vent auto-intoxication with its attendant evils. This feature has been stressed by Continental observers, particularly by Prof. Pierre Delbet, Superintendent of the Cancer Institute, Hôpital Cochin, Paris. The *Stockholm Weekly Journal*, in June, 1931, published a most interesting article by Professor Delbet, entitled: "Take magnesium and escape cancer," in which he advocated, as a prophylactic measure, the administration of magnesium to all persons in and past middle life. By his experimental work he showed that soil, water and foodstuffs, deficient in magnesium salts, predisposed to cancer. Delbet, in order to check up his gross findings, inoculated a series of rabbits with cancer virus. Fifty per cent of these he treated with magnesium chloride. All of those treated with magnesium chloride recovered, most of the untreated cases died. Just as chaulmoogra oil is almost a specific when administered in early cases of leprosy, so magnesium salts in the form of sulphate or chloride, may be one of the major keys in the control and eradication of cancer.

The presentation of this tube would not be complete without reference to the invaluable assistance of Dr. G. Allen Robinson and The Radon Company, Inc., 1 East 42nd St., New York, whose cooperation made it possible and from whom it may be obtained.

TUBERCULOUS PERITONITIS*

(A REPORT OF 21 CASES TREATED AT ST. MICHAEL'S HOSPITAL DURING THE PAST FIVE YEARS)

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TUBERCULOUS peritonitis is for the most part a chronic inflammatory process involving the peritoneum, and secondary usually to tuberculosis elsewhere in the body. While it may occur at any period of life, it is most frequent between 20 and 40 years of age. Post-mortem records show that it is more frequent in males. This may depend partly on the greater frequency with which post-mortems are done on males, and also, perhaps, on the success which attends removal of foci in the female by extirpation of the Fallopian tubes, which are frequently a starting point for the peritoneal infection. Faulkner and Everett[1] report that in 45 per cent of their cases, tuberculosis of the tubes was proved to be present. Osler[2] reported 21 of his own cases, of which 15 were in males and 7 in females, but he stated that the disease is more common in females, and from the combined figures of Boulland, Hane and Mourange and his own found a total of 60 males and 131 females.

Cirrhosis of the liver shows a decided tendency to become complicated by peritoneal tuberculosis.

Pregnancy is held to have a definite causal relationship to tuberculous peritonitis. H. Kelly[3] states in 28 per cent of his cases the illness dated from childbirth or miscarriage. More recently, Faulkner and Everett[4] report that 14.5 per cent of their cases occurred during, or followed in a short time after the termination of, a pregnancy. In 6 of the 27 pregnancy cases, miscarriage took place.

TABLE I

SUMMARY OF CASES AT ST. MICHAEL'S HOSPITAL DURING YEARS 1928–1932

No.	*Sex*	*Total Admissions 1928-1932 Inclusive*	*Incidence of Tuberculous Peritonitis*	*Occupation*
21	Male 5 Female 16	41,300	21 out of 41,300 admissions, or 0.0508 per cent, or 50.8 per 100,000	Labourers .. 2 Nurses in training .. 3 Housewives . 3 Delivery boy 1 Stenographer 1 Store clerk . 1 Others 9

Tuberculous peritonitis is generally conceded to be almost invariably secondary to a tuberculous focus elsewhere. This primary focus may be in the intestines, in the lymphatic glands, or in the lungs. Faulkner and Everett[6] say, "The longer one works over the records of this group of patients with peritoneal and pelvic tuberculosis, the more does it seem likely that most of these patients may fairly definitely be considered as having had an original pulmonary focus from which all their troubles began. This is just an impression one gains from observing the frequency with which an anæsthetic stirs

* One of a series of lectures on Diseases of the Alimentary Tract read before the Academy of Medicine, Toronto, on January 6, 1933.

up an acute pleurisy, and the greater frequency with which active or old pulmonary disease is demonstrated in the most recent cases, especially since the use of the roentgen-ray as a diagnostic adjunct." In three of the cases reported in their series they were able to find no evidence of intra-pulmonary infection by the use of the x-ray. This, however, does not exclude tuberculous glands around the hilus of the lung. A large percentage of women with tuberculous peritonitis have been shown to have tuberculous salpingitis as a focus. The route by which tubercle bacilli reach the Fallopian tubes is not clear.

Bacteriology.—The bovine form of tubercle bacillus was found by the English Commission of tuberculosis in 48 and by the German Commission in 63 per cent of the cases of abdominal tuberculosis investigated.[5]

Pathology.—The pathological appearance of the peritoneum varies as the disease is acute or chronic.

The acute form may be part of a generalized miliary tuberculosis or miliary tuberculosis of the cæcum simulating an acute appendicitis. Here the tubercles vary in size from that of a millet seed downward, are scattered over both layers of the peritoneum, mesenteries and omentum, and are often more numerous over the diaphragm.

In the chronic forms, the tubercles are larger and fibrotic, the peritoneum is thickened and the naked-eye appearances may exactly imitate malignant disease. The omentum becomes rolled-up into a hard mass, and the mesentery is shortened from cicatricial contraction so that the intestines become tethered to the spinal column. For purposes of clinical description, the chronic cases are classified as follows:— (1) the ascitic; (2) the loculated, encysted or fibroplastic variety; and (3) the chronic fibroid. adhesive or obliterative form. The difference between these different forms depends largely on the varying combinations of the amount of fluid and the extent and distribution of the adhesions that are present.

In the ascitic form, tubercles are scattered profusely all over the peritoneum. The more acute the disease, the smaller are the tubercles; the more chronic the disease, the larger are the tubercles. Considerable exudate develops in this form and is free in the peritoneal cavity.

The loculated or encysted form may be (a) suppurative or ulcerated, or (b) ascitic.

(a) In the suppurative or ulcerated form the intestines are matted together by adhesions and enclose collections of serofibrinous, turbid, or purulent exudation. In this form the tubercles increase in size, become confluent masses of caseous material surrounded by fibrin and adhesions, and by softening give rise to suppurating foci among the adherent coils of intestine. There may thus be numbers of intraperitoneal abscesses, the pus of which may erode the walls of the intestine and eventually lead to perforation. As the result of a perforation, a fæcal fistula may form at the umbilicus. The bowel is easily torn in attempts to unravel the intestines. Adhesions unite all the viscera; mesenteric glands are enlarged and caseous, and may soften and give rise to a localized abscess.

(b) In the ascitic form of loculated peritonitis there is a transition between the purely ascitic type with free fluid and the obliterative or chronic adhesive type. The obliterative form may follow the cure of the ascitic form or develop subacutely. The matted intestines, rolled-up omentum, and masses of caseous glands embedded in adhesions give rise to the tumour-like masses felt through the abdominal wall.

Symptoms.—Symptoms vary according to the anatomical lesions present. In general miliary tuberculosis the infection of the peritoneum may be latent, with no effusion. The disease is frequently not suspected during life. This accounts in part for the discrepancy between the relative percentages of tuberculous peritonitis found during life and post mortem by some writers. In general it may be stated that abdominal pain or pelvic pain in the female which is worse at the menstrual period, low-grade fever, exhaustion toward evening, loss of weight, poor appetite, accompanied or followed by abdominal swelling with free fluid in the abdomen, constitute a syndrome which should strongly arouse the physician's suspicion of tuberculous peritonitis, especially if these symptoms occur in patients 20 and 40 years of age in whom there is a history of pleurisy or other evidence of pulmonary infection.

The variation in the signs present is accounted for by the varying and relative amount of fluid and adhesions. In the *ascitic* form in which miliary tubercles are scattered over the peritoneum, the characteristic feature is the effusion,

which is free and gives the signs on examination associated with that condition. The amount is usually not extreme, unless associated with hepatic cirrhosis. The abdomen is tender on pressure. The fluid may be clear, turbid or blood-stained, and the contained cells are mainly lymphocytes. Injection of the fluid into a guinea pig may produce tuberculosis.

In the purely *fibroid* type, we go from complete absence of symptoms to those of intestinal obstruction. The physical signs will depend on whether the abdomen is thin and scaphoid or distended by gas in the intestines. Palpation of the abdomen will give varying signs according to the above conditions. It is in this form that the matted intestines, rolled-up omentum, and masses of caseous glands, give rise to the tumour-like masses felt through the abdominal wall.

Encysted tuberculous peritonitis gives a combination of signs of the two forms just described. The abdomen gradually becomes more and more distended. Large walled-off quantities of fluid may in the female simulate an ovarian cyst. The abdomen feels doughy and tumour-like masses may be palpated through the abdominal wall. The thickened omentum forms a characteristic hard cord running transversely across the upper part of the abdomen. In advanced cases the umbilicus may become indurated and inflamed from an abscess pointing there. Percussion and palpation are painful and show irregular areas of resonance and dullness. Rectal or vaginal examination may reveal the presence of tumours, matted coils of intestines and salpingitis.

The blood may show a moderate secondary anæmia. Leukocytosis occurs in a certain number of cases, but is due to some complication or secondary infection. In eleven cases there is no mention of leucocytosis. The leucocytes ranged from 8,400 to 17,200.

The urine usually shows nothing abnormal except a slight trace of albumin.

DIAGNOSIS

A complete history and physical examination (including a pelvic examination in the female), together with roentgenograms of the lungs, usually leave no doubt as to the diagnosis. One should stress (*a*) pain and soreness over the abdomen; (*b*) low-grade or moderate fever, normal in the morning, and slightly or moderately raised at night; (*c*) failing health with loss of weight over a period of time, varying from one to several months; (*d*) evidence of gradually accumulating fluid and of tuberculous foci in the lungs or elsewhere.

PROGNOSIS

This varies according to the type of the disease. It is best in the discrete miliary form with ascites, and worst in the form with numerous localized foci and purulent exudation; it is hopeless in a patient suffering from generalized

TABLE II

SUMMARY OF COMPLAINTS, PHYSICAL FINDINGS, AND OTHER EXAMINATIONS AT ST. MICHAEL'S HOSPITAL

Summary of Complaints in 21 cases	*Summary of Physical and Other Examinations*					
Per cent Pain, tenderness, soreness..... 76 Abdominal swelling..... 42 Flatulence and belching..... 33 Cough..... 29 Loss of appetite.. 28 Vomiting..... 24 Exhaustion..... 19 Loss of weight... 14 Expectoration.... 9 Other symptoms: Epistaxis, headache, hæmoptysis, fever and chills, glandular swelling, blood in stool, diarrhœa and constipation.	*Abdomen*	*Chest*	*Pelvis*	*L. Glands*	*White Blood Cells*	*X-Ray Chest*
	Per cent Tenderness. 43 Distention,. 38 Free fluid.. 24 Doughy feel, 2 cases. Abdominal mass, 2 cases. Abdomen negative on examination, but peritonitis found postmortem in 2 cases.	Negative in 6 cases. Positive for T. B. in 6 cases. (*a*) Moderate, 3 cases. (*b*) Advanced, 2 cases. (*c*) Pleural effusion, 1 case. No report, 9 cases.	Not examined in 16 cases. *Positive* in 4 cases. 1st. Tender in both fornices. 2nd. Enlarged uterus: mass in each fornix. 3rd. Tender both sides of rectum. 4th. Mass on left fornix. *Negative*, 1 case.	Generally enlarged in 1 case and found to be T.B. Glands.	Ranged from 8,400 to 17,200 per cu. mm. *Ascitic fluid in 3 cases.* Gross: 1 bloody, 1 turbid, 1 amber. Microscopic: Lymphocytes, 3 R.B.C., 2 T.B., 0 Guinea pig Inoculation, 2 Positive, 1 Negative, 1	No x-rays in 10 cases. Negative in 5. Positive in 4. Suggestive in 2. Negative at first, but positive 6 months later, 3.

miliary tuberculosis. In estimating the outlook in individual cases, features that might be considered favourable are (1) a history of short duration; (2) moderate or low-grade fever; (3) good general nutrition; (4) absence of tuberculosis elsewhere, as in the lungs and intestines; (5) the ascitic form of this disease. The features that give an unfavourable prognosis are (1) an acute onset with high fever; (2) evidence of wide-spread tuberculosis; (3) poor general nutrition; (4) the encysted type of tuberculous peritonitis, especially of the suppurative form. Some writers hold the disease to be curable in 50 per cent of the cases, while others take a more pessimistic view.

Recurrences occur in a certain number of cases. This probably depends on the presence of some source of reinfection in the abdominal cavity such as the intestines, lymphatic glands, vermiform appendix, or the Fallopian tubes. The importance of removing such foci wherever possible has been amply proved.

The following case report shows several important features especially the insidious onset, prolonged course, and recurrences.

M.M., aged 32, had scarlet fever and pneumonia as a child. She started training as a nurse in October, 1924, and had an appendectomy for acute non-tuberculous appendicitis in November, 1924. After return to duty at the end of January, 1925, she developed erythema nodosum and when the attack subsided tonsillectomy was performed. She went home for further convalescence in March, 1925, but did not regain her health and in May tuberculous peritonitis was definitely diagnosed. Recovery seemed not complete till the Spring of 1926, when she was allowed out of bed. She did not return to duty at the hospital until January, 1928.

A second attack of tuberculous peritonitis developed in May, 1928, and recovery again seemed complete in June, 1929, the interval having been spent in bed. From then on she kept well and worked at home in the country till the summer of 1932.

A third attack then became evident with moderate fever and abdominal tenderness with fluid. She was afebrile at the end of 2 months. At the end of 4 months from the onset of this last attack her appearance was healthy; her weight had increased by 20 lbs. but there were (1) slight frequency and pain on urination; (2) slight soreness on palpation; (3) some pain on defæcation; (4) soreness of the abdomen on attempting to stand up straight; (5) a fixed uterus and tenderness in the left fornix. A laparotomy was undertaken in the hope of finding a removable focus of infection, but extensive adhesions prevented any search for such. In spite of her favourable condition tubercles were found scattered all over the peritoneum which was greatly thickened. The bladder was drawn half-way up to the umbilicus.

It is of especial interest in this case to note that while the patient was afebrile and in good general health, the peritonitis was found at operation to be very extensive and still active. As a pre-operative warning that trouble was still present we should like to emphasize (1) soreness over the abdomen on palpation or on attempting to straighten up as in standing or walking; (2) slight frequency on urination; (3) pain on defæcation; (4) and fixation of the uterus on pelvic examination. The discrepancy between the pre-operative findings and the extensive pathological changes disclosed at operation was very striking. It impressed on one the great necessity of prolonged treatment and caution in prognosis in the face of an apparently favourable course of the disease.

TREATMENT

Treatment should include any procedure that will help to restore the unfortunate patient to health. There should be no such classification as medical or surgical treatment. In general, one may say that the treatment is that of tuberculosis elsewhere in the body, namely, rest in bed, judicious feeding, fresh air, exposure to sunshine or sun lamp in those cases past the acute stage and showing no activity in the lungs. *The patients should be under treatment in bed for at least 3 months.* A very difficult question to decide is when to let them out of bed. Several indications for such a procedure are essential. (1) The patients should be afebrile. Slight rises of temperature in the late afternoon or evening, to 99.1° or 99.2° F., point to an active process. The case reported, however, shows that there may be extensive disease without any rise in temperature. (2) All fluid should have disappeared from the abdomen and pleural cavities. (3) All soreness should have gone from the abdomen on palpation, on standing up, and on pelvic examination. (4) There should be no pain on defæcation or urination. (5) Signs of good general health should be manifest in increased weight; good appetite; regular bowel movements, and refreshing sleep. The time out of bed should be very short at first and very gradually increased. Moving about will depend on the presence of the favourable indications noted above and complete absence of soreness on walking. Return to work should be by easy stages and should not be considered till the patient has had at least 6 months, and better still 1 year, free from the symptoms and signs of this disease. Active tuberculosis elsewhere may prolong the convalescence. The case reported emphasizes the need for prolonged ob-

servation, the chronicity of this disease, and the possibility of recurrences after long periods when complete cure seemed certain.

Whether or not one should employ surgical methods depends on the individual case. Many surgeons claim that simple laparotomy in the ascitic type is beneficial. On the other hand we know that this type does well without any surgical interference. As in pleurisy with effusion, the fluid disappears in from one month to six weeks if the patient is left alone. Operative procedures will have to be undertaken where there is an intestinal obstruction, or where it is thought there are foci of infection as in the appendix or Fallopian tubes. These should if possible, be removed when diseased. Massive adhesions in the plastic type may, however, prevent this, and one has to trust to the *vis medicatrix naturæ*. It is interesting to note that some of those who recovered from the serofibrinous type of this disease show when operated on for some other reason, years later, no evidence of the disease.

Of the 21 cases treated in St. Michael's Hospital, 6 were operated upon. The findings at operation were as follows: (a) free fluid—3 times; (b) tubercle—4 times; (c) adhesions—4 times; (d) thickened bowel—once; (e) calcareous deposit—once; (f) appendicitis, with tip broken off—once.

Three of the total number treated died while in hospital, but none of these had been operated upon. The stay in hospital varied from a minimum of 3 days to a maximum of 352 days, with an average of 79 days.

The immediate results of treatment in hospital were as follows: improved—15 cases; cured—1 case; died—3 cases (14 per cent); unimproved—2 cases.

Five cases only have been traced since they left hospital. Three of these have remained well. One has had a tube and ovary removed since leaving hospital, and one other has developed a lymphadenitis of the cervical glands.

CONCLUSION

In conclusion the following features of this disease should be emphasized.

1. That tuberculous peritonitis is very frequently associated with tuberculosis and is probably secondary to tuberculosis elsewhere in the body.
2. That it is a serious illness.
3. That the time required for complete recovery is uncertain and prolonged.
4. That in the female involvement of the Fallopian tubes is frequently found, and this necessitates careful pelvic examinations, and, where disease is discovered, salpingectomy if possible.

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RADIATION IN CARCINOMA OF THE CERVIX UTERI*

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WE are presenting herewith a survey of the cases of primary carcinoma of the cervix treated at the Memorial Hospital during the years 1925 and 1926. During these two years 227 cases of primary cervical cancer were seen in the Memorial Hospital clinic. This represents all groups, and includes all cases, even the most advanced, in some of which even an attempt at palliation was known to be useless. In 1925, 118 cases were seen and in 1926, 109.

The ages of the patients ranged from 26 years to 79 years, with the greater number occurring in the two decades from 40 to 60 years. Of the total there were 8 cases between 20 and 30 years of age, 46 from 31 to 40 years inclusive, 81 from 41 to 50 years, 69 from 51 to 60 years, 16 from 61 to 70, and 7 cases over 70 years. It is interesting to note that one of the youngest, a woman 26 years of age, is still alive and clinically free from disease 6 years after treatment. The oldest, a woman of 79 years, lived 21 months after treatment and died of heart disease, at which time she was free of any clinical evidence of carcinoma. The significant fact is that car-

* Read before the Section on Obstetrics and Gynæcology, New York Academy of Medicine, in March, 1932.