view the time is not far off when the illogical but time-honoured attitude of leaving a minor disk lesion to get larger or smaller as fortune dictates will provide us with another legal hazard.

Economic Considerations

If a family doctor is asked how many patients in bed with lumbago he has at any one moment, the usual answer is one, two or three. This implies that between 20,000 and 50,000 patients are off work at any one time because of a displaced fragment of disk. Were patients off sick because of a stiff neck, brachial neuritis, "fibrositis," pleurodynia, and sciatica all added to the list, a huge total of largely avoidable disablement would be reached. This costs the Health Service in sickness benefits far more than the expense that would be entailed in securing adequate treatment for the sufferers. Without further research, merely by a more general application of methods already evolved and continuously tested since, a great saving in pain and disablement would accrue, with huge advantage to the financial aspect of health insurance. From the economic point of view it is the logical treatment of the common disorders of the vertebral column that would make the biggest immediate contribution to industrial health to-day.

Summary

The rediscovery 21 years ago of intervertebral disk lesions explains the cause of many pains in the trunk and limbs, previously misunderstood. This clarification has not been followed by enough change in methods of treatment. Measures thought appropriate in previous decades—for example, heat, massage, exercises—remain in use at a time when reduction by manipulation or traction is required.

At present spinal manipulation for disk lesions is largely in the hands of laymen. This is a sad state of affairs; for if a patient requires treatment for an intervertebral displacement this should be administered by a doctor; failing that, by a physiotherapist working under his direction. The economic benefit is no less important than the humanitarian aspect.

Physiotherapists should be trained in accurate manipulation and thus make treatment for the reducible disk lesion possible on a large scale within the Health Service. It can be done, as our experience at St. Thomas's Hospital proves, and would render lay manipulators superfluous.

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The Association of Universities of the British Commonwealth has just published, as a pamphlet entitled *United Kingdom Postgraduate Awards (Fellowships, Scholarships, Grants, etc.)*, Appendices II and III of the *Commonwealth Universities Yearbook, 1955*. The *Yearbook* itself will be published in May. Appendix II contains a list of post-graduate awards "for advanced study and research tenable in the United Kingdom." It has been prepared as the result of a resolution of the Congress of Universities of the Commonwealth that each of the countries of the Commonwealth should draw up a list of postgraduate and research awards available at its universities for overseas graduates. Appendix III contains a list of postgraduate and research awards tenable outside the United Kingdom. It applies only to United Kingdom graduates and does not claim to be exhaustive. The pamphlet can be obtained from the secretary, Association of Universities of the British Commonwealth, 36, Gordon Square, London, W.C.1.

PRIMARY TUMOURS OF THE SMALL BOWEL

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It is now well recognized that tumours of the small bowel, though rare, account for about 3% of tumours found in the gastro-intestinal tract, and that most surgeons will encounter several in the course of their career. The incidence of tumours of the small bowel is greatest in the duodenum. Willis (1948), quoting a series published by Hoffman and Pack (1937), mentions that, of 228 small-bowel tumours, 104 were situated in the duodenum. As the distance along the small bowel from the duodeno-jejunal junction increases so the incidence of tumours decreases, the symptomatology is different, and there are types of neoplasm met with in the jejuno-ileum seldom seen in the duodenum. One may therefore consider the two categories, duodenal and jejuno-ileal neoplasms.

Tumours of the small bowel are of four main types and may be innocent or malignant:

Types of Small-bowel Tumour

	Innocent	Malignant
I. Epithelial tumours ..	Adenoma	Adenocarcinoma
II. Connective-tissue tumours	Fibroma, myoma, lipoma, neuro-fibroma	Fibrosarcoma, leiomyo-sarcoma
III. Tumours of lymphatic or vascular origin	Angioma	Lymphosarcoma, reticu-lum-cell sarcoma, Hodg-kin's disease
IV. Special group ..		Carcinoid

In general, it may be said that these tumours produce symptoms in one of four ways: (1) Obstruction, which may be due to an annular stricture, to intussusception with the tumour at the apex, or to volvulus. (2) Jaundice due to obstruction at the ampulla of Vater. (3) Melaena, anorexia, and loss of weight. (4) Perforation, which is a rare method of presentation.

It is not intended to discuss the signs and symptoms in detail, but rather to present the experience gained at a provincial hospital in dealing with these tumours over a period of ten years. In this period 16 cases have been diagnosed as suffering from small-bowel neoplasms. The details of these cases are shown in the table on the opposite page.

If we consider these cases together it will be seen that 12 presented with symptoms of acute or subacute small-bowel obstruction, 2 with abdominal discomfort and jaundice, and 2 with abdominal discomfort and melaena. In most of these cases pre-operative investigation was of little help in establishing the diagnosis, as in many of them operation was performed forty-eight to seventy-two hours after admission for the relief of obstructive symptoms. However, in four cases a barium meal examination was made, but was negative in each instance. The benzidine test for occult blood was performed in four cases and in each case gave a positive result. A plain film of the abdomen with the patient

standing in order to demonstrate fluid levels was done in six cases, and in none of these were fluid levels seen. Other investigations included barium enemata and sigmoidoscopy in isolated instances with negative results. All the diagnoses were confirmed by section of material removed at operation or at post-mortem examination. We shall now consider these lesions individually in more detail—8 carcinomata, 5 sarcomata, 1 argentaffinoma, and 2 benign tumours.

Carcinoma

Adenocarcinoma of the small bowel may affect the duodenum or the jejuno-ileum, though it usually appears not more than 2 feet (60 cm.) from the duodeno-jejunal junction (Ewing, 1940); although in a series published by the Mayo Clinic (Mayo, 1940) there were 31 tumours in the jejunum and 21 in the ileum. Of those arising in the duodenum, 22.5% are situated above the ampulla of Vater, 59.2% are peri-ampullary, and 18.3% are situated below the ampulla, these figures being given in a review of the subject by Locke (1953). Those growths situated around the ampulla of Vater may in fact be arising from the lower end of the common bile duct, and it is very difficult in many cases to decide whether they are duodenal or ampullary in origin: in advanced cases it may even be difficult to decide whether the tumour arises from the duodenum or the pancreas. Adenocarcinoma of the small bowel may be proliferative, may form an ulcer or an annular stricture, or may be a mixture of these varieties. Symptoms will depend on the site and type of growth present. Lesions of the duodenum are often associated with obstructive jaundice; ulceration produces melaena, and obstruction when it occurs is late. Ulcerating lesions in the jejuno-ileum may produce melaena, but obstructive symptoms are also late owing to the fluid nature of the small-bowel contents. Vomiting is more pronounced in duodenal than in jejuno-ileal lesions. The diagnosis in these cases may be helped by straight *x*-ray examination of the abdomen, which will sometimes show fluid levels above the site of the lesion. Barium meal and follow-through is sometimes of use, and is safe if a Miller–Abbott tube be first passed down to the site of the obstruction. Barium studies may show a filling defect, an ulcer, or annular constriction at the site of the lesion. In cases in which ulceration has occurred the benzidine test on the stool should be positive.

In our series there are eight adenocarcinomata, situated as follows: second part of duodenum—peri-ampullary, 3; duodeno-jejunal junction, 1; proximal jejunum, 3; terminal ileum, 1.

Of the three tumours in the duodenum, two were associated with obstructive jaundice and subacute bowel symptoms of an obstructive nature. The only symptom associated with the third case was the recent appearance of an epigastric mass in a person who had had steatorrhoea for years. Case 6 is interesting because of its mode of presentation and subsequent history.

Case 6.—A woman aged 61 was admitted in December, 1951, complaining of jaundice for three months which was becoming progressively worse. Her urine was dark and the stools were clay-coloured. There was no other relevant history. On examination she was seen to be an obese, markedly jaundiced, middle-aged woman. Abdominal palpation revealed a moderately enlarged liver, but the gall-bladder was not palpable and no other abnormality was detected. Biochemical investigation indicated that her jaundice was of an obstructive type, and straight *x*-ray examination of the abdomen, including the gall-bladder area, was negative. Laparotomy was carried out in December, 1951: the gall-bladder was dilated and a firm mass was felt in the head of the pancreas. No glands were palpable and there were no secondaries in the liver. A duodenectomy and removal of the head of the pancreas were done in one stage, but section showed the tumour to be a papillary adenocarcinoma of the duodenum. Convalescence was uneventful, and she remained well until June, 1953, when multiple pulmonary metastases were demonstrated.

Details of Cases

Case No.	Date	Sex and Age	Symptom	Duration	Operative Finding	Section	Result
1	18/2/51	F 82	Colicky abdominal pain	2 months	Carcinoma terminal ileum. R. hemicolectomy	Adenocarcinoma	Death, 28/6/52
2	26/1/52	F 19	Recurrent abdominal colic	1 month	Laparotomy. Reticulosarcoma. Biopsy gland	Reticulosarcoma	Untraced
3	Feb., '47	M 50	Abdominal pain—colic. Vomiting	4 days	Carcinoma jejunum. Resection and anastomosis	Adenocarcinoma	Secondaries. Death, Dec., '47
4	28/12/51	F 76	Jaundice. Vomiting. Abdominal pain	6 weeks	Laparotomy. Carcinoma ampulla of Vater. Cholecystostomy	P.M.: carcinoma of ampulla	Death, 3/1/52
5	13/12/51	M 38	Abdominal discomfort. Vomiting	1 week	Laparotomy. Chylous ascites. Thickened rigid bowel. Mesenteric glands enlarged—grey	Reticulosarcoma	Death
6	12/12/51	F 61	Painless obstructive jaundice	4 months	Hard mass 2nd part duodenum. Duodenectomy and removal head of pancreas	Adenocarcinoma duodenum	Alive. Pulmonary secondaries
7	3/8/50	F 33	Colicky abdominal pain	3 ,,	Multiple tumours ileum; glands	Argentaffin carcinoma	Alive
8	4/5/50	M 5	Abdominal pain. Vomiting	2 weeks	Chylous ascites. Bowel thickened. Liver, spleen enlarged. Mass in pouch of Douglas	Lymphosarcoma	Death, 8/5/50
9	20/9/50	F 30	Recurrent colicky abdominal pain	3 months	Intussusception. Adenoma ileum	Adenoma	Alive
10	29/12/50	M 33	Abdominal colic. Haematemesis	4 days	Subtotal gastrectomy	P.M.: lymphosarcoma involving stomach and small bowel	Death
11	28/10/51	F 48	Repeated melaena. Epigastric pain	6 months	? Carcinoma pancreas. Duodenectomy and partial pancreatectomy	Polypoid carcinoma duodenum	,,
12	3/5/50	F 50	Generalized abdominal pain. Melaena	4 weeks	Resection of terminal ileum with Meckel's diverticulum and leiomyoma	Leiomyoma	Alive
13	Sept., '48	F 65	Abdominal pain. Constipation	2 months	Carcinoma jejunum 4 in. from duodeno-jejunal flexure. Glands++. Resection and anastomosis	Reticulosarcoma	Death
14	21/1/53	M 40	Steatorrhoea for years. Abdominal discomfort	3 ,,	Carcinoma duodeno-jejunal junction. Resection and anastomosis	Adenocarcinoma	Death. Thrombosis superior mesenteric artery
15	10/1/46	M 50	Colicky abdominal pain	2 weeks	Carcinoma jejunum 2 in. beyond duodeno-jejunal junction. Glands++. Gastro-enterostomy	P.M.: adenocarcinoma	Death
16	19/8/52	F 44	Recurrent attacks of colicky abdominal pain. Vomiting	3 months	Annular carcinoma jejunum 12 in. from duodeno-jejunal junction. Glands++	Adenocarcinoma	Readmitted June, 1953. Large mass in pelvis. Laparotomy. Krukenberg tumour right ovary

All the growths in the jejunum and ileum were associated with obstructive symptoms varying from 2–3 days to 2–3 months in duration. In each case laparotomy was performed shortly after admission. Case 3 is illustrative.

Case 3.—A man aged 50 was admitted to hospital in February, 1947, complaining of colicky abdominal pain of four days' duration; there was no vomiting. His abdomen was slightly distended and he was tender to the left of his umbilicus. His symptoms subsided with expectant treatment but recurred at intervals until April of that year. A test for occult blood was positive, but barium enema and sigmoidoscopy were both negative. Haemoglobin was 94%. In April a tender mass was noticed in his left iliac fossa and laparotomy was performed. He was found to have an annular carcinoma of the jejunum approximately 2 ft. (60 cm.) from the duodeno-jejunal flexure, and this had led to a small-bowel volvulus. Secondary glands were felt in the mesentery and peritoneal deposits in the pelvis. The affected portion of bowel was resected and an end-to-end anastomosis performed. Convalescence was satisfactory, but he died from secondary carcinomatosis in January, 1948.

The duodenum and jejuno-ileum both have an abundant lymphatic drainage, together with a rich blood supply, and this probably accounts for neoplasms of the small bowel tending to metastasize early to the mesenteric lymph nodes and to the liver. Lesions in the duodenum produce symptoms at a rather earlier stage than do those in the jejuno-ileum, even before any metastases have occurred. The treatment of choice is resection of the involved segment together with its lymphatic field, followed by end-to-end anastomosis. General experience has shown these lesions to have a very poor prognosis, symptoms severe enough to cause the patient to seek treatment not occurring until comparatively late in the disease. This is borne out by our cases.

The Sarcoma Group

Amongst our cases there were five which came within this category. Two of these patients, aged 5 and 33, were diagnosed as suffering from lymphosarcoma, while three, aged 65, 38, and 19, were shown to have a reticulum-cell sarcoma. These two diseases together with Hodgkin's disease may primarily involve the mesenteric lymph nodes and lymphatic tissue in the wall of the small bowel. They frequently cause a chylous ascites due to lymphatic obstruction. The peritoneum may be studded with firm greyish nodules of tumour tissue. Large masses may be produced by glandular enlargement and the matting together of thickened and rigid loops of small bowel, resulting in subacute small-bowel obstruction. In some of these cases the liver and spleen may be involved. Diagnosis is often difficult, though the presence of an enlarged liver or spleen or of glands elsewhere may help, but in the present series the child of 5 was the only patient with a palpable liver and spleen. Full blood examination and glandular biopsy will help in establishing the diagnosis. One patient had previously been admitted elsewhere with a haematemesis for which he had undergone partial gastrectomy before the correct diagnosis was reached. In Cases 2, 8, and 13 there was a palpable mass in the lower abdomen. In all cases, at laparotomy, a large mass was found involving both the wall of the small bowel and its mesentery. In suitable cases resection of the involved segment followed by radiotherapy would appear to be the treatment of choice, although in none of our cases was this possible. Case 2 demonstrates these points.

Case 2.—A girl of 19 was admitted to hospital on January 26, 1952, having had an attack of severe colicky upper abdominal pain. Prior to admission she had had frequent attacks of less severe pain, each associated with vomiting. Bowel and urinary history were normal, menstruation was trouble-free. On examination there was an ill-defined lower abdominal tumour, but no other abnormality was noted. Laparotomy was performed on January 29, when the peritoneal cavity was found to contain a large quantity of chylous fluid. The mesentery of the terminal ileum together with the bowel itself formed a large mass. There were numerous grossly enlarged glands, the lymphatics were dilated, and there were several large lymphatic cysts, some 3 in. (7.5 cm.) in diameter, along the mesenteric border of the bowel. The bowel itself was thickened and rigid. It was only possible to remove a gland for biopsy, and the report was as follows: "Great increase of reticular elements at the expense of lymphoid tissue in the gland. No normal lymphoid follicles seen. Probably a reticulosarcoma." There is no record of this patient having been seen since at the hospital.

The prognosis in these cases is that of the general disease, and, as is well known, is uniformly poor. Fibrosarcoma and leiomyosarcoma may both occur in the small bowel but have not been met with in this series.

Carcinoid Tumours or Argentaffin Carcinoma

These deserve special mention, occurring as they do in two special situations, the appendix and the terminal ileum.

These tumours arise from granular cells lining the depths of the crypts of Lieberkühn. They were described by Kultschitzky and have a special staining reaction with silver stains, thus often being referred to as argentaffin cells. Freidin (1953) states that these tumours occur as a result of abnormal proliferation of the argentaffin cells, the tumour first appearing in between mucosa and the muscularis mucosa and forming a yellowish-white mass over which the mucous membrane is stretched. As the mass increases in size it comes to involve the serosal surface of the bowel, where it may be seen as a yellowish or greyish plaque which, as a general rule, does not completely encircle the bowel, and thus obstruction may not be a prominent feature. The mucous membrane seldom becomes ulcerated over the tumour. Microscopically, the tumour is made up of columns of round or polyhedral cells with a granular cytoplasm and a darkly staining nucleus. There is no attempt at gland formation.

Tumours in the appendix are characteristically single and most frequently occur near the tip: they are usually discovered following routine appendicectomy or at necropsy. Ileal growths may be multiple, but, as they may not always encircle the bowel completely, symptoms may be absent. In his series Freidin reports that 13 of 16 ileal carcinoid tumours were found incidentally at post-mortem examination, the others causing obstructive symptoms. Metastasis from appendical lesions is seen in about 5% of the cases. Metastasis from ileal lesions is more frequent, and secondary deposits are found in the regional lymph glands and in the liver. Though similar in appearance and in microscopic structure, appendical and ileal lesions have several important differences which are summarized below, the figures being taken from Freidin's series of 30 cases.

	Appendix	Jejuno-ileum
Sex incidence	M:F=4:10	M:F=14:2
Age	Average 26 years	Average 26 years
Number	Single	May be multiple
Metastasis	Rare	Common

One of our cases (No. 7) is worth reporting.

Case 7.—A married woman aged 33 was admitted to hospital on August 3, 1950, complaining of lower abdominal pain of a colicky nature which had been present for three months. A straight *x*-ray film of the abdomen and a barium meal and follow-through showed no abnormality. Laparotomy was carried out on August 4 and in the ileum 17 isolated yellowish-coloured tumours were found almost completely encircling the bowel. The mesenteric glands were enlarged with similar growth and there were peritoneal seedlings. Approximately 8 ft. (2.4 metres) of ileum containing these tumours together with the mesentery and as many glands as possible were removed and an end-to-end anastomosis was performed. Convalescence was uneventful and the patient was alive and well three years after operation.

This case is remarkable in that there seems to have been no progression of secondaries in the three years since operation.

Benign Tumours

Many types of benign tumours may occur in the small bowel from time to time, and in this series we have two such cases. The first of these was an adenoma situated in the terminal ileum and forming the apex of an intussusception in a woman aged 30. The intussusception was reduced and the adenoma removed. The patient was still alive and well at the time of writing. The second tumour occurred in a

woman aged 50 who presented with melaena. Laparotomy showed her to have a Meckel's diverticulum and a rounded tumour in the wall of her terminal ileum distal to the diverticulum. Resection of the involved segment of ileum was carried out, section showing the tumour to be a leiomyoma.

Summary

We have reviewed briefly the primary tumours met with in the small intestine and report a series of 16 such tumours dealt with in this hospital over the past ten years.

Adenocarcinoma is the commonest of these tumours. It occurs most frequently in the duodenum and upper jejunum. Symptoms occur late owing to the fluid nature of the bowel content at this level. Prognosis is uniformly poor, and this has been our experience. The age incidence of these growths corresponds to the general cancer age, and women were affected more often than men.

A description of the lesions produced by lymphosarcoma and allied conditions is given. Five such cases are reported, and it is suggested that in suitable cases resection of the involved segment followed by radiotherapy is the treatment of choice.

A description is given of the carcinoid or argentaffin carcinoma. The different behaviour of this tumour occurring in the appendix and ileum is discussed, and one such case is reported.

Our thanks are due to other members of the staff of the Essex County Hospital for allowing access to their case records, and to Dr. J. B. Penfold for his helpful criticism.

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ASSOCIATION OF JEJUNAL DIVERTICULOSIS AND STEATORRHOEA

BY

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It seems justifiable to report the following single case of steatorrhoea, macrocytic anaemia, and glossitis associated with multiple jejunal diverticulosis, in view of the considerable theoretical interest of the association and the apparent rarity of the occurrence. No similar case can be found in the literature. Moreover, the diarrhoea was relieved for a period of eight months after a course of chlortetracycline ("aureomycin"), and during this time the anaemia remained in remission without other treatment.

Diverticula of the small intestine between the duodeno-jejunal flexure and the ileo-caecal valve are usually symptomless and are found by chance in the course of a barium-meal examination or at necropsy. Their incidence has been recorded as 9 cases in 2,820 necropsies at King's College Hospital and as 0.31% by Edwards (1939), but it may be commoner than this. Benson, Dixon, and Waugh (1943) state that 122 cases had been recorded at the Mayo Clinic, of which 100 were jejunal, 17 in the ileum, and in 5 cases the diverticula were present in both. They are commoner in older people (Edwards, 1939). They are said on occasion to give rise to vague abdominal symptoms such as flatulence and postprandial discomfort, but in some instances it may be that the presence of these symptoms from other causes has led to the performance of a barium meal and the discovery of the diverticula.

Complications such as acute intestinal obstruction, volvulus in relation to diverticula (Stiven, 1934), haemorrhage (Braithwaite, 1923; Waterson, 1952), perforation (Butler, 1937), diverticulitis (Butler, 1933), and the syndrome of chronic intestinal obstruction (Phillips, 1953) have all been described. The latter consists of symptoms varying from vague abdominal discomfort to more definite colic, vomiting, and constipation with loss of weight and deterioration in general health. Phillips, in discussing this syndrome, points out that there is no organic obstruction at laparotomy, although distended hypertrophic loops of bowel may be found, and he in fact suggests that there is a "dyskinesia" of the bowel which produces this syndrome and which also causes the pulsion-diverticula. He quotes Benson *et al.* (1943) as stating that non-organic chronic small-bowel obstruction was the commonest observed complication in their series of 122 cases—and that the changes resemble those in small intestine which has been obstructed for a long period. One of two cases which he describes had loose stools.

No reference to their association with deficiency syndromes from failure of small-intestinal absorption can be found in the literature other than a single case report by Montuschi (1949). He reported the case of a man aged 66 with a history of eight years' recurrent abdominal pain and bouts of diarrhoea and four years' oedema of the legs. Investigation showed a lowered plasma albumin and a raised faecal fat. Barium examination revealed multiple diverticula in the small intestine and colon, with precipitate passage of barium through the small intestine and loss of the normal mucosal pattern. It was thought that a low-grade inflammatory process in the diverticula was probably the cause of the small-intestinal hurry which led to deficient absorption of protein.

Case Report

A housewife aged 71 was first seen in December, 1949. She had been in good health until five years previously, when she began to have two or three loose motions a day, the stools being sometimes pale. She did state that her bowels had always tended to be easily upset, but that it was seldom this occurred. Three years before she developed a sore tongue, and shortly afterwards in November, 1946, a blood count showed some macrocytosis and anisocytosis. (Details of blood counts are given in the Table.) On December 20 a barium meal showed a small hiatus hernia. On the second part of the duodenum and on the duodeno-jejunal flexure there were large diverticula, and there were multiple diverticula throughout the jejunum. These showed some stasis in the erect position (Dr. F. R. Berridge). She was apparently diagnosed as suffering from pernicious anaemia, and it was thought that the diarrhoea was due to achlorhydria.

She was treated with a purified liver extract ("anahaemin") intramuscularly once a fortnight at first, and subsequently monthly for the next three years until she was admitted to hospital. No test meal had been done. Full particulars of her blood counts during this time are not available, but she still had macrocytosis in 1949. Her diarrhoea remained unchanged during this time, and her tongue continued to be sore most of the time, with occasional periods when it did not trouble her. One month before admission she developed much more severe diarrhoea, having 10 watery stools a day and copious vomiting. The