of 11, she had been given *x*-ray therapy to the right side of the neck for tuberculous lymphadenitis. She subsequently developed severe radiation dermatitis, and in 1930 an area of skin was excised from the right side of the neck and a skin graft was performed. On examination she was found to have a bilateral nodular goitre which was thought to be non-toxic. There was a skin graft on the right side of the neck extending from the tip of the mastoid process to the clavicle. The incisional scar was keloidal, and the right sternomastoid muscle had become converted into a fibrous cord. A partial thyroidectomy was carried out. Section showed a follicular carcinoma in the right lobe of the thyroid. The interval between irradiation and the diagnosis of cancer was 38 years.

### Case 3

A woman aged 69 was seen in 1956 and found to have a firm nodule in the right lobe of the thyroid. In 1915, at the age of 28, she had been given *x*-ray therapy for exophthalmic goitre. Treatment had been given weekly over a period of three years. At the end of this time a remission had occurred. On examination there was slight telangiectasis and atrophy of the skin over the anterior surface of the neck and over the upper part of the sternum. There was no evidence of radiation damage to the subcutaneous tissues. A total thyroidectomy was carried out. Section showed the nodule in the thyroid to be a follicular carcinoma. The interval between irradiation and the diagnosis of cancer was 41 years.

### Discussion

*X*-ray therapy was for many years widely used for the treatment of thyrotoxicosis; it was also often used for treating tuberculous cervical lymphadenitis. As a result a large population has received radiotherapy to the neck for benign conditions. A number of radiation tumours in the deep tissues of the neck have now been reported in the literature. Most of these have occurred in the pharynx (Goolden, 1957), while the thyroid seems to be relatively free from this complication. In addition to the case of Wilson *et al.*, already mentioned, one other instance of radiation cancer of the thyroid after irradiation of the gland in adult life has so far been reported (Kindler, 1943): this occurred in a man of 54 who developed an adenocarcinoma in the left lobe of the thyroid 24 years after *x*-ray treatment for tuberculous glands in the neck.

It is often difficult to decide whether there is a causal relationship between the development of a tumour and previous irradiation. Any tumour which arises in previously irradiated tissue after a suitable latent interval may be suspect, and when several such tumours arise in similar circumstances there is further reason to believe that they may be attributable to irradiation. Further evidence is desirable, however, in order to establish with any certainty a diagnosis of radiation cancer. Although proof is lacking it seems likely that there is an association between radiation and the development of thyroid carcinoma in the cases described above.

It has hitherto been generally accepted that radiation tumours appear only in tissues which have suffered appreciable radiation damage, but there is no real evidence of a threshold dose below which carcinogenesis does not occur. On the contrary, there is evidence from the children who developed malignant disease after irradiation of the thymus that cancer can occur in tissues which have not suffered gross radiation damage. The patients with thyroid carcinoma reported here had varying degrees of damage to the skin and subcutaneous tissues and therefore presumably to the thyroid gland.

The increased incidence of thyroid cancer and leukaemia in children following irradiation, and the increased incidence of leukaemia in patients irradiated for ankylosing spondylitis (Court-Brown and Doll, 1957), were confirmed only after large-scale surveys had been carried out. It would require a survey on similar lines to prove whether or not irradiation of the thyroid gland in adult life increased the incidence of thyroid cancer. In the absence of such a survey it cannot be assumed that the adult thyroid gland is immune to radiation cancer. In the meantime reports of thyroid carcinoma following irradiation would be of interest and might give some indication of whether the adult gland is susceptible to radiation carcinogenesis.

### Summary

The literature referring to the increased evidence of thyroid cancer after irradiation of the neck in infancy or childhood is briefly reviewed.

There is at present little evidence to suggest that the adult thyroid is susceptible to radiation cancer.

The development of carcinoma of the thyroid in three patients following irradiation of the neck is reported. Two of the patients received irradiation during adult life. It is considered probable that the tumours in these three patients were induced by radiation, but it is pointed out that it would be necessary to carry out a large-scale survey to find out whether irradiation of the thyroid gland in adult life increased the incidence of thyroid cancer.

I am indebted to Dr. Raymond Greene, Sir Geoffrey Keynes, and Mr. J. E. Piercy for permission to publish these cases.

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# Medical Memoranda

## Fatal Haematemesis Due to Foreign Body in Stomach

The great majority of swallowed foreign bodies, once having traversed the oesophagus, are passed safely per rectum. Penetration of the stomach wall is a rare event, and the following case report records an instance in which fatal gastric haemorrhage followed ingestion of a piece of chicken bone.

### CASE REPORT

A man aged 62 was admitted to the Nuffield Orthopaedic Centre on February 21, 1957, complaining of pain and stiffness of the left hip. He was in excellent health apart from a mild chronic dyspepsia, relieved by antacids, and he had had no previous illnesses. The left hip was found to be severely osteoarthritic. He had a symptomless hypertension of 180/90 and carious teeth, but no other abnormalities were noted on clinical examination.

After dental extraction had been carried out with penicillin cover, he was considered fit for operation on his hip, and a week later a Girdlestone pseudarthrosis was performed on the affected joint.

His immediate post-operative progress was satisfactory, but 24 hours later, shortly after a meal, he vomited food, followed by some altered blood. He improved after a blood transfusion of 2 pints (1,140 ml.), but continued to vomit small amounts of "coffee-ground" fluid. A diagnosis of acute gastric erosion was made.

On the third post-operative day he developed the signs of a very severe bronchopneumonia, which was treated with penicillin and streptomycin. His haematemeses recurred, his general condition deteriorated in spite of continued blood transfusions, and he died on the eighth day.

At necropsy, a chicken-bone 3 cm. long was found impacted at the pylorus. It had penetrated all the coats of the stomach, apart from the serosa, and had eroded a small gastric artery. The stomach and intestine were full of altered blood. There was also a severe inhalation bronchopneumonia.

The patient's hospital menu was then examined, and this showed that chicken had been included in the diet on three occasions, twice after the dental extraction and once the day following the pseudarthrosis. It would seem most probable that the offending bone was swallowed on the last occasion, since this was rapidly followed by vomiting and then a haematemesis.

### Comment

Haematemesis due to an ingested foreign body is a rare occurrence. Occasionally the oesophagus is perforated and an adjacent vessel penetrated with fatal consequence, but this occurred in only 3 of the 505 patients treated by Clerf (1940) for foreign bodies impacted in the oesophagus.

In the stomach, haemorrhage may occur from the pressure-ulceration of a bezoar. DeBakey and Ochsner (1938), in a review of the world literature, found 22 such examples in 311 cases. Furthermore, the large collections of metallic objects swallowed by lunatics, criminals, or circus side-show performers may erode the stomach wall and cause bleeding; examples have been recorded by Henderson and Gaston (1938) and by Wheeler (1936). These complications are unusual, but still less common is the haematemesis following laceration of a gastric vessel by a solitary sharp foreign body.

In 1909 Wolfler and Lieblein (quoted by Henderson and Gaston, 1938) reported a fatal gastric haemorrhage from an ingested fish-bone which had perforated the posterior wall of the stomach. Matthews (1930) recorded a fatal haematemesis due to a small piece of copper turning which had ulcerated the oesophagus in three places and which had also transfixed a large vessel on the anterior stomach wall. Dervillée, Lefrou, and L'Épée (1947) described a third case where haematemesis, again fatal, followed impaction of a sharp duralumin ring at the pylorus.

It is perhaps surprising, considering the large number of ingested sharp foreign bodies which are encountered in practice, that they should prove to be such a rare cause of haematemesis.

We thank Mr. R. G. Taylor and Mr. A. Elliot-Smith for permission to publish this case, and Dr. M. S. Dunhill for the necropsy report.

H. Ellis, M.Ch., F.R.C.S.,
Radcliffe Infirmary, Oxford.

A. M. Wiley, M.Ch., F.R.C.S.,
Nuffield Orthopaedic Centre, Oxford.

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## Intussusception in a Case of Penetrating Abdominal Injury

Exploration of the abdomen for a penetrating injury revealed three interesting lesions—a perforation of the small bowel, an ileo-ileal intussusception, and a very short intestine. It is suggested that this is more than a strange coincidence.

### Case Report

The patient, a well-built man of 30, was admitted to the General Hospital, Colombo, with a history of having been stabbed in the abdomen with a knife about three hours previously.

On examination his general condition was satisfactory. His pulse rate was 96, blood pressure 110/75, temperature 98.6° F. (37° C.), and respirations 22. He had an incised wound of his epigastrium with protrusion of omentum through it. The abdomen was not distended, but there was marked guarding and tenderness in the epigastrium below the wound. Bowel sounds were absent. There were no other injuries. He was prepared for urgent laparotomy, and an intravenous drip and gastric suction were begun.

*Operation.*—Under general anaesthesia a right paramedian incision was made. The prolapsed omentum was withdrawn into the abdominal cavity from within. It was intact. The peritoneal cavity contained a small quantity of blood. A perforation with a diameter of ½ in. (1.3 cm.) was found in the jejunum, and on further examination of the intestine an ileo-ileal intussusception was located; this was observed for some time, and there was no spontaneous reduction or increase in the mass, which was about 4 in. (10 cm.) long; the sheath was tight at the neck of the intussusception. It was also noticed that the intestine was surprisingly short, and, on measuring, it was found to be about 12 feet (3.6 metres). There was no other injury to the viscera. The perforation in the intestine was closed and oversewn. The intussusception was reduced and there was no bruising or haematoma of the intestine in this region. The stab wound and the paramedian incision were closed in layers without drainage.

Post-operatively, gastric suction and intravenous therapy were continued for 48 hours and penicillin and streptomycin were administered for four days. The patient made an uninterrupted recovery, except for a short delay in the healing of the stab wound, and was discharged on the fifteenth day.

### Comment

Intussusception is uncommon in adults, and most cases are secondary to some lesion in the bowel. Intussusception in the absence of a lesion of the bowel is still more uncommon in the adult. Some observers have noted such intussusceptions at necropsy (Boyd, 1955), and others have recorded temporary intussusceptions during abdominal operations (Perrin and Lindsay, 1921). In recent years the occurrence of intussusception in relation to abdominal injury has been recorded in a closed injury of the abdomen (Aldis, 1944). In the case described here it was associated with a penetrating injury. In neither case was there any evidence of injury to the segment involved in the intussusception.

The length of the small intestine, from the ileo-caecal valve to the duodeno-jejunal flexure, was very short, measuring 12 feet (3.6 metres). The average length of the small intestine is about 21 feet (6.5 metres) (*Gray's Anatomy*, 1942). Recent studies show great variations in the length of the small intestine (Underhill, 1955); in the male the range was between 16 and 25 feet (4.9 and 7.6 metres) (measured from pylorus to ileo-caecal valve). Thus in this case the intestine was shorter than the minimum recorded above (allowance being made for the length of the duodenum).

While shortening may have been due to a congenital defect, the simultaneous finding of an intussusception suggests another explanation. Treves was of the opinion that some irregular or disordered contractions of the intestine, perhaps connected with incoordinate action of the circular and longitudinal muscular layers of the bowel, are the prime cause of invagination (Barnard, 1910). Spasm of the longitudinal muscle of the intestine would account for some of the shortening of the bowel. It would also be a factor in the formation of the intussusception. Here, spasm may have been initiated by the intestinal perforation caused by the penetrating injury.

I wish to thank Dr. Noel Bartholomeuz, under whose care this patient was admitted, for permission to publish this case.

H. S. Kirthi Singha, M.B., F.R.C.S..
Resident Surgeon, General Hospital, Colombo, Ceylon.

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