Papers and Originals

Problems of Alimentary Bleeding*

F. AVERY JONES,† C.B.E., M.D., F.R.C.P.

British Medical Journal, 1969, **2**, 267–273

This lecture is a commentary on diagnosis and management of acute alimentary bleeding, with special reference to the problems of the less common causes. It is based on the experience of treating over 4,000 cases admitted to the two gastroenterological wards at the Central Middlesex Hospital.

Acute and chronic peptic ulcer accounted for about 80% of the admissions. The remainder included: hiatus hernia (2·3%), portal hypertension (2·7%), carcinoma of the stomach (2·5%), Mallory–Weiss syndrome (3%), and about 40 different uncommon causes (5·2%), with a residue of acute bleeds of uncertain origin.

Mechanisms of Alimentary Bleeding

There is still much to be done in unravelling the mechanisms of alimentary bleeding (see Table). There are obvious causes from erosion or rupture of blood vessels. The outstanding problem that remains is the mechanism of diffuse bleeding—gastrostaxis or enterostaxis. Doig and Shafar (1956) presented an admirable study of the disturbed haemodynamics associated with superficial mucosal haemorrhages which may be found complicating intracranial vascular accidents. They pointed out that the venules forming the source of the haemorrhages were often much dilated, and there were vascular haemorrhages which tended to coalesce to form typical wedge-shaped superficial mucosal haemorrhages. It was not possible to determine whether vasomotor paralysis, venous compression by muscular activity, or transient ischaemia was the primary initiating cause, but it was clear that the associated venous dilatation and perivascular haemorrhages were the essential steps in a train of events leading to erosion and the formation of acute ulcers. Folate and ascorbic acid deficiencies may play a part in reducing defence mechanisms. It seems likely with some drugs, such as aspirin, that the normal protective barrier to hydrogen ions migrating back into the cells is weakened (Davenport *et al.*, 1965). Gastrostaxis may occur in patients who have been exposed to some form of shock or when there is a defect in the normal coagulating processes. Haemorrhagic duodenitis has been described after myocardial infarction (Katz, 1959).

Mechanisms of Alimentary Bleeding

Erosion and/or rupture of blood vessels associated with:
- (*a*) Peptic or pancreatic digestion
- (*b*) Pressure necrosis
- (*c*) Hypertension (systemic or portal)
- (*d*) Angiectasia
- (*e*) Abiotrophy
- (*f*) Infiltrations
- (*g*) Atherosclerosis
- (*h*) Bacterial inflammation
- (*i*) Trauma—for example, Mallory–Weiss

Gastrostaxis or enterostaxis
- (*a*) Idiopathic
- (*b*) Secondary

Genetic disorders which may influence vascular structure or coagulation processes have to be kept in mind. There are a number of rare diseases and disorders with a gene abnormality which may bring the patient into hospital with alimentary bleeding. These include the Ehlers–Danlos syndrome, haemophilia, pseudoxanthoma elasticum, congenital hepatic fibrosis, Peutz–Jeghers's syndrome, neurofibromatosis, angiomatosis, hereditary haemorrhagic telangiectasia, and von Willebrand's disease. Many of these are associated with cutaneous changes which may be seen.

Traumatic Laceration of Cardio-oesophageal Junction (Mallory–Weiss Syndrome)

This acute lesion represents a single episode of trauma, and if diagnosed prevents the patient being assumed to have a peptic ulcer and put on a regimen. The bleeding is due to a laceration, usually between 3 and 20 mm. in length and 2 or 3 mm. wide, sometimes multiple, and extending longitudinally at the junction of the oesophagus and stomach. It is caused by the physical strain of sudden distension of the lower oesophagus, usually due to vomiting, but it may also result from the physical strain of prolonged coughing, after epileptic convulsions, and from blunt trauma over the abdomen. Its mechanism of production has been well demonstrated by Lion-Cachet (1963) in post-mortem studies. By fixing a lighted cystoscope at one end and a water tap at the other he could both observe and hear the sudden rupture take place when the stomach was distended with water in a dark room. It seems that the mucosa reaches the limit of its distensibility before the muscular coat and therefore gives way, producing this characteristic lesion.

The diagnosis may be strongly suspected if food or liquid is vomited first and then blood is brought up soon after or after an interval which may be as long as six hours, as in one proved case reported by Hardy (1956). In most cases the bleeding soon stops, but in some patients the haemorrhage may be brisk, severe, and repeated. The diagnosis can be established with gastroscopy by inflating the fundus just as the instrument is being withdrawn, and the linear tear can be very clearly shown, and indeed much more successfully than by oesophagoscopy. It can be seen when bleeding is still taking place. The bleeding usually takes place from a single and sizable artery in the base of the tear, and this may be easily ligated and the mucosal tear sutured (Grimes, 1964).

It is a diagnosis that is essential to keep in mind when emergency surgery is undertaken, and it constitutes a strong argument against undertaking a blind gastrectomy.

A sliding hiatus hernia may be present, and this will facilitate the sudden build-up of pressure which is necessary to produce the tear.

* Part of the Croonian Lecture delivered at the Royal College of Physicians, London, on 24 February 1969. The full version will be published in the "Proceedings of the Royal College of Physicians' Fifth Conference on Advanced Medicine" later this year.

† Consultant Physician, Department of Gastroenterology, Central Middlesex Hospital, London N.W.10.

The diagnosis has been made in nearly 3% of the admissions to the Central Middlesex Hospital in recent years. In a prospective study of 297 patients admitted for bleeding and examined endoscopically there were eight instances of gastric or oesophageal tears—that is, 2·7%.

In this series few of the patients had been alcoholics and the majority seemed to be quite normal people who had had for some reason a bout of violent vomiting. This has been seen in vomiting after overeating, during a migraine attack, and during normal pregnancy.

Hiatus Hernia

Hiatus hernia can be a main factor in determining a haematemesis and melaena, and a small hernia may easily escape radiological detection. Massive bleeding is less likely in patients with sliding hiatus hernia, and the risk of severe bleeding is greater in patients with a large and often fixed loculus above the diaphragm. Windsor and Leigh Collis (1968) drew attention to the mechanical friction which may result from pressure at the level of the diaphragmatic crus and be accentuated by respiratory movement. This may cause vascular congestion and set the scene for mucosal erosions or chronic ulceration. The experience of massive haemorrhage in such cases was well recorded by Marchand (1960), who analysed 19 patients admitted to hospital with hiatus hernia. In 12 of his patients bleeding was clearly associated with the hernia, 10 having rolling hernias and two incarcerated sliding hernias. Unless there is a question of torsion of an incarcerated hernia or an associated chronic gastric ulcer emergency operation is best avoided, and none were done in this series, but elective repair may be needed later.

Hiatus hernia accounted for 2·3% of the present series, and 15 of the 87 patients had large rolling hernias. There was a heavy concentration in the elderly, with 65% of the patients being over 60 years and no fewer than 20% being over 80. The three who were under 40 were women, and two were pregnant.

Diverticular Disease

Meckel's diverticulum is an accepted cause of gastrointestinal haemorrhage, and is kept in mind particularly in patients in whom there is a combination of red blood and melaena in the stool, and who have a tender area below and to the right of the umbilicus (Hadley and Emanuel, 1951). It is not so well recognized that massive bleeding can occur from a diverticulum in the jejunum or in the colon. The evidence incriminating gastric diverticula and duodenal diverticula is minimal. Langman (1963), studying patients in this series, found no evidence to incriminate duodenal diverticula as a source of bleeding.

Massive bleeding can occur from both jejunal and colonic diverticula. There were 13 patients in this series with bleeding from colonic diverticula. The characteristic picture is one of sudden, unexpected, and alarmingly profuse passage of fresh blood occurring in middle-aged or elderly hypertensive people in otherwise good health. Such sudden massive bleeding comes from a small erosion in relation to a single diverticulum. This may be the only diverticulum present, but more often there is extensive diverticulosis. It is the normal or atonic colons with scattered diverticula that tend to have brisk bleeding, in contrast to the hypertonic sigmoid type of diverticular disease in which bleeding is mild or absent. The management of brisk bleeding from the colon should normally be conservative, but massive continued exsanguinating bleeding obviously necessitates an emergency operation.

Locating the site of the bleeding may be difficult. Maynard and Voorhees (1956) described a simple technique. They milked the blood from the colon through a rectal tube, applied rubber-shod clamps at 10-cm. intervals along the entire colon, and were able to show one segment that filled rapidly with blood. Unless the bleeding area can be defined, which is exceptional, a subtotal colectomy is probably the best policy, but a defunctioning right-sided colostomy may be sometimes an alternative (Dunning, 1963).

Vascular Malformations and Tumours

Bleeding from abnormal blood vessels constitutes a small but important group of patients in whom there may be repeated episodes of unexplained alimentary bleeding. These cases arise owing to a hamartomatous condition in which there is an abnormal arrangement of an excessive amount of normal tissue. In some there is a familial tendency, as in hereditary haemorrhagic telangiectasia. Their diagnosis has been made much easier by the introduction of angiography, and the recent progress has been shown by Ashby *et al.* (1968) and well reviewed by Halpern *et al.* (1968). Bleeding may also be due to pseudoxanthoma elasticum and to some form of arteritis or atherosclerosis.

Solitary Abnormally Large Submucosal Artery

This is seen in patients who may present with sudden massive exsanguinating alimentary bleeding and who have previously been in excellent health. The bleeding is due to erosion of a single artery which has perforated the mucosa of the stomach and presumably undergone peptic digestion. The constant pulsation of the large artery in the submucosa could presumably give rise to pressure necrosis. Such arteries appear to be otherwise normal and do not show any arteriosclerotic changes. Goldman (1964) brought together 24 such examples from the literature. These patients may have recurring episodes of bleeding. One such patient was seen in this series, a man of 41 who bled himself down to 27% haemoglobin. The diagnosis was established by gastroscopy, and he stopped bleeding. The mucosal defect may be very small, only 2 to 5 mm. in diameter and merely exposing the large artery. It is possible that the same lesions may equally occur in the intestine, and in the case reported by Arto Sivula (1966) a node the size of a pinhead was found in the intestinal wall in the middle of which a small artery was squirting blood. The patient, who was aged 21 and had previously been perfectly well, was admitted to hospital severely exsanguinated and was operated on after having had 14 units of blood. The surgeon opened the intestine at a point where fresh bleeding was thought to be occurring and was obviously very fortunate in discovering such a small solitary lesion. This may be a more common cause than is realized and one very much to be kept in mind at laparotomy.

Hereditary Haemorrhagic Telangiectasia

In this condition alimentary bleeding may occur in recurring episodes, and one of our patients was admitted 17 times. Bleeding is seldom as dramatically exsanguinating as in the previous group of patients, because the defect is one involving mainly capillaries and veins. The vascular lesions usually occur in the submucosa, but the serosa can also sometimes be involved. Lesions can exist elsewhere in the body: in the lips, mouth, respiratory tract, renal tract, liver, spleen, brain, spinal cord, and in bone. Hepatic enlargement is not uncommon and portal fibrosis may be found. Bile duct ectasia, portal vein dilatation, hepatic vein dilatation, and angioma are features of the hepatic histopathology. It is possible that haemobilia may be one mechanism of gastrointestinal bleeding in these patients, and associated hepatic artery aneurysm has been reported (Condon *et al.*, 1967).

Haemangioma of the skin has been reported many times in association with vascular lesions of the gastrointestinal tract

(Heycock and Dickinson, 1951 ; Rickham, 1952) and may give a clue to the diagnosis in a patient with recurrent episodes of melaena.

Phlebectasia causing varicosities of the intestine has twice been diagnosed in this series at laparotomy by the finding of dilated veins throughout the length of the small intestine. Both patients were without evidence of portal hypertension and had been subject to recurring mild episodes of melaena. Phlebectasia of the small intestine has been described involving the jejunum, with lesions also involving the scrotum (Fordyce lesion) and the oral cavity, with "caviare" spots under the tongue due to clusters of small varicose veins, in patients who have episodes of alimentary bleeding (Rappaport and Shiffman, 1963 ; Miller and Akers, 1968). Bandler (1960) described a 41-year-old patient with numerous episodes of melaena who was found to have venous varicosities of the entire small intestine and who had mucocutaneous pigmentation similar to that described in the Peutz–Jeghers syndrome.

When the diagnosis of haemangioma is considered, attention must be focused on the family history and on the skin and mucous membranes. The abdomen should be auscultated for a vascular bruit. Recurrent pain may recur from phlebitis, and a plain *x*-ray film of the abdomen may show calcification due to calcified phleboliths (Madell, 1957 ; Nys and Buyssens, 1963). Angiographic studies can give a very clear definition of vascular abnormalities, and is clearly going to prove very helpful in locating these small but exceedingly troublesome lesions causing recurrent bleeding and which may easily escape discovery at operation.

Abiotrophy of Gastrointestinal Blood Vessels

There are two hereditary conditions affecting connective tissue which predispose towards fragility and rupture of arteries and have to be kept in mind in unexplained cases of overt alimentary bleeding, particularly when there are recurring episodes. In pseudoxanthoma elasticum (Grönblad–Strandberg syndrome) there is an alteration in elastic tissue throughout the body, producing characteristic skin changes, angioid streaking of the retina, and fragility of blood vessels. The skin changes greatly facilitate its diagnosis. They affect particularly the neck and axillae, the antecubital areas, inguinal folds, and periumbilical region. The affected skin is coarse and thicker than normal, looking rather like a crêpe bandage, with the elevations being slightly yellow. There is loss of elasticity, with the skin tending to form folds easily, and the appearance of the neck may immediately suggest the diagnosis, as occurred in one of the two patients seen in this series. The eye changes show angioid streaking of the optic fundus and there may also be macular or perimacular haemorrhages and choroidoretinitis. The angioid streaks are lines fanning out from optic discs, varying in colour from grey to red brown, due to degeneration of elastic fibres and causing cracking of Bruch's membrane.

Bleeding in the form of haematemesis or melaena is a common feature and usually later in onset than the skin and eye manifestations. Gastrointestinal bleeding appears to be due to rupture of a blood vessel or vessels. The elastic lamina of the arteries becomes fragmented and may disappear completely. This may cause compensatory proliferation of the intima, with considerable narrowing of the lumina of the vessels. There may be a patchy replacement of the muscle by connective tissue and deposition of calcium salts. The condition was well reviewed by Edwards (1958) and Berlyne (1960), and has been shown to be transmitted by a recessive gene, which may be partly sex linked (Berlyne *et al.*, 1961).

The second connective-tissue disorder causing alimentary bleeding, but which has not been seen in the present series, is the Ehlers–Danlos syndrome. This is a generalized defect in the organization of the connective tissue resulting in friability of blood vessels, and in addition there may be a coagulation defect owing to a deficiency of plasma thromboplastin (Lisker *et al.*, 1960). Alimentary bleeding is relatively uncommon and occurred in only 6 of 110 patients studied by Beighton (1968). The condition is easily recognized by the hypermotility of joints, hyperextensibility of the skin, and the wide, thin scars that frequently overlie the bony prominences. Kerr Grant and Aldor (1967) discussed the mechanism of alimentary bleeding in these connective-tissue disorders and support the view that the primary defect is an abiotrophy of collagenous material, as first postulated by Hannay (1951).

Aneurysm

With modern methods of vascular surgery it has become increasingly important to recognize alimentary bleeding due to erosion of the alimentary tract from an arteriosclerotic aneurysm of the aorta. The difficulties of diagnosis were well demonstrated in a case reported at the Mayo Clinic Clinicopathologic Conference (1964), in which a 62-year-old man had had six episodes of bleeding over two months and had been subjected to two laparotomies ; finally a diagnosis of a laminated aneurysm eroding the duodenum was made at necropsy. Such aneurysms may not pulsate, and they may be associated with spells of quite intense pain, usually associated with a phase of enlargement. The intestinal lesion may consist merely of a small indurated plaque with an inconspicuous perforation. The third part of the duodenum is at particular risk and is the most common site. The successful treatment by excision of an aneurysm has been reported by Law *et al.* (1962). Two cases of ruptured aneurysm were diagnosed in our series.

Portal Hypertension

Portal hypertension accounted for 2·7% of admissions in this series, a much lower figure than in many parts of the world. Portal hypertension may be classified into presinusoidal and postsinusoidal types. The postsinusoidal causes, which in this country are almost entirely due to hepatic cirrhosis, when causing haematemesis and melaena tend to carry a poor prognosis on account of the underlying hepatocellular insufficiency. Hislop *et al.* (1966) recorded a mortality of 54% in the first episode of bleeding among 63 admissions to the Central Middlesex Hospital and to St. James's Hospital, Balham. There is one rare sub-group—partial nodular transformation of the liver—with portal hypertension in which the duration of life is considerably greater than in cirrhosis (Sherlock *et al.*, 1966).

Attention will be concentrated on the presinusoidal causes of portal hypertension, where there tends to be good cellular function. It is important to recognize them, since the prognosis may be excellent and the management different from classical hepatic cirrhosis.

Congenital hepatic fibrosis is to be kept in mind in relation to patients with recurrent episodes of bleeding and in whom portal hypertension and gastric and oesophageal varices have been found. It is due to broad fibrous bands around the otherwise normal hepatic lobules and is a variant of polycystic disease, and may be found both sporadically and in the familial form. The portal hypertension is due to defects of the main portal veins often caused by fibrous compression of the portal vein radicles. It is this group of patients who are particularly good candidates for surgical relief of portal hypertension by portacaval anastomosis.

Portal vein thrombosis also tends to carry a relatively good prognosis in comparison with hepatic cirrhosis causing portal hypertension, and also may present better opportunities for surgical intervention. One patient in this series, a young woman, was admitted to hospital 15 times, and finally, after all other medical and surgical methods had failed, her recurrent bleeding episodes were stopped by direct surgical attack, with

resection of the lower oesophagus and upper part of the stomach.

Transient portal hypertension is not sufficiently recognized as a mechanism leading to acute alimentary bleeding. This can cause varices in otherwise normal women in pregnancy (Palmer, 1961). It may be a consequence of an acute bout of alcoholism, with swelling of the parenchymal liver cells causing increased sinusoidal pressure, and the same may occur in acute viral hepatitis. Clearly these patients will have a very much better prognosis than those with true hepatic cirrhosis.

Increased arterial inflow into the portal circulation associated with splenomegaly is not sufficiently recognized as being a main factor in some patients with portal hypertension, and such cases may be cured by splenectomy. Many cases of tropical splenomegaly have a presinusoidal portal hypertension, which may be reversed in some instances by removal of the spleen (Williams *et al.*, 1966). Arteriovenous fistulae in the spleen with consequent increase in blood flow have also now been recognized as a cause of presinusoidal portal hypertension (Johnston and Gibson, 1965). The concept of primary portal hypertension is now coming to the fore in these patients with splenomegaly and resultant increased arterial inflow. This condition may be associated with sclerosis of hepatic portal venous channels, but it is difficult to know whether this is a primary or a secondary phenomenon. The best long-term results in patients in this series with cirrhosis occurred in those who had recurrent bleeding in association with portal hypertension and in whom a splenectomy was performed with or without some additional procedure. Splenectomy should probably be undertaken in patients with portal hypertension with bleeding and in whom splenomegaly is the only significant finding.

It is important not to assume that recurrent bleeding associated with portal hypertension will occur from varices only in the stomach or oesophagus. Tanner (1967) reported the case of a patient who had had many procedures undertaken to control recurrent bleeding from portal hypertension, which presumably had arisen from portal-vein thrombosis at the time of prolonged illness due to appendicitis. At necropsy it was found that his final episode of catastrophic bleeding came from the caecum. Adhesions occurring after the appendicitis had led to the development of a collateral circulation between the caecum and the parietes, and superficial caecal erosions in this highly vascular area had led to his exsanguination. A particularly interesting case illustrating this pitfall in diagnosis was recently seen at the Central Middlesex Hospital. The patient, a man aged 61, had had recurrent sharp episodes of bleeding over eight years after a partial gastrectomy for penetrating duodenal ulcer, when it was noted, as at the time of a later laparotomy, that the liver and spleen were normal ; but at the second laparotomy the spleen was noted to be twice the normal size. Apart from some reduction in platelets on one occasion, all investigations had proved within normal limits, including studies of clotting factors. Finally it was confirmed that he did indeed have hepatic cirrhosis with portal hypertension, but varices were not present in the oesophagus or stomach but only in relation to the anastomosis between the stomach and the jejunum established on the occasion of his partial gastrectomy operation.

Richter and Pochaczevsky (1967) described a patient with portal hypertension in whom the fatal bleeding started from rupture of a duodenal varix, but in this case varices were present also in the stomach and oesophagus, though the main mass was in relation to the duodenum.

Making a clear-cut distinction between presinusoidal and postsinusoidal causes of portal hypertension is not without difficulty in some patients, and help may be given by the measurement of wedged hepatic pressures. Arteriovenous angiography is a technique to keep in mind, as this can be used for demonstrating the portal venous circulation in patients who have had a splenectomy performed or in whom there is a bleeding tendency which might cause splenic puncture to be hazardous.

Biliary Diseases (Haemobilia)

It is important to realize that massive unheralded bleeding can occur into the biliary tree from cholecystitis, aneurysm of the hepatic artery, and from tumours, and this may cause haematemesis and melaena. Zederfeldt (1967) reported a case in which a 74-year-old woman developed haematemesis and melaena in association with slight jaundice and, later, biliary pain. At operation it was found that brisk arterial bleeding was occurring from the gall bladder, which contained two stones, and blood clots were present in the common bile duct ; no further source of bleeding was found. It seems that such patients tend to be elderly and arteriosclerotic. Serious bleeding is a very uncommon complication of chronic cholecystitis, though stools positive for occult blood can sometimes be found. Massive bleeding can also occur from an aneurysm of the hepatic artery, and a considerable number of cases have been recorded. Such a case with survival was reported by Mackay and Gordon Page (1959). It seems that one can ligate the right or left hepatic artery with little chance of a fatal result, provided antibiotics and supporting therapy are given. Haemobilia can also occur from ulcerating tumours of the bile duct or gall bladder and from hepatoma.

Usually haemobilia is associated with upper abdominal pain and jaundice, both of which may arise from blood clots in the common bile duct. Krikler and Marks (1963) described a case in which the usually associated biliary pain and jaundice were absent because the patient who had gall stones causing haemobilia was receiving anticoagulation therapy. The subject was well reviewed by Stahl (1959), Arneson *et al.* (1965), and Larmi (1966). In this series there were three patients with haemobilia, two with carcinoma of the gall bladder, and one with gall stones.

Bleeding into the alimentary tract can also occur as a result of erosion of a large gall stone through the gall bladder and into the duodenum. Two such patients were seen in this series, both with melaena and one with symptoms suggestive of pyloric obstruction.

Pancreatic Causes

Both directly and indirectly the pancreas may be responsible for episodes of alimentary bleeding and has to be kept in mind particularly when there are unusual clinical features. Ectopic pancreatic tissue may occur in the oesophagus, stomach, duodenum, and jejunum. There is a nodule, usually single, varying from one to six centimetres in diameter, mainly located in the submuscularis. It may give rise to symptoms suggestive of peptic ulcer or cholecystitis, and a number of cases have been reported in which such foci appear to have given rise to acute gastrointestinal bleeding, and these have been reviewed by Hudock *et al.* (1956) and by Razi (1966).

With acute pancreatitis bleeding can occur into the pancreatic ducts and into the gland itself, and this may be particularly apt to happen when there is associated pancreatic lithiasis. The following example was recently seen:

A man aged 56 with a history of heavy alcoholism had been subject to recurrent crises of severe upper abdominal pain lasting from 18 to 36 hours, and on account of slight duodenal deformity was thought to have a duodenal ulcer. Further investigation, however, showed the presence of pancreatic lithiasis. Shortly after admission to hospital he developed a further acute attack and became considerably distended. The serum amylase was only moderately raised, a feature of alcoholic pancreatitis. The abdomen became distended and his general condition sharply deteriorated. His haemoglobin was found to have fallen from 95 to 45%, but there was no melaena stool. Laparotomy showed a massive haemorrhage into the tissues under the diaphragm and much clot was evacuated. The pancreatic calculi were removed and a Roux-en-Y anastomosis was made with a loop of jejunum into the pancreatic duct, and he made a slow but excellent recovery.

A similar case history was reported by Dagradi and Meister (1959) of a patient with severe melaena treated by ligature of the pancreatic ducts together with cholecystectomy and choledochostomy. No less than 26 units of blood was needed.

Chronic pancreatitis may indirectly give rise to alimentary bleeding by causing splenic vein compression or thrombosis (De Kretser *et al.*, 1966), and this may also result from a pancreatic tumour (Hurwitt *et al.*, 1954). Massive bleeding may occur after cystogastrostomy for a pancreatic cyst (Chollet and James, 1961). A review of gastrointestinal bleeding in relation to 529 patients with pancreatitis has been made by Haller *et al.* (1966) and by Marks *et al.* (1967).

Carcinoma of the head of the pancreas or bile duct eroding the duodenum may cause bleeding, and accounted for eight admissions with two immediate deaths. These were all massive bleeds and did not include the silver stool from slight melaena which may occur with ampullary carcinoma.

Tumours

Smooth-muscle tumours (leiomyoma) of the alimentary tract constitute a small but important cause of massive and sometimes recurring episodes of bleeding. Twelve cases were diagnosed in this series. The diagnosis of leiomyoma of the stomach does not present difficulty, because the radiological and gastroscopic appearances are characteristic, but there is a problem when they occur in the small intestine, particularly in the duodenum. Upper intestinal leiomyomata tend to give rise to postprandial pain, and a diagnosis of duodenal ulcer may be readily accepted after an episode of bleeding if there is any associated irritability or spasm of the duodenal cap (Huntley *et al.*, 1960). Even with the diagnosis suspected it may be possible to overlook the tumour at laparotomy if it is in the region of the duodenojejunal flexure. This occurred in one patient who had had recurrent episodes of alimentary bleeding, and two elective laparotomies failed to find the cause of the bleeding. He was operated on at another hospital a third time during a later episode of bleeding, when a tumour was easily palpated at the duodenojejunal junction. Bleeding into the tumour had made it palpable and is an argument in favour of operating at the time of acute haemorrhage.

A similar diagnostic problem was reported by Dawson (1964) with recurrent episodes of bleeding from a leiomyoma of the second part of the duodenum, which escaped detection until the fourth laparotomy and after the patient had had a blind partial gastrectomy. The tendency to cause recurrent bleeding over many years was underlined in the review by Huntley *et al.* (1960), and Hanno and Mensch (1944) reported the case of a patient who had had a total of 20 episodes of bleeding over 16 years, and gastroenterostomy had been performed after the fifth episode, but it was not until her death from an exsanguinating haemorrhage that a walnut-sized tumour was found just beyond the duodenum. The bleeding may be due to rupture of enlarged submucosal veins in relation to the tumour (Laurain, 1962).

Other rare, simple tumours may also cause bleeding and these include adenomas of Brunner's glands (Ponka and Shaalan, 1964), lipomas (Allison and Babcock, 1948), and neurofibromatosis (Ghrist, 1963).

In the present series 2·5% of patients had carcinoma of the stomach, and brisk bleeding occurs probably in about 10% of all patients with this condition. It is important to realize that bleeding may be a first symptom, and it was salutary to discover that 3 out of 142 patients submitted to *x*-ray examination and followed up were found to have a carcinoma of the stomach and two had a small intestinal neoplasm (Avery Jones *et al.*, 1959).

Other malignant tumours include carcinoma of the colon, carcinoma of the jejunum (Segal *et al.*, 1945), and argentaffin carcinomas (Loebel *et al.*, 1964 ; Schwartz, 1966).

Blood Disorders

There is a small but important group of blood diseases that may predispose towards recurring episodes of acute alimentary bleeding. The simple Hess test of capillary fragility is invaluable in drawing attention to these cases. In this series there were six patients in whom a blood dyscrasia was diagnosed.

Von Willebrand's disease was twice diagnosed. This bleeding disorder was first described in 1926 and 1931 by von Willebrand in several families in the Aland Islands, and the most significant abnormality was a prolonged bleeding-time. Later studies showed that these patients had a deficiency of antihaemophilic globulin (A.H.G. or factor VIII). The prolonged bleeding-time seems to be associated with the lack of a second plasma factor distinct from A.H.G. Alimentary bleeding is usually mild, but fatal cases have been described (Stroehlein *et al.*, 1968). Clinically the picture is very variable, with a tendency to ready bruising, epistaxis, and prolonged bleeding, but this is variable and patients can be operated on without incident ; sometimes there may be virtually no bleeding manifestation except for an occasional episode of alimentary bleeding. These are the patients who give rise to haematological problems in diagnosis and who have been recently reviewed by Weiss (1968). Clinical problems also occur, and one patient was found to have a cyst in the small intestine and the bleeding attributed to this, but later very low A.H.G. level was shown. In another patient who had had some bleeding tendencies in the past the recurring melaena was attributed to the Meckel's diverticulum found at laparotomy, but again further investigation showed a low serum A.H.G. Classical haemophilia has the same deficiency of A.H.G., but there is a fundamental difference. Patients with von Willebrand's disease appear to lack a factor which controls the production of antihaemophilic globulin, whereas classical haemophiliacs lack the ability to produce the antihaemophilic globulin.

Patients with platelet disorders are a group to be aware of and for whom one may need expert haematological assistance when investigating unexplained recurrent alimentary bleeding. Thrombocytopenic purpura was seen in three patients in this series. Chronic alimentary bleeding has been described with a thrombocythaemic state (Fountain, 1958). More difficult to detect are those patients who have a qualitative platelet disorder due to abnormal clotting function of platelets (thrombopathy) or to defective platelet clumping (thrombasthenia) (Brandstaetter *et al.*, 1966). Hereditary thrombopathy associated with gastrointestinal bleeding in three patients was reported by Harris and Babcock (1967). One example of thrombopathy in a woman of 50 with recurrent episodes of melaena has been seen and abnormalities in her platelets were shown.

A positive Hess test and possibly a reduced platelet count may be found not uncommonly in older people admitted to hospital for acute alimentary bleeding. The possibility of early myelosclerosis should be kept in mind and folate and ascorbic deficiencies excluded.

Polycythaemia rubra vera may present with acute alimentary bleeding due to associated duodenal ulcer, and the facies may readily suggest the haematological diagnosis. Henoch–Schoenlein purpura is also to be kept in mind.

Alimentary Bleeding Complicating General Medical or Surgical Conditions

This includes patients who present primarily with a disease or disorder affecting the body generally or some other system of the body and with serious alimentary bleeding.

Primary amyloidosis is a condition that one has to keep in mind, particularly in older age groups with unexplained loss of weight, debility, diarrhoea, and occasionally peripheral neuritis. There may be abnormal gastrointestinal protein loss and a

nephrotic syndrome, and alimentary bleeding may complicate the situation as in two cases reported by Jarnum (1965). It seems that selective amyloidosis of the jejunum can occur, again causing bleeding, with other parts of the alimentary tract being unaffected (Long *et al.*, 1965). The nature of these lesions was well illustrated by Jerman (1967) in a patient with amyloidosis of the jejunum secondary to long-standing rheumatoid arthritis. In this patient the vascular occlusion which was the cause of the mucosal necrosis and bleeding occurred at arteriolar level in the distribution of arterie rectae and evidently resulted from the heavy subintimal deposits of amyloid.

Chronic renal insufficiency may cause bleeding from uraemic enterocolitis, but a focal alimentary cause of bleeding may be present, as in the cases described by Scalettar *et al.* (1957). Recurrent duodenal haemorrhage has occurred from *renal carcinoma*, a reminder of the proximity of the duodenum to the renal pelvis (Lawson *et al.*, 1966). Alimentary bleeding may be a problem in long-term *renal dialysis*. Gastroduodenal bleeding may complicate cases of *leukaemia*, myelomatosis, malignant tumours of lymphoid tissue (Cornes *et al.*, 1961) and *Hodgkin's disease* (Andersen, 1960). A severe gastric haemorrhage may complicate *diabetic ketosis*. It is well known that gastric dilatation may occur, and this may sometimes be associated with oozing of blood and occasionally massive bleeding (Hirsch, 1960). *Anaphylaxis* is not uncommonly associated with nausea, vomiting, and pain owing to the angioneurotic oedema affecting the gastrointestinal mucosa, but massive bleeding has occurred after a sensitivity reaction to oral penicillin (Bralow and Girsh, 1959). In this case the gastric oedema was seen gastroscopically and was sufficient to produce *x*-ray changes which simulated malignancy, but which disappeared when the patient had a further *x*-ray examination.

Haematemesis may be spuriously fabricated, as with *Munchausen's syndrome* (Asher, 1951). Bleeding is well known to occur after *extensive burns*. Ousterhout and Feller (1968), in reviewing post-mortem findings in 43 burn patients, found that 60% had ulcerative or haemorrhagic lesions in the gastrointestinal tract between the oesophagus and colon. In a study of 291 patients who died after burning, Sevitt (1967) found acute duodenal ulcers in 26 (9%) and acute gastric erosions in 42 (14%). The acute duodenal ulcer gave no dyspeptic symptoms in 23 of these patients. *Poliomyelitis* is particularly apt to be associated with acute gastroduodenal ulceration, and Hoxsey (1953) found this in association with bleeding in five out of eight fatal cases. The association with intracranial vascular and other lesions has been fully recorded by Doig and Shafar (1956), and with severe brain injury by Heiskanen and Törmä (1968).

Finally, there remain certain alimentary diseases which can cause sudden unexpected alimentary bleeding. These include polyarteritis nodosa (Wold and Baggenstoss, 1949), coeliac syndrome, and regional enteritis (Sauter, 1966). Melaena may occur from bleeding from heterotopic gastric mucosa in the small intestine (Wilson, 1950). Accidentally swallowed foreign bodies—for example, chicken bones—may be a cause (Ellis and Wiley, 1958).

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Miliary Tuberculosis in Adults

A. T. PROUDFOOT,* M.B., B.SC., M.R.C.P.ED. ; A. J. AKHTAR,† M.B., B.SC., M.R.C.P.ED.
A. C. DOUGLAS,‡ M.B., F.R.C.P.ED. ; N. W. HORNE,§ M.B., CH.B., F.R.C.P.ED.

British Medical Journal, 1969, **2**, 273–276

Summary: Of 40 adults with miliary tuberculosis 24 had "overt" disease; in them miliary mottling was usually present on the chest radiograph, and tubercle bacilli were readily isolated from sputum, urine, or cerebrospinal fluid. In the remaining 16 patients the disease was termed "cryptic" because its usual clinical and radiographic features were absent. This cryptic type is as common as the overt type in patients over 60 years. In this series the peak age incidence was in the eighth decade, and possibly this increase in the incidence age is due to the breakdown of old tuberculous foci in patients with diminished immunological mechanisms.

Cryptic miliary tuberculosis is a difficult diagnostic problem and should be suspected in any elderly patient, particularly a woman, who has an unexplained pyrexia, pancytopenia, or leukaemoid reaction. In 10 cases it was diagnosed by a therapeutic trial with para-aminosalicylic acid and isoniazid, a fall of temperature to normal (usually within a week), weight gain, a rise in haemoglobin, and increased well-being being the criteria of improvement. The use of such a trial is strongly advocated as a specific method of diagnosing cryptic miliary tuberculosis.

Introduction

In its common form miliary tuberculosis is a disease of young children, usually occurring within a few months of the primary infection (Miller, Seal, and Taylor, 1963). It may also be a terminal event in other forms of tuberculosis. Though predominantly a disease of the young, a considerable number of cases arising in patients over the age of 60 years has been described (Braun, 1917 ; Hartwich, 1922).

With modern public health measures, including mass miniature radiography, particularly of high-risk groups, B.C.G. vaccination, and effective chemotherapy for active disease, the reservoir of tuberculous infection in many countries has diminished considerably. The incidence of classical miliary tuberculosis has fallen simultaneously and this disease is now rare even in the age group that was formerly most susceptible.

* Senior Registrar, Royal Infirmary, Edinburgh.
† Senior Registrar, University Department of Geriatrics, Stobhill Hospital, Glasgow.
‡ Senior Lecturer, Chest Unit and University Department of Respiratory Diseases, City Hospital, Edinburgh 10.
§ Consultant Physician, Chest Unit and University Department of Respiratory Diseases, City Hospital, Edinburgh 10.

Over recent years disturbing reports have been published of the diagnosis of disseminated tuberculosis being made at necropsy, the disease not having been suspected during life (Treip and Meyers, 1959 ; Böttiger, Nordenstam, and Wester, 1962 ; Oswald, 1963 ; Brunner and Haemmerli, 1964). This type of tuberculosis which we shall refer to as "cryptic" does not present the clinical and radiographic features associated with classical miliary tuberculosis.

The object of this paper is to present our experience of this type of tuberculosis with a view to increasing awareness of its existence. These patients will be compared with others suffering from classical or overt miliary tuberculosis in order to emphasize that they constitute a separate clinical entity.

The Patients

The case records of 40 adults diagnosed in Edinburgh between 1954 and 1967 as having disseminated tuberculosis were studied. The series comprised 16 males and 24 females aged 21–89 years. Only three patients were not of British extraction, two being European and one Indian.

A total of 24 cases were classified as having overt disseminated tuberculosis and 16 as having the cryptic variety. With one exception all cryptic cases were diagnosed between 1962 and 1967.

Clinical Features

The sex and age distribution in both groups is shown in Table I.

TABLE I.—*Age and Sex Distribution of 40 Adults Suffering from Miliary Tuberculosis*

Age (Years)	Overt		Cryptic	
	M	F	M	F
20–29	1	5		
30–39		2	1	1
40–49	2		2	
50–59	2			1
60–69	1	1	1	1
70–79	2	5	2	4
80–89	1	2	1	2

A past or contact history of tuberculosis was obtained from eight patients in the overt group and from four in the cryptic group. At the time of diagnosis 13 patients in the overt group and 10 patients in the cryptic group had concomitant illnesses. Of these 23 patients 15 were over the age of 60 years.