or laryngitis, no conjunctivitis, and no hyperkeratosis; the diagnosis was made on the history, the pigmentation, the increased arsenic content of the hair, and the rapid improvement when the mixture was discontinued. This case serves to emphasize the necessity for considering drug intoxication when any unusual syndrome is encountered.

I wish to thank Dr. Mary T. Penrice for various clinical details and for the prescription of the bromide mixture; I would also like to thank Dr. J. F. Clark for his estimation of the arsenic content of the hair.

ROBERT R. HUGHES, M.D., M.R.C.P.,
Assistant Physician, Royal Southern Hospital, Liverpool.

Perforations of the Small Intestine by Ingested Non-metallic Foreign Bodies

Intestinal perforation by ingested non-metallic foreign bodies is an uncommon occurrence, and the largest personal series recorded is that of Ginzburg and Beller (1927) who reported 12 cases which occurred at the Mount Sinai Hospital in the preceding decade.

The following conclusions may be drawn from their paper: (1) Impaction of the foreign body usually occurs at the caecum or flexures of the colon. It is unusual for the small bowel to be involved unless a large hernia or Meckel's diverticulum is present. (2) The foreign body impacts transversely and usually produces one area of necrosis in the bowel wall through which it perforates. Sometimes it impacts as above, but produces two areas of necrosis and two perforations. More rarely still the impacted foreign body frees itself and passes on, but perforation occurs later from sloughing of the involved bowel wall. (3) The perforation produces either acute or chronic symptoms: the latter is more often the case, and results in a localized abscess or an inflammatory tumour. Cases resulting in acute peritonitis are very infrequent.

Three cases of acute peritonitis due to perforation of the small bowel by non-metallic foreign bodies are recorded, all of which occurred during September, 1948. In each case a provisional diagnosis of acute appendicitis was made.

CASE 1

A farmer aged 52 was admitted to hospital complaining of diffuse lower abdominal pain of 20 hours' duration which had gradually become worse. He had vomited six hours after the onset of the pain and on several further occasions before admission. On examination his temperature was 99° F. (37.2° C.), pulse 96, and respirations 18. The whole lower abdomen was rigid and tender, tenderness being most marked in the lower right quadrant, and the pelvic peritoneum was tender to rectal examination.

Operation.—The approach was through a muscle-splitting incision in the right iliac fossa. The peritoneum was inflamed and there was a fair amount of free blood-stained serous fluid in the peritoneal cavity. The appendix was normal, but on examining the lower ileum a mass was felt which proved to be a large Meckel's diverticulum perforated at its fundus by a thorn 1½ in. (3.8 cm.) long, and with surrounding loops of small bowel attached to it by fibrinous adhesions. The Meckel's diverticulum was excised and appendicectomy performed. Recovery was uneventful.

CASE 2

A man aged 41 was admitted to hospital complaining of lower abdominal pain of 12 hours' duration. He had eaten fish for supper the previous evening, and was awakened early on the morning of admission by the pain, which later improved somewhat so that he went to work; but it became more severe towards midday, and he had to return home. On examination his temperature was 97.8° F. (36.6° C.), pulse 76, and respirations 20. There was marked tenderness and rigidity in the right iliac region of the abdomen, but rectal examination revealed no abnormality.

Operation.—The approach was through a muscle-splitting incision in the right iliac fossa. The peritoneal cavity con-

tained an excess of serous fluid, the appendix was normal, but about 18 in. (45.7 cm.) from the ileo-caecal junction a fish bone 1½ in. (3.8 cm.) long was impacted transversely across the ileum, perforating the bowel wall on each side: there was considerable inflammatory reaction but no gangrene of the bowel at the sites of perforation. The bone was removed, the perforations were sutured, and appendicectomy was performed. Recovery was uneventful.

CASE 3

A man aged 48 was admitted to hospital with a complaint of intermittent abdominal pain of three days' duration, starting 15 hours after a meal of roast chicken. At first the pain was diffuse and most marked just below the umbilicus; but some minutes after its onset the pain suddenly intensified and the patient vomited twice. Since then intermittent attacks of similar pain but of milder intensity occurred until the morning of admission, when it became constant and more severe. On examination the temperature was 99.8° F. (37.7° C.), pulse 100, and respirations 20. The tongue was coated and the breath foul; there was generalized abdominal rigidity and tenderness, principally in the umbilical region; the pelvic peritoneum was tender on rectal examination, and peristaltic sounds could be heard.

Operation.—The approach was through a right paramedian incision. The peritoneal cavity contained a quantity of turbid fluid, and a loop of the upper jejunum was found with two perforations, one on each side of the bowel, sealed off by adherent omentum: there was commencing gangrene of the bowel wall at the sites of perforation. A search was made for the foreign body, and a piece of chicken bone 2 in. (5 cm.) long was felt in the caecum and removed. The damaged loop of jejunum was excised and an end-to-end anastomosis performed. The patient made an uninterrupted recovery.

DISCUSSION

Foreign Body.—Fish bones and chicken bones are usually found in perforations of this type: a thorn, like other vegetable matter, is an uncommon finding (Macmanus, 1941; Macfarlane, 1948).

Site of Impaction.—A Meckel's diverticulum is recognized as a likely site for impaction of any intestinal foreign body, and transverse impaction in the lower ileum, although far from common, is the usual site for a perforation causing acute peritonitis (Ginzburg and Beller, 1927). Impaction with perforation of the jejunum, however, as in Case 3, is most unusual, and occurred only twice in the 95 cases of intestinal perforation due to ingested foreign bodies of all types collected and reviewed by Macmanus (1941).

Mechanism of Perforation.—In Case 3 the bone was impacted transversely, caused two areas of necrosis which subsequently perforated, and then freed itself. This unusual mechanism was probably due to the relatively large diameter of the small intestine in the upper jejunum.

Type of Pain.—In Cases 1 and 2 the pain would appear to have been due to the peritonitis, but in Case 3 the man suffered intermittent attacks of central abdominal pain over a period of three days before it became constant. It seems justifiable to assume that during this period the pain was caused, not by peritonitis, but by spasm of the bowel, possibly due to a local reflex.

Peritonitis.—The infection was of a low grade in all the cases on account of minimal peritoneal soiling. This was due partly to blockage of the perforation by the foreign body and partly to the peritoneal reaction, which had good time to develop in each case.

I am indebted to Mr. J. O. D. Wade, surgeon to the United Cardiff Hospitals, for his advice and criticism in presenting these cases.

HILARY WADE, M.C., F.R.C.S.,
Surgeon,
United Cardiff Hospitals.

REFERENCES

- Ginzburg, L., and Beller, A. J. (1927). *Ann. Surg.*, **86**, 928.
Macfarlane, David A. (1948). *Brit. J. Surg.*, **35**, 421.
Macmanus, J. E. (1941). *Amer. J. Surg.*, **53**, 393.