Tuberculous appendicitis was first described in the literature by Corbin in 1837. Since then approximately 300 cases have been described, the total number of cases reported up to 1956 being 265 (Borrow and Friedman, 1956).

Incidence

Tuberculous appendicitis is a rare disease. It is difficult to determine the correct incidence of tuberculous appendicitis from the literature, perhaps because the condition is almost always diagnosed on pathological examination and because on many occasions not all the specimens of removed appendices are examined pathologically. Also, there is a variable relation to the associated pulmonary or gastrointestinal tuberculosis. Cases have even been reported as primary involvement of the appendix in tuberculosis, without having a tuberculous lesion anywhere else in the body.

However, the incidence, based on computer analysis of the total number of appendicectomies reported from various general hospitals, ranges from 0.1 to 3%, but it rises to 24% to 30% among the patients with known tuberculosis and those from tuberculosis sanatoria (Morrison et al., 1952). Even the standard textbooks of surgical pathology (Illingworth and Dick, 1969; Ackermann, 1964) have not mentioned this condition, except Muirs (1964) who noted that in tuberculosis the appendix is not infrequently affected.

Earlier in the century, in a review of Mayo Clinic cases from 1900 to 1946, Braastad et al. (1950) reported 21 cases of tuberculous appendicitis. Among the western population the incidence has decreased drastically, as shown from the 10-year review by Bentley and Webster (1967) in England. These authors did not find a single case of tuberculous appendicitis among their total of 14 cases of gastrointestinal tuberculosis. Of these, 9 were of tuberculous involvement of intestine. Even William J. Mayo had noted as long ago in 1914 that it was curious that the appendix, which contained abundant lymphoid tissue analogous to that of tonsils and Peyer's patches of ileum, was seldom the primary seat of tuberculosis.

Among the surveys made in tuberculous rift areas such as the Indian subcontinent, it was noted by Anand and others (1956) that not a single case of tuberculous involvement of appendix was found among their series of hypertrophic ileocaecal tuberculosis in India, with a record of 50 hemicolecotomies.

Age and Sex

Although there is a wide variation in the age incidence - from 9 months to 62 years, the tuberculous appendicitis is normally a disease of young adults, the average age being about 30 years. Most authors agree that there is a slightly greater incidence among women than men. Brown et al. (1953) have found 2% involvement while Averbach (1942) has reported 9%, in cases of pelvic tuberculosis.

Pathogenesis

The route of infection by the tubercle bacillus may take place in 3 ways: (1) the most common route is by direct extension from neighbouring organs such as the ileocaecal region or genital tuberculosis; (2) from infected ingested food such as milk, cheese or butter (not so common in the western world but still so in the Indian subcontinent - perhaps more common than direct extension); (3) by the bloodstream from a focus in a distant organ or lymph nodes. An interesting pathway was shown by Richet (1915) and confirmed by Carnot, Lavergne and Ficher (1935). The first showed that faecal matter may be contaminated in the course of experimentally produced tuberculous septicaemia. The second group of workers showed that tubercle bacilli, injected intravenously, may be recovered in the contents of the biliary and intestinal tracts, particularly in the appendix.

Pathology

Grossly, these appendices are described as ulcerative or hyperplastic types; the ulcerative type is the most common. The appearances on external examination may vary from normal or
Thick walled, or very large appendix or a mass in which the appendix was buried. Occasionally tubercles or caseations are noted on the serosal surface. In these types of cases ("tuberculous periappendicitis") the lesions are limited to the serosal surface and are usually secondary to tuberculous peritonitis or salpingitis.

Microscopically, the ulcerative type shows caseation, tubercles and ulcerations in the mucosa and submucosa. Secondary pyogenic infection of ulcerations is common and generally it leads to large intramural abscess formation and perforation. There is usually no healing tendency, as would be indicated by fibrosis and calcification. The hyperplastic type shows connective tissue proliferation and lymphoid infiltration in the muscularis and practically no caseation or ulceration.

**Clinical features**

Tuberculous appendicitis can manifest as an acute pyogenic type of appendicitis with usual short history of pain in the right iliac fossa, vomiting, fever and localized tenderness. More commonly, it manifests as a chronic form, with intermittent attacks of pain, diarrhoea, poor nutrition, loss of weight, and often associated with pulmonary tuberculosis. However, most authors agree that these patients have no symptoms which can distinguish the disease from ordinary appendicitis or from other intra-abdominal tuberculosis. Especially in some females, the clinical findings of genital lesions may overshadow the true picture referable to the appendix. Thus, diagnosis on clinical grounds is almost impossible. It is invariably diagnosed on pathological examination of the appendix removed at operation or at post mortem.

**Laboratory investigations**

These investigations seldom show signs of special significance. In the acute pyogenic type the WBC may go up to 20,000 due to superimposed pyogenic infection, whereas in the chronic variety it is usually about 10,000. The ESR is usually raised up to 30 - 35mm. in one hour. Chest x-ray helps in chronic forms by revealing hitherto unsuspected lung tuberculosis. Plain x-ray of the abdomen in the acute stage may reveal a fluid level in the distended caecum.

**Treatment**

Accepting the diagnosis of acute or chronic appendicitis, the treatment is appendicectomy, irrespective of aetiology. However, if at laparotomy it is found to be involving other visceras such as ileum or caecum, then further resection is advisable, and post-operatively such cases should be treated with antituberculous drugs for at least 6 - 8 months. If the disease is confined to the appendix, then after appendicectomy an antituberculosis drug umbrella is not necessary.

**Prognosis**

Following surgery, primary tuberculous appendicitis should be cured completely. With the involvement of other visera, the prognosis depends on the extent of tuberculosis elsewhere. Occasionally, cases have been reported of faecal fistula due to incomplete surgery or ineffective therapy. The patient should be carefully followed up for the development of any other detectable lesion elsewhere in the body for a period of at least 2 - 3 years.

**CASE REPORT**

A 26-year-old, well nourished young female was admitted on 21 June 1971 as an emergency, with persistent generalized abdominal pain for the last 2 days, vomiting on and off for one day and absolute constipation for one day. Before admission, she had been in good health, apart from intermittent evening rise of temperature and irregular periods. Her appetite had been good and she had no history of indigestion; her bowels and micturition had been normal. The weight had remained steady. There was no family history of any chronic diseases such as tuberculosis or peptic ulcer.

Physical examination revealed a well nourished young female patient in great pain. Examination of the neck did not reveal any enlarged lymph-nodes, nor any scars of healed sinuses or previous operation scars. The abdomen was rigid, distended, silent and extremely tender. The tongue was coated and moist and the breath foetid. The conjunctiva looked pale. Pulse 72 min. BP 110/70 mmHg., respiration 22 min., Hb. 13g. - 100 ml, WBC 7050 cm. (P 79%, L 19%, M 2%).

Straight x-ray of the erect abdomen showed free gas under the right dome of diaphragm and multiple fluid levels (Fig. 1). In view of these findings, a diagnosis of generalized peritonitis due to perforated viscus-like perforated peptic ulcer or perforated appendicitis was made.

The patient underwent laparotomy on the same day. At operation there was free, turbid non-offensive fluid in the peritoneal cavity. The stomach and duodenum were normal, but there was gross distension of the terminal ileum due to a hard mass found in the ileocaecal region. The appendix was greatly thickened, enlarged and inflamed. It was buried over the anterior part of the ileocaecal mesentery and there were several enlarged, matted mesenteric lymph nodes. The impression was one of hyperplastic type of ileocaecal tuberculosis (even though the caecum was relatively free from the disease). There was no clearcut perforation seen in any part of the gastrointestinal tract but it was felt that the base of the appendix had perforated and was sealed off by the exudate and fibrinous flakes. A modified right hemicolecctiony was carried out, by excising terminal 6in. of ileum, appendix and entire caecum, and adjoining lin. of ascending colon. The two ends of the bowels were anastomosed in the usual way. The abdomen was closed in layers, without a drain. Postoperatively her recovery was uneventful. She was put on anti-
tuberculosis treatment immediately after the operation and was discharged on the same regimen on the 16th postoperative day. Follow-up studies for 6 weeks were satisfactory.

The microscopic appearances were reported as follows: The specimen consists of 24cm. of bowel, part of which is ileum, and the other part is caecum and appendix. On the serosa of the appendix chronic thick exudate is seen and a mass of haemorrhagic fat is seen adherent to the appendix. On cutting the appendix the lumen appears to be almost obliterated. A few lymph nodes are identified, some of which appear to show yellow necrosis (Fig. 2, 3). Section of the appendix shows numerous tubercles in the submucosa with ulceration of the mucosal surface. A few tubercles are seen on the serosal aspect involving the peri-appendicular fat. Section of the caecum and ileum shows diffuse, chronic inflammation with submucosal oedema in the ileum. Some areas show tubercles on the submucosa and evidence of acute peritonitis. Sections of all lymph nodes show pink caseation surrounded by epithelial cell reaction. The overall impression is of tuberculous appendicitis with tuberculous acute peritonitis.

**DISCUSSION**

Acute appendicitis (pyogenic) is the most common emergency seen in general hospitals in the western world. In tropical countries the incidence is somewhat low. This is due mainly to change in dietary factors. However, if each appendix removed at operation is examined pathologically, the incidence of tuberculous appendicitis will certainly be higher. Since the incidence of pulmonary tuberculosis is decreasing, the chances of tuberculous involvement of other organs are more particularly those of lymphoid-rich structures. Also, the average life in years is increasing and so the chances of the appendix being involved with disease increases. Once the appendix is involved, the antituberculosis therapy cannot significantly alter the pathological changes. Hence, tuberculous ulceration of the mucosa, secondary pyogenic infection, abscess formation, perforation and peritonitis will take place. This in turn can increase the morbidity and mortality associated with similar conditions, indicating that appendectomy should be carried out as early as possible.

My case illustrates how a case of generalized peritonitis due to perforated viscus can be misdiagnosed. Numerous efforts were made preoperatively to substantiate the diagnosis but the true nature of the pathological condition was not
suspected and found only at histopathology. The normal stomach, duodenum, small and large bowels, and normal uterus together with normal pelvic adnexa had alerted us to the possibility of perforated appendicitis.

SUMMARY
The literature on tuberculous appendicitis has been reviewed. The incidence is low and is confirmed by the rarity of the lesion found at this busy and acute general hospital during an 8 year period. The diagnosis was made on histopathological section. Surgical treatment was successful.

Acknowledgement
I wish to thank Dr. L. MONTEIRO, Dean, St. John's Medical College, Bangalore for allowing me to publish this case and for his encourage-

(continued from page 86)

In patients with initially high uric acid levels, uricosuric agents or allopurinol may paradoxically precipitate acute gout during the first month of treatment. This is probably due to mobilization of urate crystals in the tissues. It is recommended that colchicine, 0.5mg. t.d.s., be given concurrently for the first month.

Allopurinol is indicated in the following circumstances: (a) failure of uricosuric agents, usually because of side-effects; (b) in the presence of significant renal impairment or uric acid stones; (c) prophylactically during chemotherapy of leukaemias or other myeloproliferative disorders. Allopurinol blocks the metabolism of the cytotoxic agents 6-mercaptopurine and azathioprine, and the dose of these drugs should be decreased accordingly; (d) prophylactically during treatment of severe obesity by starvation or near-starvation diet; (e) in the Lesch-Nyhan syndrome, to block overproduction of uric acid.

SUMMARY
The careful management of gout is rewarding both in relieving acute symptoms and in preventing long-term complications and disability.

* Equivalent SI values are 0.45 mmol/l for men and 0.38 mmol/l for women.

---

On the Diagnosis of Smallpox

J. PICKFORD MARSDEN, MA, MD, DPH

"On the Diagnosis of Smallpox" was first published by The British Journal of Clinical Practice in May 1958 and revised for the Department of Health and Social Security in August 1962. This authoritative article has been revised once again by J. Pickford Marsden for the Department of Health and Social Security. Copies of this important paper are available to readers on written application.

HARVEY & BLYTHE LTD., Lloyd's Bank Chambers, 216 Church Road, Hove, Sussex BN3 2DJ.