15 (60.0%)</td>
<td>10 (40.0%)</td>
<td>6 months - 80 yrs</td>
<td>42.6 yrs</td>
<td>2 (8.0)</td>
</tr>
<tr>
<td>5. Unexplained anemia</td>
<td>18 (5.5%)</td>
<td>11 (61.1%)</td>
<td>7 (38.9%)</td>
<td>13 yrs - 90 yrs</td>
<td>49.0 yrs</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>6. Abdominal distension</td>
<td>17 (5.1%)</td>
<td>10 (58.8%)</td>
<td>7 (41.2%)</td>
<td>1 day - 90 yrs</td>
<td>24.9 yrs</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>7. Palpable mass</td>
<td>14 (4.2%)</td>
<td>7 (50.0%)</td>
<td>7 (50.0%)</td>
<td>8 - 75 yrs</td>
<td>48.8 yrs</td>
<td>7 (50.0)</td>
</tr>
<tr>
<td>8. Recurrent &amp; acute intestinal obstruction</td>
<td>11 (3.3%)</td>
<td>9 (81.8%)</td>
<td>2 (18.2%)</td>
<td>1 months - 100 yrs</td>
<td>52.9 yrs</td>
<td>4 (36.4)</td>
</tr>
<tr>
<td>9. Change of bowel habits</td>
<td>9 (2.7%)</td>
<td>4 (44.4%)</td>
<td>5 (55.6%)</td>
<td>27 - 60 yrs</td>
<td>37.4 yrs</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

The purpose of this study. Out of all these barium studies, 330 cases met the criteria for this analysis. The cases with incomplete data were eliminated from this review, these are 6 in number. These 330 cases were studied with regards to the indication for the examination, and the pathological findings on barium enema studies. The age-group distribution, the sex, and the nationalities of the patients were also recorded. All the 330 cases were arbitrarily divided into 9 groups based on the major clinical finding that necessitated the request for barium enema studies (Table 1).

Results. Of these 330 cases analyzed 204 (61.8%) were males and 126 (38.2%) females. The age-group distribution was from 1 day to 100 years. Total negative barium study was 266 (80.6%). Pathology was found only in 64 cases (19.4%). The most common pathology found from the barium study was colo-ano-rectal neoplasm, 22 cases (33.8%). This was followed by 15 cases (23.1%) of diverticular colon disease, 9 cases (13.8%) of inflammatory bowel disease, and 8 cases (12.3%) of Hirschsprung's disease (Table 2).

The indication for barium enema studies in the first group of 126 patients (38.2%) was abdominal pain. There were normal studies in 105 cases (83%) and pathology was found in 21 cases (17%). The pathological findings in the 21 cases were diverticular disease of the colon, 9 cases, cecal mass, 4 cases, inflammatory bowel disease, 3 cases, 2 cases of benign colon stricture, 2 cases of left colon carcinoma and one case of rectal carcinoma.

In the 2nd group, 60 barium studies (18.2%) were performed for chronic constipation. Normal findings were seen in 44 patients (73.3%) and pathology detected in 16 patients (26.7%). The pathological findings detected in this group were 7 cases of Hirschsprung's disease, 5 cases of left colon carcinoma, and one case each of colitis, sigmoid polyp, diverticular disease and cecal volvulus.

In the 3rd group, there were 50 cases (15.2%). The indication for barium enema study was rectal bleeding. Normal studies were found in 39 cases (78%) and pathology found in 11 cases (22%). The various pathology found in this group were 4 cases of inflammatory bowel disease (colitis), 4 cases of left colon carcinoma and 3 cases of diverticular disease.

The indication for the barium enema in the 4th group of 25 patients (7.6%) was diarrhoea. Normal studies were found in 23 cases (92%) and diverticular disease found in 2 cases (8%).

In the 5th group, unexplained anemia was the indication for barium enema studies. No pathology was found in all these 18 patients.

Table 2 - Pathological findings in 330 barium enema studies

<table>
<thead>
<tr>
<th>Pathological findings</th>
<th>Total No.</th>
<th>Males</th>
<th>Females</th>
<th>Age Group</th>
<th>Mean Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colo-rectal neoplasm</td>
<td>22</td>
<td>12</td>
<td>10</td>
<td>42 - 100 yrs</td>
<td>57 yrs</td>
</tr>
<tr>
<td>Diverticular colon disease</td>
<td>15</td>
<td>12</td>
<td>3</td>
<td>40 - 90 yrs</td>
<td>67 yrs</td>
</tr>
<tr>
<td>Inflammatory bowel disease</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>26 - 55 yrs</td>
<td>37 yrs</td>
</tr>
<tr>
<td>Hirschsprung's disease</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>6 days - 6 yrs</td>
<td>17 months</td>
</tr>
<tr>
<td>Intussusception</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2 months - 1 year</td>
<td>7 months</td>
</tr>
</tbody>
</table>

*Pathological findings found in 2 patients or less are not included
The indication for barium studies in the 6th group was abdominal distension. There were 17 patients (5.2%) in this group. No pathology was found in 14 patients (82.4%) and the remaining 3 (17.6%) showed 2 cases of intussusception and one case of Hirschsprung's disease.

In the 7th group the indication for the barium enema studies was a palpable abdominal mass or a rectal mass. There were 14 patients (4.2%). In half of the cases there was no pathology, but in the remaining 7 (50%), the pathology detected on barium enema studies were, 3 cases of cecal mass, 2 cases of left colon carcinoma and one case each of malrotation of the colon, and an ascending colon carcinoma.

In the 8th group, the 11 patients had barium enema studies performed because of a recurrent or an acute intestinal obstruction. Seven cases (63.6%) had normal barium enema studies and 4 (36.4%) had abnormal studies. The pathology found in the abnormal studies were 2 cases of intussusception, one case each of small bowel obstruction, and inflammatory bowel disease (colitis).

The indication for the barium enema study in the 9 patients (2.7%) of the 9th group was a change in bowel habits. All the barium enema studies in this group were normal.

**Discussion.** The diagnostic yield for pathological findings in this survey is 19.7% as compared with a range of 3.7% to 42.7% reported in the literature. There are various reasons for the wide discrepancies. The selection of patients for barium enema study is one factor. The 3.7% diagnostic yield for pathological findings was a survey of patients under 31 years of age with non-specific abdominal pain as the only symptom. Another factor is whether the patients are hospital based, 41.6% or are referral from the general practitioners, 35.6%. 2 The 3rd factor is whether the patients were previously screened by having rigid sigmoidoscopy prior to the study, 42.7% or not, 32.6%. 3 Colon preparation is an important factor and several studies reported that 10% - 20% of colon carcinomas are missed on initial barium examination, primarily because poor preparation results in the tumor being overlooked or confused with fecal matter.

The technique of the study is also important in the diagnostic yield for pathological findings in barium enema studies. The single-contrast barium enema examination is useful for patients with acute diseases, the elderly, the debilitated and those too ill to cooperate for the necessary manoeuvres for double-contrast examination. 4 But the double-contrast is more sensitive and accurate. This has therefore been recommended as the initial procedure for patients with positive fecal occult blood. 4 In the detection of colonic neoplasms, because of its relatively low cost, it has been suggested that double-contrast barium enema should be the technique of choice for the examination of asymptomatic patients, or symptomatic individuals without known antecedent disease.

Because colonoscopy does not visualize the cecum in 10 to 36% of cases, 6 and because of the comparable accuracy, for detecting significant lesions, greater safety, and greater cost-effectiveness, the use of barium enema is favoured in most patients. 6 It has also been shown that double-contrast barium enema is effective in diagnosing carcinoma and polyps one centimeter and above, although not very effective in diagnosing inflammatory bowel disease and other non-frequent causes of colonic bleeding. 7 Barium enema is claimed to be the most useful radiographic examination in the diagnosis of colonic ischemia. 6 Although the double-contrast barium enema is the standard radiological examination of the colon, 7 it is an examination of high radiation exposure to the patient. However, a significant reduction of the screening time for the double-contrast barium enema can be achieved without loss of examination quality. 8 During the filling phase, screening can be pulsed at short intervals with longer gaps in between. Also patients rotation and positioning can be used without screening as much as possible. In addition, correct use and appropriate removal of the antiscatter grid and proper collimation of the beam to the area of interest will help reduce the patient dose.

Although no complication was recorded in this series, complications that have been described following barium enema studies include, perforation with peritonitis, acute appendicitis, incorrect vaginal rather than colonic insertion with fatal consequences, and venous intravasation. 10-13 Systemic allergic reaction can also occur most probably provoked by the latex balloon on the rectal catheter. 14

In conclusion of this analysis, the single clinical feature that gave the most diagnostic yield for pathological findings (50%) was the presence of a palpable abdominal mass, followed by recurrent and acute intestinal obstruction (36.4%), chronic constipation (26.7%), and rectal bleeding (22%). To increase the diagnostic yield for pathological findings in barium enema studies, stricter indications are necessary in patients with unexplained anemia and in patients with change of bowel habits.

**References**


3. Gastrointestinal Radiology (book) Chapter 50, Pages 681-