Intestinal pneumatisos is a condition characterized by the presence of gas in cyst-like spaces in the intestinal wall, most commonly in the ileocolic region. About 200 cases have been reported in adults, and the literature has recently been reviewed by Friedmann (1949). According to Judge, Cassidy, and Rice (1949) only 30 cases have been described in infants, mostly in the American literature. Moore (1929) reported four cases in a series of 260 necropsies on infants, and Judge et al. (1949) found 17 in 501 necropsies.

Though few cases have been published, intestinal pneumatisos is by no means uncommon. The following six cases have been found in 240 consecutive necropsies at the Duchess of York Hospital for Babies, Manchester, and all were associated with severe diarrhoea (Table 1).

The intestine presents a characteristic appearance with irregular small vesicles, chiefly in the submucosa, although present beneath the peritoneum (Figs. 1 and 2). As suggested by Lindsay, Rice, and Selinger (1940), the thickened intestine resembles "sponge rubber," and if firmly held in the fingers gives the typical feeling of surgical emphysema. The cysts contain gas and no fluid. Microscopically they have no cellular lining, though occasional flattened cells, probably of connective tissue type, are seen in the wall. In none of these cases was there any inflammatory lesion around the cysts and no organisms could be demonstrated histologically.

Discussion

Intestinal pneumatisos in infants appears to be invariably associated with conditions leading to increased peristaltic activity. There is usually a severe enterocolitis and in most cases ulceration of the mucosa. In the series reported by Judge et al. (1949) 13 of 17 cases showed ulcerative lesions, and the remainder acute ileocolitis. In the present group four out of six showed ulceration of the mucosa, visible to the naked eye. The absence of an ulcerative inflammatory process probably accounts for its rarity with congenital pyloric stenosis.

The absence of a marked inflammatory reaction, the failure in all the reported cases to demonstrate pathogenic organisms bacteriologically or in stained sections, and the absence of vesicles in the muscular coat is strong evidence that the condition is not of bacterial origin. Moore (1929) described occasional giant cells around the cysts, indicating a mild chronic inflammatory reaction. One can exclude

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Sex</th>
<th>Age</th>
<th>Duration of Diarrhoea (weeks)</th>
<th>Site of Pneumatisos</th>
<th>Intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F.</td>
<td>4½ months</td>
<td>3</td>
<td>Ascending and transverse colon</td>
<td>Haemorrhagic mucosa</td>
</tr>
<tr>
<td>2</td>
<td>M.</td>
<td>3 months</td>
<td></td>
<td>Ascending colon</td>
<td>Ulceration</td>
</tr>
<tr>
<td>3</td>
<td>M.</td>
<td>8 weeks</td>
<td>2</td>
<td>Ileum (patchy)</td>
<td>Ulceration</td>
</tr>
<tr>
<td>4</td>
<td>M.</td>
<td>7 months</td>
<td>3</td>
<td>Terminal ileum</td>
<td>Haemorrhagic mucosa</td>
</tr>
<tr>
<td>5</td>
<td>M.</td>
<td>8 weeks</td>
<td>4</td>
<td>Ileum, ascending and transverse colon</td>
<td>Ulceration</td>
</tr>
<tr>
<td>6</td>
<td>F.</td>
<td>7 weeks</td>
<td>2</td>
<td>Ascending and transverse colon</td>
<td>Ulceration</td>
</tr>
</tbody>
</table>
a post-mortem development, since the condition has been observed surgically in adults, and also in the colon of a rabbit killed as an experimental control.

The most feasible explanation is that the cysts are produced mechanically, gas being forced into the submucosa by violent intestinal peristalsis and spasm through minute ulcerative lesions in the mucosa. The gas may then spread along the cellular planes in the bowel wall. In support of this explanation, air blown gently into a minute deep ulcer shown in Fig. 2 passed into the surrounding vesicles. It would be expected that a few organisms would likewise gain access to the submucosa, but these presumably are not sufficiently pathogenic to cause an acute inflammatory reaction. An identical appearance can be produced by injecting air with a hypodermic needle into the intestinal submucosa. The condition thus appears to be of the same nature as surgical emphysema in other parts of the body. There is evidence that the cysts may be rapidly reabsorbed (Friedmann, 1949).

Summary

Six cases of intestinal pneumatosis in infants are reported: the lesion is not uncommon. The relationship with severe diarrhoea and ulcerative enterocolitis is emphasized. It is thought to be produced mechanically.

I wish to thank the honorary medical staff of the Duchess of York Hospital for Babies, Manchester, for use of clinical notes, Professor S. L. Baker for helpful criticism, and Mr. F. Ward for the photographs.

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Intestinal Pneumatosis in Infants

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