Heterotopic gastric mucosa in the duodenum

AM LESSELS, DF MARTIN

From the Departments of Pathology and Medicine, UHSM, Withington Hospital, West Didsbury, Manchester M20 8LR

SUMMARY  Thirteen patients are described who, on routine endoscopy of the upper gastrointestinal (GI) tract, were found to show a characteristic appearance in the proximal duodenum. This consisted of multiple small mucosal nodules, predominantly in the anterior wall. All cases were biopsied, and showed identical histological appearances of heterotopic gastric mucosa of body type.

The incidence of this condition is probably much higher than reported previously, and may be present in up to 2% of the population. In all our patients a diagnosis was reached, other than heterotopic gastric mucosa, to explain the GI tract symptoms. In none was a healed or active duodenal ulcer evident and in none was there a history of a pre-existing ulcer. In our opinion these nodules are probably of little or no clinical significance.

Heterotopic tissue is well known to occur in the alimentary tract. Pancreatic heterotopia is found in both the stomach and duodenum, while in Meckel’s diverticulum gastric mucosa or pancreatic tissue can be seen.1 Isolated cases of heterotopic gastric mucosa have been reported at all levels of the alimentary tract from the oesophagus to the rectum.2 These cases are regarded as congenital in origin due to abnormal embryological development.

Epithelium resembling gastric mucosa of the non-specialised antral or pyloric type is seen in a variety of conditions—for example, inflammatory bowel disease. This change occurs secondary to the chronic inflammation and hence is strictly a metaplastic change. Similarly it is well recognised that in duodenitis and peptic ulceration, the surface epithelium may change to a gastric type, this again representing metaplasia, rather than true heterotopia.3 Unfortunately many authors have made the mistake of combining metaplasia and true heterotopia under the term heterotopic gastric mucosa. As a result many of the conclusions drawn seem to be incorrect.

With the increasing use of fibreoptic endoscopy, biopsies from the upper GI tract form a considerable proportion of the work load of pathology departments. It would not be surprising if occasionally a lesion is found incidentally at endoscopy which although unusual may have little or no clinical significance. We wish to report a series of 13 cases which seem to represent a well defined clinicopathological entity, whose recognition has been obscured by previous reports.

CLINICAL EXAMINATION

The 13 cases were seen over an 18-month period in the endoscopy unit of Withington Hospital. Annually 1500 endoscopies are performed. One endoscopist (DFM) identified 12 of the 13 cases and he personally had performed 30% of the total endoscopies. All patients had been referred for investigation of upper GI tract symptoms (Table). There were five men and eight women patients with an age range of 33-82 yr (mean age 56 yr). The characteristic endoscopic appearance was of multiple small mucosal nodules, usually less than 1 cm diameter, situated in the first part of the duodenum. These were more commonly seen in the anterior wall (Fig. 1). In all cases, the endoscopist was absolutely certain that he had passed through the pylorus and was in the duodenum. Five cases had repeat endoscopies at a later date and in all the appearances were essentially unchanged. All cases had complete examination of the upper GI and biliary tracts. In none was an active or healed duodenal ulcer identified. After consideration of the clinical symptoms and radiological, biochemical and endoscopic findings, a final diagnosis was made in all cases (Table).

PATHOLOGY

Several biopsies were taken from the abnormal areas. Although many of the biopsy fragments were small and difficult to orientate, sufficient material was obtained in all 13 for histological assessment. All cases
Investigation of GI tract in 13 patients

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (yr)</th>
<th>Sex</th>
<th>Symptoms</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45</td>
<td>M</td>
<td>Obstructive jaundice</td>
<td>Cholangiocarcinoma</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>M</td>
<td>GI blood loss</td>
<td>Colonic bleeding</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>M</td>
<td>Dysphagia; weight loss</td>
<td>Carcinoma of stomach</td>
</tr>
<tr>
<td>4</td>
<td>66</td>
<td>F</td>
<td>Diarrhoea; weight loss</td>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td>5</td>
<td>54</td>
<td>F</td>
<td>Retrosternal discomfort</td>
<td>Gastro-oesophageal reflux</td>
</tr>
<tr>
<td>6</td>
<td>61</td>
<td>F</td>
<td>Dyspepsia</td>
<td>SLE</td>
</tr>
<tr>
<td>7</td>
<td>82</td>
<td>F</td>
<td>Dysphagia</td>
<td>Oesophageal stricture</td>
</tr>
<tr>
<td>8</td>
<td>53</td>
<td>M</td>
<td>Abdominal pain; vomiting</td>
<td>Chronic obstructive lung disease</td>
</tr>
<tr>
<td>9</td>
<td>66</td>
<td>F</td>
<td>Heartburn; flatulence</td>
<td>Muscular abdominal pain</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>F</td>
<td>Vague abdominal pain</td>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td>11</td>
<td>61</td>
<td>F</td>
<td>Abdominal discomfort</td>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td>12</td>
<td>33</td>
<td>M</td>
<td>Obstructive jaundice</td>
<td>Sclerosing cholangitis</td>
</tr>
<tr>
<td>13</td>
<td>54</td>
<td>F</td>
<td>Heartburn</td>
<td>Gastro-oesophageal reflux</td>
</tr>
</tbody>
</table>

Fig. 1 Endoscopic appearance of heterotopic mucosa in the duodenum, with multiple mucosal nodules projecting into the lumen, as seen through the pylorus.

Well organised, orderly groups of glands, consisting of a mixture of chief and parietal cells (Figs 2 and 3). These were covered by a surface epithelium of gastric type, which at the edges merged with the adjacent normal duodenal mucosa (Fig. 4). This epithelium was best demonstrated by a periodic acid-Schiff (PAS) stain. In all cases, small fragments of normal duodenal mucosa were present as well as the gastric type mucosa. In no case, was there evidence of significant inflammation either in the duodenal mucosa or in the heterotopic gastric type mucosa. In the five cases where repeat biopsies were performed the histology was identical on both occasions.

Discussion

This series of 13 cases represents a well defined clinicopathological entity. The patients, who covered a wide age range, were found to have characteristic endoscopic appearances in the proximal duodenum, and all had identical histological features on biopsy. In none was an active or healed duodenal peptic ulcer identified.

In 1927, Taylor,4 from a series of 150 necropsies, described two cases of heterotopic gastric glands in the duodenum which presented as small slightly raised nodules. Histologically the nodules were composed of fundal glands with chief and parietal cells. The perfect differentiation and orderly arrangement indicated their undoubted congenital origin. In one case, a peptic ulcer was noted one inch (2.5 cm) distal to the heterotopic glands. These two cases appear identical to those reported in our series.

In 1962, Gannon described two further cases of heterotopic gastric mucosa in the duodenum at necropsy. One consisted of a single nodule, the other several small polyps. Both these cases and four others from elsewhere in the small intestine showed true fundal type gastric mucosa. A further case was reported eight years later by Lee et al, presenting as a polyp 2.5 x 1.5 cm adjacent to the ampulla of Vater.

Wolff2 then reported a large series of 87 cases of gastric heterotopia in the alimentary canal, 15 involving the duodenum. She subdivided heterotopia into congenital and acquired groups, the latter representing an abnormal regenerative process as exemplified by pyloric type epithelium in Crohn's disease. This, as we have suggested earlier is probably best termed metaplasia to avoid confusion. Pathologically, this so-called heterotopia "consisted of small numbers of parietal cells and sometimes chief showed identical appearances. Centrally there were
cells, or small groups of fundic glands, rather than fully developed fundic mucosa.” In Wolff’s view this description of scattered isolated parietal cells amongst otherwise indigenous cells was probably an acquired phenomenon, only the fully formed fundic mucosa representing true congenital heterotopia. We would support this interpretation of the pathology.

However other workers, predominantly German and Scandinavian, have taken a different view. Hoedemaker examined the duodenal cuff in 158 gastrectomy specimens and found 52 cases where parietal and occasional chief cells were found. These were commoner in cases of duodenal ulcer and a relation was postulated with hyperacidity. In no case was a macroscopic abnormality seen. Although in a few cases the duodenal mucosa was entirely replaced by gastric type mucosa, usually only a few glandular structures lined by some parietal cells were found. A similarly designed study by Scandinavian workers examined 250 gastrectomy specimens and 2 duodenal resections. These workers showed parietal cell heterotopia in 61 of the 272 cases (22.5%). This was diagnosed even if only a few parietal cells were demonstrable in only one of the three sections. Again a relation was found with acid output.

Although a few of their cases may have represented true congenital heterotopia, the vast majority appear to resemble those described by Wolff, where, again, there was a strong association with peptic ulceration.

In 1970, the first case diagnosed endoscopically was reported. Three years later Scandinavian workers described six cases of heterotopic gastric mucosa in the duodenum, three diagnosed at endoscopy and three at operation. Four of the cases consisted of multiple polyps; the others only a single
polyp. However their statement that "histological
examination revealed fully developed gastric mucosa
with parietal and pepsinogen cells in nearly all the
dolypes. Only a few were composed solely of gastric
surface epithelium surrounding an oedematous
lamina propria" is imprecise. Certainly some of the
six cases are genuine heterotopic gastric mucosa as
shown by their Fig. 5, which shows an identical
appearance to our cases but we feel that these six
cases may not all represent the same entity, although
it is difficult from the text to be sure. Certainly we
do not agree with their conclusion that this epithelium
is a response to an "extraordinarily strong stimulus
forcing the heterotopic tissue to grow beyond the
level of the normal mucosa. The growth is hyper-
plasia not neoplasia."

In 1977,11 Kratzsch described 14 polypoid lesions
in the duodenum, seen during 3140 endoscopic
examinations. Eight of these were reported as
showing gastric mucosa, but in only four was it of
body type. One of these had erosive bulbitis, the
other three having no evidence of duodenal ulcer-
ation. Unfortunately the pathological description is
not sufficiently clear to enable us to assess whether
all four represent true heterotopia.

Lastly in 1980,12 22 cases were described—17
diagnosed on double contrast barium meal and five
seen at endoscopy, from a series of 7400 barium
meals and 2700 endoscopies. However the pathology
is only briefly discussed, "parietal cells with or
without chief cells were demonstrated in all cases."

Having reviewed the literature critically, it seems
that there are five definite cases diagnosed at nec-
ropsy and at most 30, but probably fewer, cases
diagnosed at endoscopy.

The term heterotopic gastric mucosa has been
applied, in the past, to three different entities:

Firstly, gastric type surface epithelium lining
the duodenum is recognised as a prominent feature
of duodenitis and is regarded as metaplastic.
Interestingly, Dutch workers18 have shown this
epithelium to be present in 64% of apparently
normal individuals.

Secondly, nodules of pyloric type glands may
be seen in the mucosa and termed heterotopic,
although we suspect that most of these represent
Brunner's glands, which are difficult to differenti-
te from pyloric-type glands. In addition, it appears
that occasional parietal cells and less commonly
chief cells may be present, although usually in very
small numbers. These cases we regard not as con-
genital and heterotopic but as metaplastic. There
seems convincing evidence that this entity is related,
as is the surface change, to hyperacidity, being most
common in association with duodenal ulcer. In our
opinion, most of the cases described by Wolff,2
Johansen8 and Hoedemaker7 fall into this category.

Thirdly, true heterotopic body type mucosa in
the duodenum as in our patients. This is identified
by a well organised mass of perfectly differentiated
body type glands covered by gastric surface epi-
thelium replacing the entire thickness of the duodenal
mucosa. This is congenital in origin, and is present
in up to 2% of the population. One case was de-
scribed in a study of 50 normal people by a group
from the Netherlands.13 The interesting point related
to its frequency in this series is that 12 of the 13
cases were identified by one endoscopist who per-
formed only 30% of the examinations in the unit. It
appears that endoscopists are failing to recognise
this entity. If the pathologist is also unaware of
the entity, a duodenal biopsy will be reported as
"consisting only of gastric mucosa." As yet this
condition appears of no clinical significance and
there is no evidence of an association with peptic
ulceration. This is understandable in that any acid
and pepsin produced will be quickly neutralised in
the duodenum and as the nodules themselves are
very small, the quantity produced is presumably
insignificant.

This report may help to clarify this area of con-
fusion in the literature, but further studies are needed.
However it can only be studied when endoscopists
and pathologists are aware of the entity and patho-
logists are aware of the strict criteria which should be
applied.

References

1 Morson BC, Dawson JMP. Systemic pathology Vol 3.
2 Wolff M. Heterotopic gastric epithelium in the rectum.
A report of three new cases with a review of 87 cases of
gastric heterotopia in the alimentary canal. J Clin Pathol
3 James AH. Gastric epithelium in the duodenum. Gut
4 Taylor AL. The epithelial heterotopias of the alimentary
5 Gannon PG, Dahlin DC, Bartholomew LG, Bearhs OH.
Polypoid glandular tumours of small intestine. Surg
6 Lee SM, Mosenthal WT, Weismann RE. Tumorous
heterotopic gastric mucosa in the small intestine. Arch
7 Hoedemaker PhJ. Heterotopic gastric mucosa in the
8 Johansen AA, Hansen OH. Heterotopic gastric epithelium
in the duodenum and its correlation to gastric disease
81:676-80.
9 Belber JP, Misick R. Ectopic gastric mucosa in the duo-
10 Johansen AA, Hansen OH. Macroscopically demonstrable
heterotopic gastric mucosa in the duodenum. Scand J
11 Kratzsch KH, Furstenau M, Buttner W. Zum endo-


Requests for reprints to: Dr AM Lessells, Withington Hospital, West Didsbury, Manchester M20 8LR, England.