The diagnosis of primary tumours of the duodenum

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SYNOPSIS This paper discusses the incidence of primary malignant tumours of the small intestine and reports in detail the clinical and radiological features of 19 patients with primary duodenal tumours and discusses the differential diagnosis.

A review of the accumulated experience over a period of 28 years in the clinics of the Saskatchewan Cancer Commission revealed that in only 58 instances (0.2%) was the small intestine primarily involved in a total of 29,825 consecutive proven primary cancers in all sites. These small bowel tumours represented 1% of the total of 5,693 malignant neoplasms of the gastrointestinal tract. Of 58 patients, 31 (53.4%) had lesions in the ileum, five (8.6%) in the jejunum, and in 22 (38%) the duodenum was the primary site. These data indicate that primary malignant tumours of the small intestine are not common but verify the truth of Jefferson's (1916) aphorism that 'inch for inch, the duodenum is more likely to undergo cancerous change than the jejunum or ileum'.

Patients with lymphosarcoma, reticulum cell sarcoma, and other lymphomata were not included in the group of 58 because their lesions were considered to be local manifestations of generalized disease and, in the cases found, not peculiar to the gastrointestinal tract. One patient, a man of 50 years, was included although the duodenal adenocarcinoma was not a solitary lesion of the intestine. He had attended one of the cancer clinics for 24 years for treatment of the Peutz-Jegher syndrome and at various times had benign polypi removed from the ileum, colon, and rectum. Adenocarcinomatous change was found in one polyp removed from the ileum and in one from the colon. In 1947, a benign polyp was removed from the fourth part of the duodenum. He died in 1959 and at necropsy an adenocarcinomatous polyp was found in the first part of the duodenum.

In a previous publication, we described eight patients with adenocarcinoma of the duodenum Barclay and Kent (1956). This report made a small

contribution to approximately 550 authentic cases published in the medical literature since Hamberger described the first example in 1746. These eight patients were found in a consecutive series of 20,137 cases of primary malignant tumour of all sites over a 22-year period. Because of the increased interest engendered by the review of these patients, vigilance for similar lesions was stimulated and in the subsequent six years, among the additional 9,688 consecutive primary cancers of all types diagnosed and treated at the cancer clinics, 14 new cases of primary malignant disease of the duodenum were discovered. Eleven of these had primary adenocarcinoma, one a leiomyosarcoma, and two had malignant carcinoid tumours.

In addition to the total of 22 malignant tumours found over the 28-year period there were six benign neoplasms of the duodenum. Four of these were adenomatous polypi, one a leiomyoma, and one a neurolemmoma.

For the purpose of this report the major clinical interest was concentrated on the 19 patients, including the eight previously described, who had primary adenocarcinoma. Despite the rarity of the condition, we considered a special study of these patients from the diagnostic aspect would be worth while because of improvement in the accuracy of recognition of the disease and the increased success in its surgical treatment over the past 10 years.

The group comprised 12 women and seven men. The age range was from 24 to 83 years. Six patients were in the sixth decade of life, five in the seventh, four in the eighth, and two in the ninth decades. There was one patient in each of the third and fourth decades.

All of the tumours were proved to be adenocarcinoma by histological examination. Seven of the

lesions, as described by the pathologists, were polypoid, six were annular, four were ulcerating and two appeared as nodules demonstrating infiltration.

The distribution of the lesions in relation to the papilla of Vater (Mateer and Hartman, 1932) was not in accord with that presented in most other published series. Ritvo and Shaffer (1952), Berger and Koppelman (1942), Howard (1943), and Kleinerman, Yardumian, and Tamaki (1950) reported that the peripapillary site was commonest, followed in turn, by suprapapillary and intrapapillary lesions. Dixon, Lichtman, Weber, and McDonald (1946), on the other hand, describing the experience of 49 of these tumours treated at the Mayo Clinic, stated that peripapillary lesions were commonest, followed closely by those in the suprapapillary and intrapapillary sites. In the Saskatchewan series, 13 of the 19 tumours were in the intrapapillary portion of the duodenum. The peripapillary site was involved in only two patients and the suprapapillary in four. The small number of lesions reported here as arising in the peripapillary portion may be a reflection of the care taken by the writers to exclude all tumours whose primary origin in the duodenum could not be established with certainty. It is possible that the authors have been over-cautious in this respect and that they have excluded some primary duodenal tumours from this study, crediting these to the commoner sites of origin such as the pancreas and ampulla of Vater.

Pic (1894, 1895) was the first to attempt correlation between symptoms and the site of the duodenal tumour. Although others have followed his example in the presentation of their cases, experience has shown that the symptoms are more likely to be related to the morphology of the lesions than to their respective positions in the duodenum.

The onset of symptoms was most acute in those patients with annular lesions, with half of the patients giving a history of one month or less. This contrasted with the more insidious onset of symptoms due to polypoid lesions. In this latter group only two patients had symptoms for less than six months, and in half the duration was more than a year. In the patient with the Peutz-Jegher syndrome the duration was not known. His symptoms related to intestinal polyposis and did not belong especially to the duodenal lesion. The duration in ulcerative lesions was intermediate between that of annular and polypoid tumours.

Loss of weight was the commonest symptom and occurred in all but one patient. The loss was minimal in the two patients with infiltrative lesions. Polypoid and annular tumours were associated with moderate loss, ranging in the former to 15% and in the latter to 23% of the normal body weight. The

degree of loss was greatest in the patients with ulcerative lesions and in two of these was severe, amounting to 40% in one and 50% of the normal body weight in the other.

Fifteen patients complained of abdominal pain. In two this was of moderate severity and in the remainder amounted to little more than a dull ache. The epigastrium was the commonest site of the pain (10 patients) followed by the right upper quadrant (two patients) and umbilical region (two patients). In one patient the pain was in the right lower abdominal quadrant. Only five patients could relate their pain to taking food. In all of these the pain was experienced two to three hours after food and was relieved by eating. Only one patient, in whom gastric analysis revealed hyperchlorhydria, obtained relief of the abdominal discomfort by taking antacids. Of these five patients four had polypoid tumours and one an ulcerative lesion.

Anaemia was most severe in the patients with polypoid lesions. In four of these the haemoglobin levels ranged from 5 to 8 g. per ml., and in two between 8 and 12 g. In only one of the patients with ulcerative lesions was the anaemia immoderate and was related to gross melaena. With annular and infiltrative lesions anaemia was either very mild or absent.

Vomiting was a common symptom but was combined with constipation, as part of the syndrome of high intestinal obstruction, only in annular lesions.

Ten patients had jaundice. In eight the icterus was moderate and intermittent and in one deep and continuous. One patient had a cholecystoduodenostomy performed during the first icteric episode. In two of these patients the tumour was situated in the second portion of the duodenum, in two in the suprapapillary, and in six in the intrapapillary sites. In one patient only was there histological evidence that the tumour had extended to the common bile duct, but the ampullary stoma was patent and biliary obstruction was minimal. In all of the patients the pathologists were able to demonstrate patency of the papillary stoma. The jaundice in most of these patients may be explained by the incomplete or intermittent closure of the papillary stoma by inflammatory oedema which may occur in the immediate environment of the tumour mass, or by pressure, on the supraduodenal part of the biliary system, of lymphatic glands involved in metastatic cancer.

The tumour had remained localized to the duodenum in seven patients. All of the ulcerating and infiltrating lesions had metastasized at the time of initial diagnosis. Four of the polypoid and half of the annular lesions had also extended beyond the

limits of the duodenum. The metastases in six patients were confined to the regional nodes. In the remainder there was direct extraduodenal and metastatic spread which made excisional surgery impossible. There was no apparent relationship between the duration of symptoms or the symptomatic pattern and the incidence of metastases.

Study of this series of patients and of the published data concerning primary adenocarcinoma of the duodenum demonstrates that there is no specific syndrome by which malignant tumours of the duodenum may be recognized and that, at best, a clinical diagnosis may be suspected only after exclusion of the common conditions which give rise to the same or similar symptoms. It is at this stage that the opinion of the radiologist is invaluable.

In the diagnosis of duodenal tumours the radiologist must bear in mind the following aspects: He must demonstrate the lesion, decide if it has arisen in the duodenum, and assess whether it is neoplastic or due to other causes.

A review of the 28 cases forming the basis of this report revealed that where barium studies were undertaken the great majority of the tumours were seen. No barium meal examination is complete unless the whole of the duodenal loop up to, and including the duodeno-jejunal flexure, has been adequately examined. The fact that the duodenal loop was visualized should be stated in every report. The suprapapillary and papillary regions of the loop generally present little difficulty in examination, but

the infrapapillary region to the duodeno-jejunal flexure may be troublesome to outline satisfactorily with barium, since it is often obscured by the stomach. The supine right anterior oblique position will often afford the most satisfactory view of the duodenal loop, and this view should never be omitted during an examination.

It is our belief that this routine has, to a considerable extent, accounted for the higher frequency with which duodenal neoplasms have been reported by radiologists in recent years. Thus in this series the morphological lesion was reported seven times in the last 11 carcinomata seen between 1954 and 1960, although it went unrecognized in the others. In one of the four failures a large hiatus hernia clouded the issue and distracted the examiner's attention. This points to the all too natural tendency for a fluoroscopist to be satisfied with one obvious lesion, whereas an additional, more significant one, may be overlooked. In two further cases review of the available films failed to show the lesion, and in the fourth patient, due to a failure in technique, the lesion was obscured by residual barium in the colon from a preceding enema examination. Of the nine neoplasms, other than carcinomata, four were recognized by the radiologists concerned, four were not examined, and one showed features attributed to extrinsic causes and a small duodenal diverticulum.

If an obstructing lesion is encountered in the duodenum, with marked retention of excess resting

FIG. 1. Carcinoma of distal duodenum. The overfilled and dilated proximal duodenum resulted in unsatisfactory demonstration of lesion.

FIG. 2. The same patient as in Fig. 1. Repeated examination with an empty duodenum revealed the eccentrically placed neoplastic stricture to advantage.

FIG. 3. *Polypoidal duodenal carcinoma. Asterisk marks the small circumscribed lesion at the base of the cap. The patient also had multiple intestinal polyposis (Peutz-Jegher syndrome).*

FIG. 4. *False filling defect simulating an intrinsic circumscribed lesion, due to a kink at site of deformity in the course of the duodenal loop.*

secretion, the examination should be repeated following aspiration and lavage of the stomach. Under such circumstances improved visibility of the duodenal loop, particularly at the point of obstruction, is achieved, and a correct diagnosis can be made as shown in Figs. 1 and 2.

Provided the examination proceeds smoothly, and a good radiograph of the duodenal loop has been obtained, only the smallest lesions should be missed. The smallest lesion in this series presented as a less than 1 cm. diameter filling defect on the lateral aspect of the base of the duodenal cap (Fig. 3). This was repeatedly demonstrated in the patient with the Peutz-Jegher syndrome.

Gastric and pancreatic carcinomata cause very similar symptoms to those of primary duodenal carcinomata. It is perhaps stating the obvious that the radiologist will exclude such other lesions with all his skill and the means available to him.

It may not always be easy to decide if the abnormality has actually arisen within the duodenum, or whether extrinsic causes have resulted in the deformity. The history, the age of the patient, and the location of the lesion all have an important bearing in reaching a decision. Congenital bands,

or variants in the course of the duodenal loop resulting in bends and kinks, are generally easy to differentiate, although at times they can closely resemble an intrinsic duodenal lesion. This is demonstrated in Fig. 4. Deformities due to adhesions, particularly with the gall bladder, or the bed of the excised gall bladder, are commonly seen, but will not result in filling defects which one comes to expect in duodenal neoplasms. Such features are encountered particularly in the first part of the duodenum, where primary malignant tumours are decidedly uncommon. Fistulae between the biliary tree and the duodenum can give rise to sufficient distortion to cause diagnostic difficulty. Most of these are internal biliary fistulae, 90% of which are due to gallstones, and only a few to neoplasms. In our original series there was one duodeno-cholechochal fistula, as well as a duodeno-colic fistula, the result of primary duodenal carcinomata. In both of these patients typical neoplastic features indicated the site of origin.

Of the neoplasms causing extrinsic involvement, carcinoma of the head of the pancreas is by far the most important. Carcinomata in this location can simulate primary duodenal neoplasms so closely

FIG. 5

FIG. 6

FIG. 7

FIG. 5. *Carcinoma of head of pancreas. Unusual, extensively stricturing invasion of the duodenal loop by the pancreatic growth. Some widening of the loop is also present.*

FIG. 6. *Carcinoma of the right kidney, with metastatic intramural and submucosal involvement of the distal duodenum, indistinguishable from a primary, intrinsic tumour.*

FIG. 7. *Carcinoma of pancreas. Metastatic glands indenting the duodenal cap, simulating a polypoidal type of lesion.*

that it may be impossible by radiological means to decide where the actual site of origin is unless pressure effects on the duodenal loop or stomach, particularly the antrum, are visible. These effects are common in pancreatic and absent in duodenal growths. Abnormal mucosal changes, such as distortion or destruction, do occur in both conditions. On the other hand, annular constricting lesions associated with mucosal changes are more common in duodenal neoplasms. This occurred nine times in the present series. Such changes were only seen three times in a series of 74 histologically proven cases of carcinoma of the pancreas (unpublished data, H.P.K.). An example of this rare constricting lesion due to a pancreatic growth is shown in Fig. 5. Again, one cannot always pinpoint the lesion if major obstructing features are present.

Carcinoma of the ampulla, resulting usually in a small filling defect on the medial aspect in the papillary region, is difficult to distinguish from a duodenal or pancreatic tumour, although its location will be highly suggestive as to its actual site of origin. Other neoplasms involving the duodenal loop are infrequently met with. Carcinoma of the colon may involve the duodenal wall, with

or without fistulation, and a barium enema is likely to be diagnostic. Metastatic disease has been reported as causing filling defects in the duodenum, as well as mucosal deformities and obstruction. Figure 6 presents a highly interesting appearance in this respect. The patient had mural and submucosal metastases in the third part of the duodenum from a primary carcinoma of the right kidney. Abnormal and persistent mucosal changes were radiologically demonstrated, although at necropsy the duodenal mucosa was intact over the metastatic lesion, yet splayed and distorted. Such an appearance cannot be differentiated from primary intrinsic neoplastic lesions involving the mucosa.

Enlarged glands, irrespective of their cause, can encroach upon the duodenal contour and simulate a primary duodenal tumour. This is shown in Fig. 7. The patient had a carcinoma of the head of the pancreas, and the proven extrinsic metastatic glands caused multiple filling defects on the duodenal bulb.

If the appearances suggest that the duodenal lesion is intrinsic, it must be decided if it is traumatic, inflammatory or neoplastic, or possibly intraluminal in origin. Trauma, resulting in periduodenal and

FIG. 8. *Periduodenal and intramural post-traumatic haemorrhage. Note a slight narrowing in papillary and adjoining area, and downward displacement of small gut loops, due to the periduodenal component of the haematoma, and widening of the folds over the spine, due to the intramural haematoma.*

intramural haemorrhage, can give rise to distortion and splaying out of the fold pattern (Fig. 8). The history will be the deciding factor in such cases.

Chronic specific inflammatory lesions of the duodenum, such as actinomycosis, have been described (Wheeler, 1927; Rabinowitz, 1933) but it is so uncommon that it will hardly ever have to be considered in the diagnosis. Tuberculosis and

chronic regional enteritis localized to the duodenum are also only exceptionally encountered. Admittedly tuberculomata involving the duodenum may simulate a benign tumour, and the strictures and mucosal changes occurring in either of these conditions will have to be differentiated from annular constricting carcinomata of the duodenum. In both these diseases involvement elsewhere in the intestine is of course characteristic.

Duodenal ulceration is the major inflammatory lesion which must be differentiated. It is so common in the first part, and carcinoma so rare in this area, that it is unlikely that a carcinoma will even be thought of during the examination. Post-bulbar ulcers have been given a great deal of attention in recent years. Most of these are in the apical region. Post-bulbar ulcers distal to this can cause difficulties. Usually, in the absence of complicating factors such as obstruction, such ulcers are well shown on radiographs. They have a tendency to show convergence of the fold pattern towards the apex of the crater, with spastic phenomena on the opposite, generally the lateral, wall. Post-bulbar ulcers are often quite large, and by virtue of the surrounding mucosal oedema, which may be extensive, the crater tends to project well out from the normal confines of the duodenal wall. This is shown in Fig. 9. The convergence of the folds and their lack of destruction should suggest the diagnosis of a peptic ulcer rather than a neoplasm. In another patient (Fig. 10) the distortion at the site of the post-bulbar ulcer resulted in food being retained in the duodenal

FIG. 9

FIG. 9. *Post-bulbar duodenal ulcer in papillary region. Crater projects, folds converge, and some proximal obstruction is present.*

FIG. 10

FIG. 10. *Large apical post-bulbar ulcer, with proximally convergent folds, and triangular food remnant in cap simulating tumour.*

FIG. 11. *Faceted gallstones impacted in duodenal cap, simulating a polypoid growth, proximal to a cholecystoduodenal biliary fistula.*

FIG. 12. *Antral gastritis with prolapse of folds, with filling defect at base of duodenal cap.*

cap, causing a filling defect which might have been interpreted as being due to a tumour.

It is well to recall that intraluminal features other than food rests can also cause filling defects indistinguishable from benign tumours situated in the duodenum. Filling defects due to gallstones, which are impacted proximal to the mural constriction of a cholecystoduodenal fistula, are rare but one example is presented in Fig. 11. Benign gastric tumours, prolapsing into the duodenum, have been described on many occasions, and unless the stalk can be identified, may be very difficult to eliminate as primarily duodenal in origin. The commonest gastric lesion causing an intraluminal

FIG. 13. *Hyperplasia of Brunner's glands, resulting in polypoidal filling defect in cap. No surgical proof.*

filling defect at the base of the duodenal cap, either at one, but usually both sides of the pylorus, is antral gastritis with prolapsing folds (Fig. 12), but such a lesion is so frequently seen that it causes little difficulty in identification.

Gross duodenitis, without evidence of an ulcer crater in the duodenal cap, may closely mimic a duodenal polypoidal tumour. The radiograph of one patient, in whom a radiological diagnosis of hyperplasia of Brunner's glands was made, is shown in Fig. 13. No histological proof of this diagnosis was obtained.

The typical neoplastic features of primary duodenal tumours will now be described in summary.

FIG. 14. Ulcerative carcinoma of the duodenum. Large intrapapillary crater on medial aspect, with irregular folds. [By courtesy of the Editor and publisher of Gastroenterology.]

FIG. 15. Polypoidal carcinoma in third part of duodenum. Smooth, oval filling defect. Site of proximal attachment not shown on radiograph. Unchanged appearance over several years.

The radiological interpretation of the morphological appearance of some of the tumours did not always correspond to the description given by the pathologists.

In patients with adenocarcinoma, annular constricting lesions with disturbance or actual destruction of the fold pattern were seen nine times. A typical example is seen in Fig. 2. Such strictures were concentric, but rather more frequently eccentrically placed. It is considered that in such cases a diagnosis of a primary carcinoma can be offered with considerable confidence. Neoplastic craters were found only twice, an excellent example being shown in Fig. 14. In this patient the crater was situated in a proliferative lesion, with a quite irregular, though not completely destroyed, fold pattern. Purely polypoidal lesions resulting in filling defects were encountered five times, an example being shown in Fig. 15. This polypoidal lesion, about 2 in. long, was attached by a stalk to the duodenal wall at its proximal aspect. Another example of this type has already been shown in Fig. 3.

In the majority of the carcinomata there was no

evidence of actual displacement of the duodenal loop as such. Obstructing features to a lesser or major degree were seen in eight patients, and, as is to be expected, primarily in the annular constricting type of lesions. A mass was only exceptionally mentioned by the fluoroscopist. Cineradiography, which would have been of considerable value in showing rigidity at the site of the lesion and inhibition of peristalsis, only came into use in Saskatchewan recently.

A leiomyoma (Fig. 16), which involved a considerable portion of the intrapapillary region, and had led to repeated exsanguinating haemorrhages, bulged into the duodenal lumen from its intramural position, revealing a maintained fold pattern up to the edge of the growth. This is typical of an extra-mucosal, intramural lesion. In this patient cine-radiography was in fact employed, and showed diminished peristaltic activity at the area of attachment of the tumour, as barium flowed over and past it.

One of the patients with an adenomatous polyp (Fig. 17), and a patient with a malignant carcinoid (Fig. 18), had circumscribed filled defects in their

FIG. 16

FIG. 16. *Leiomyoma in intrapapillary region. Smooth, circumscribed, medially situated tumour. Fold pattern maintained up to edge of lesion.*

FIG. 17

FIG. 17. *Adenomatous polyp of duodenal cap. Smooth, slightly lobulated filling defect.*

FIG. 18

FIG. 18. *Malignant carcinoid in intrapapillary region. This lesion was accidentally discovered at the time of this operative cholangiogram. Note small gallstone at lower end of common duct.*

FIG. 19

FIG. 19. *Mucosal hypertrophy in duodenal cap. Unchanged in appearance over a period of years, radiologically considered to represent a benign tumour.*

FIG. 20

FIG. 21

FIG. 20. *Leiomyosarcoma of duodenum. Soft tissue mass above barium filling proximal transverse colon, delimited superiorly by crescentic concave downwards gas shadow.*

FIG. 21. *The same patient as in Fig. 20. Laterally situated filling defect in the intrapapillary region due to the main mass of the tumour. Widening of the lumen at site of tumour, some proximal duodenal dilatation. Medially the tumour shows a somewhat irregular ulcerating surface.*

respective positions, indicative of a neoplasm, though not specific of their exact nature. By comparison with Fig. 17 a rather similar filling defect, constant on repeated examinations over a period of years, is shown (Fig. 19). In this patient only hypertrophy of the duodenal mucosa and scarring from an old duodenal ulcer were identified at surgery. These were confirmed histologically.

A leiomyosarcoma gave rise to most striking appearances. A barium enema (Fig. 20) had shown a soft tissue mass above the proximal transverse colon, superiorly demarcated by an abnormal crescentic gas shadow. The barium meal (Fig. 21) revealed minor dilatation of the upper duodenum, the lumen being widened at the site of the actual tumour. This measured about 10 cm. in length, projected into the lumen from the lateral aspect, and caused a constant filling defect ending medially in an irregular, evidently ulcerating, surface. It is to the credit of the fluoroscopist (not the writer) that he did not only diagnose a primary tumour of the duodenum but actually suggested the nature of

the lesion in his differential diagnosis. In retrospect it is considered that the widening of the lumen at the site of attachment of the tumour is probably the most diagnostic feature in this case, since it indicates its intramural origin. Such appearances are most unusual in duodenal carcinomata.

While a radiologist should attempt a final diagnosis he can often only make an intelligent guess as to the histology of the lesion. How misleading a radiological diagnosis can be is shown in the patient presented in Fig. 15, an over-80-year-old woman, who was known to have a large polypoidal intraluminal lesion over a number of years, causing repeated intestinal haemorrhages. The stalk, the smooth outline, and the lack of mucosal changes had led to the acceptance of a diagnosis of a benign polyp. Ultimately, at surgery, the polyp proved to be a carcinoma, which had not changed its appearance radiologically. Similarly in the patient presented in Fig. 3, the lesion was thought to be a benign polyp in view of the other known and demonstrated tumours of the Peutz-Jegher syndrome. In such cases there is,

of course, no special feature which would lead the radiologist to the correct diagnosis. His radiographs, in fact, will be reassuringly misleading.

In view of cases such as these, although the radiologist should certainly express his opinion as to the exact nature of a lesion, his primary concern will remain the demonstration of the abnormality. The full assessment of the patient and the correlation of the radiological and clinical data remain ultimately the responsibility of the clinician.

The satisfaction of making a preoperative diagnosis while the lesion is in a resectable stage has, in recent years, been a growing experience for an increasing number of surgeons. This has resulted from the greater index of suspicion on the part of the clinicians and the improved techniques and understanding of his radiological colleagues.

SUMMARY

1 The incidence of primary malignant tumours of the small intestine has been discussed. A special study has been made of the tumours arising in the duodenum.

2 The clinical features of 19 patients with primary adenocarcinoma of the duodenum have been presented.¹

3 The radiological aspects of the diagnosis of primary duodenal tumours have been described. Following the demonstration of the duodenal abnormality, considerations regarding the site of origin and the type of lesion should follow in logical sequence.

4 Examples of both extrinsic, as well as intrinsic, abnormalities simulating primary duodenal tumours have been given, and briefly discussed from the point of view of the differential diagnosis. The difficulties in the diagnosis have been stressed, and the similarity in the appearance of some of the lesions with each other pointed out.

¹Since this paper was submitted two further patients with primary adenocarcinoma of the duodenum have been encountered. Both were men in the eighth decade of life and in each case the second portion of the duodenum was involved. Neither was diagnosed clinically before death. In one patient there was a co-existent carcinoma of the stomach.

5 A summary of the radiological appearances of 19 cases of primary duodenal adenocarcinoma, and several other primary duodenal tumours has been given.

6 In annular, constricting carcinoma, the commonest lesion in this series, the diagnosis can be made with considerable confidence. In polypoidal and ulcerating lesions there is need for great caution in making a histological diagnosis by radiological means.

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