Dissecting Microscope Appearance of Small Bowel Mucosa in Children

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The technique of small bowel biopsy is now well established in childhood, but reports have largely concentrated on the histological appearances and enzyme activity of the biopsied mucosa (Anderson and Townley, 1962; Burke, Kerry, and Anderson, 1965; Kerpel-Fronius, Jání, and Fekete, 1966; Kuitunen, 1966; Launiala, Kuitunen, and Visakorpi, 1966; Nordio, Lamedica, Berio, and Vignola, 1966; Townley, Khaw, and Shwachman, 1965). While the value of examination of the biopsied mucosa with the dissecting microscope has been demonstrated in adult patients, few paediatric papers have stressed its value (Burman, 1965; Sheldon and Tempany, 1966; Shmerling, 1965; Stanfield, Hutt, and Tunnicliffe, 1965). The purpose of this paper is to record the dissecting microscope appearances of 36 duodenal or jejunal biopsies from Australian children with the malabsorption syndrome or chronic diarrhoea.

Material and Method

The small bowel biopsies were performed using the paediatric Crosby capsule (Crosby and Kugler, 1957). The site of the capsule at the time of biopsy was assessed by taking an x-ray film of the abdomen shortly after the injection of 5 ml. ‘Urografin’ through the biopsy tubing. The biopsies were taken from the distal duodenum or the proximal jejunum. Within five minutes of obtaining the biopsy, the mucosa was placed in 10% formal saline and examined under the dissecting microscope. For purposes of record, black-and-white and colour photographs were taken. The mucosa was then sectioned for histological study.

Examinations were made of 36 biopsies from 32 children. The indications for biopsy were the presence of malabsorption or a history of chronic diarrhoea. The ages of the children at the time of biopsy ranged from 3 months to 13 years. 27 children were of European stock, 5 were Aboriginal or part-Aboriginal. Repeat biopsies to assess progress were performed in 4 children. Control biopsies from normal children were not obtained.

Dissecting Microscope Appearances

The mucosa, when viewed under the dissecting microscope, was assessed and placed in one of three descriptive categories, modified from Booth, Stewart, Holmes, and Brackenbury (1962).

Group I. The mucosal surface was flat and no villi were seen. Two types of appearance were observed: Type 1: The mucosa was absolutely flat and barren with no pits or grooves. In some biopsies, blood vessels could be seen beneath the surface (Fig. 1 and colour plate A). Type 2: The mucosa was flat but divided by grooves into irregular areas. These areas were pitted with the openings of crypts. This appearance has been described as a ‘mosaic’ pattern (Fig. 2 and colour plate B).

Group II. The mucosa showed thickened blunt ridges, but no villi were seen. This appearance has been described as ‘convoluted’ and ‘brain-like’ (Fig. 3 and colour plate C). In one biopsy the mucosa was, in addition, divided into irregular areas by grooves similar to Group I.

Group III. The mucosa was made up of leaf-like villi. These villi had broad bases which varied considerably in width (Fig. 4 and 5 and colour plate D and E). In some biopsies, occasional finger-like villi were seen.

Results

Thirteen children (Table I) had a flat mucosa, 5 being completely flat and the remaining 8 conforming to Group I (Type 2). Each biopsy had the histological appearance of subtotal villous atrophy. All these children had untreated coeliac disease.

Seven specimens from 6 children (Table II) were characterized by thickened ridges. All showed the histological appearance of partial villous atrophy. One child (Case 14) had been treated for coeliac disease with a gluten-free diet for one month at the time of the initial biopsy. The biopsy was still abnormal four months later. In 4 of the remaining children, gastro-enteritis had preceded the develop-
Giardia lamblia, and another grew salmonella from stool culture at time of biopsy.

In this series, no biopsy had the dissecting microscope appearance which has been said to be characteristic of the jejunal mucosa of normal adults and neonates, i.e. mucosa where finger-like villi are the principal feature (Baker, Ignatius, Mathan, Vaish, and Chacko, 1962; Booth et al., 1962).

Discussion

The presence of a flat mucosa in coeliac disease is well known, but the significance, if any, of the two patterns observed remains obscure. The appearance of ‘partial villous atrophy’ on histological section in patients with a thick-ridged convoluted mucosa has been demonstrated in adults. However, the significance of leaf-shaped villi remains uncertain.

While leaf-like villi may be seen in the duodenum of healthy adults, Booth et al. (1962) have suggested that leaf-like villi in the jejunum may represent a transition from the finger-like villi seen in normal

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**TABLE I**

**Cases in which Pattern of Small Intestine Biopsy was Flat Mucosa**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yr.)</th>
<th>Histology</th>
<th>Biopsy Site</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5½</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>2</td>
<td>2 7/12</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>3</td>
<td>7 8/12</td>
<td>SVA</td>
<td>Duodenum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>4</td>
<td>1 11/12</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>5</td>
<td>2½</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>Type 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>7</td>
<td>3 5/12</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>8</td>
<td>13/12</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>9</td>
<td>4 7/12</td>
<td>SVA</td>
<td>Jejunum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>10</td>
<td>5½</td>
<td>SVA</td>
<td>Duodenum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>11</td>
<td>½</td>
<td>SVA</td>
<td>Duodenum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>12</td>
<td>7 2/12</td>
<td>SVA</td>
<td>Duodenum</td>
<td>Coeliac disease</td>
</tr>
<tr>
<td>13</td>
<td>8 3/12</td>
<td>SVA</td>
<td>Duodenum</td>
<td>Coeliac disease</td>
</tr>
</tbody>
</table>

SVA = Subtotal villous atrophy.

**TABLE II**

**Cases in Which Pattern of Small Intestine Biopsy was Thickened Ridges**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yr.)</th>
<th>Histology</th>
<th>Biopsy Site</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>14*</td>
<td>2</td>
<td>PVA</td>
<td>Jejunum</td>
<td>Coeliac disease, Coeliac disease</td>
</tr>
<tr>
<td>14</td>
<td>2 4/12</td>
<td>PVA</td>
<td>Duodeno-jejunal flexure</td>
<td>Jejunum</td>
</tr>
<tr>
<td>15</td>
<td>1 7/12</td>
<td>PVA</td>
<td>Jejunum</td>
<td>Post-gastro-enteritis malabsorption</td>
</tr>
<tr>
<td>16*</td>
<td>2</td>
<td>PVA</td>
<td>Jejunum</td>
<td>Post-gastro-enteritis malabsorption</td>
</tr>
<tr>
<td>17</td>
<td>2½</td>
<td>PVA</td>
<td>Jejunum</td>
<td>Post-gastro-enteritis malabsorption, Giardiasis; malabsorption syndrome</td>
</tr>
<tr>
<td>18</td>
<td>14/12</td>
<td>PVA</td>
<td>Jejunum</td>
<td></td>
</tr>
<tr>
<td>19*</td>
<td>13/12</td>
<td>PVA</td>
<td>Duodeno-jejunal flexure</td>
<td></td>
</tr>
</tbody>
</table>

PVA = Partial villous atrophy.

*Cases 14, 16, and 19 were Aboriginal or part-Aboriginal.

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"..."
Fig. 1.—Flat mucosa, type 1.

Fig. 2.—Flat mucosa, type 2.

Fig. 3.—Thickened ridges.

Fig. 4.—Leaf-like villi.

Fig. 5.—Leaf-like villi.
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成年人到异常的小肠黏膜。Creamer (1964) 假设小肠绒毛的形状与上皮细胞群的大小有关，可能被各种原因减少。当上皮细胞群发生衰减时，叶子状的绒毛是第一种变化。这种表现在患有克氏病的儿童中被描述过。Burman (1965) 描述了15个来自英国儿童的活检标本，这些儿童有各种各样的胃肠道症状。48% 的绒毛呈叶子状。然而，这种表象是否异常仍然不确定。

**Summary**

对36例来自澳大利亚患有肠吸收不良综合征或慢性腹泻儿童的回肠或空肠活检进行了描述。三种模式：

**A** — 平滑的绒毛，类型1。**B** — 平滑的绒毛，类型2。**C** — 增厚的突起。**D** 和 **E** — 叶状的绒毛。缺乏正常对照的活检是遗憾的，但目前似乎不道德地获取正常健康儿童的粘膜活检标本。它感兴趣的是，叶子状的绒毛在16名儿童中被看到，所有这些儿童均存在吸收不良的证据或慢性腹泻。4例是十二指肠活检，按成人标准，可能在正常范围内，但疣状粘膜中叶状绒毛的显著性仍然不确定。

The lack of biopsies from normal controls is regrettable, but at present it seems unethical to take biopsy specimens of the mucosa of normal healthy children. It is of interest, however, that leaf-like villi were seen in 16 children in this series, all of whom had evidence of malabsorption or had chronic diarrhoea. 4 biopsies were duodenal and, by adult standards, may be within normal limits, but the significance of leaf-shaped villi in jejunal biopsies from the remaining patients is still uncertain.
were observed: flat mucosa, thick-ridged mucosa, and mucosa characterized by leaf-like villi. The significance of leaf-like villi remains uncertain.

I should like to thank Professor T. Stapleton and Dr. D. Reye for their helpful advice and encouragement, the physicians of the Royal Alexandra Hospital for Children for allowing me to study patients under their care, and Mr. W. A. Noble who took the photographs.

REFERENCES


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