of the latter group 9.6% developed demonstrable lesions. But when the 9.6% of students were analysed further, 6.2% were regarded as primary complexes and pleurisy and only 3.4% as reinfection lesions, a figure similar to the 3.1% of the first group.

The point was also made that B.C.G. has not been proved to be harmless; there have been a number of reports about "Calmette" abscesses and even of pulmonary infiltration. However, Myers's main argument was that there is no justification for taking decreasing mortality as the criterion of the protective power of B.C.G., since similar reductions have been noted in unvaccinated communities. Thus the tuberculosis situations in Denmark and Minnesota showed comparable declines in mortality in recent years, although B.C.G. was used only in Denmark. Myers felt that conventional methods, rather than B.C.G., should get the credit for the improvements in Denmark, as they do in Minnesota. I have already referred to the decline in tuberculosis mortality in Iceland, which was even greater than in Denmark and took place without any assistance from B.C.G.

In favour of B.C.G. are numerous experiments in animals, which show that immunization with the vaccine retards the development of tuberculosis following later injection of virulent tubercle bacilli, and thus results in a more chronic type of infection. This should afford a basis for the hope that in man a resistance should be set up of sufficient duration to support the defences of the body during the danger period when natural infection is taking place. However, Myers maintains that there is no evidence of the development of effective immunity even after an attack of tuberculosis from which a patient has apparently recovered. According to him, parallelism between hypersensitivity and acquired resistance is non-existent: allergic tissues are a prerequisite to the development of the more destructive forms of tuberculosis, the bacilli which were held up temporarily being widely disseminated.

The intradermal method of administration has been most used in Great Britain and Ireland and in Sweden and Denmark, while multiple puncture (with a Hagedorn needle or other instrument) and scarification have been preferred in Norway and France respectively. Newborn infants used to be given B.C.G. by mouth, but this technique is now obsolete. Intradermal vaccination in the deltoid region as soon after birth as possible has recently been employed by Gaisford and Griffiths (1951).

Much attention has been given recently to the method of preparation of the vaccine. "Liquid vaccine," which is the type ordinarily used in Great Britain and Ireland and in Scandinavia, has a very short life—only ten days or so from the date of preparation. (This and other traditional concepts about B.C.G. vaccine and vaccination have been challenged recently by Palmer (1952), of the Tuberculosis Research Office, W.H.O.) Freeze-dried vaccine should retain full viability and immunizing efficiency for many months. The workers at the Pasteur Institute, Paris, have been outstanding in developing a dry vaccine.

My own views in this difficult field of vaccination against tuberculosis may be summarized as follows. While the value of B.C.G. in man has not been proved, it is sounder preventive medicine to produce primary allergic complexes with a living attenuated vaccine, even if its complete innocuousness is occasionally in doubt, than to risk the potentially dangerous manifestations that may result from random natural infection with virulent bacilli. The essence of all vaccination procedures is to produce some immunity with antigens, living or dead, that are safer than an attack of the natural disease. One recalls that, in the case of smallpox, variolation was replaced by vaccination, and that Pasteur's attenuated virus is used in the prevention of rabies. But it is also noteworthy that in the attack on tuberculosis "fundamental control measures" have often produced considerable falls in mortality without any part being played by B.C.G. At best, B.C.G. must be regarded as an adjunct to, and not as a substitute for, precautions introduced to prevent fre-

quent or massive exposure to infection. Unfortunately in many countries to-day the injection of B.C.G. is the only measure of control which is practicable.

Wells's Vole Bacillus (Living)

This is the only tuberculosis vaccine which competes at all with B.C.G. It consists of a culture of a strain of murine tubercle bacillus, and has the advantage over B.C.G., an artificial laboratory product, that it is already stabilized in its virulence for man and cattle. Attenuation from prolonged and repeated subculturing is thus unnecessary. Although some results in guinea-pigs, cattle, and man are encouraging, it is unlikely that Wells's vaccine will ever oust B.C.G., or even offer a serious challenge to it, if only because B.C.G. is already well established.

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FOUR CASES OF OBSTRUCTION AT THE DUODENO-JEJUNAL JUNCTION

BY

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Unusual cases tend to come in runs, and sometimes present such similar features as to enable those who have encountered them to suggest the diagnosis in subsequent cases with reasonable certainty. During the past year four such cases have come our way—namely, obstruction at or near the duodeno-jejunal junction resulting from narrowing by growth. Two were caused by primary carcinoma of the duodenum, one followed infiltration by carcinoma of the body of the pancreas, and one followed infiltration by some adenopathy of adjacent glands. Each case presented points so strikingly alike that the syndrome could be recognized as pointing to some stenosis at or just beyond the junction.

Case 1

A minister of religion aged 39, a married man with one child, had been in robust health until six weeks previously. He was then on holiday, during which he began to suffer epigastric pain some 10–15 minutes after meals. It lasted about an hour, was unrelieved by alkalis, and did not radiate in any direction. Within a few days he began to vomit copious amounts of dark-green, watery, bitter-tasting fluid. This vomiting was quite unrelated to food, and he declared that pints of fluid just flowed from him. He was put on a milk diet, and remained on it until admission to hospital.

The vomiting was checked somewhat thereby, but still occurred once or twice each day; it never contained blood. The pain ceased one month after the onset. He had lost weight. The bowels were constipated, but the stools were pale as the result of the milk diet. He was a non-smoker and teetotaler.

On admission under Dr. Trevor Cooke his general condition was found to be reasonably good, there being no complaint of pain, no dehydration, no abdominal swelling, tenderness, or free fluid, and no abnormality being discovered in any other systems of the body. The fasting test meal showed charcoal in all specimens, fasting juice of 182 ml., and residual juice of 308 ml. Starch and bile were present in all specimens, but no blood. Serum chlorides were somewhat low, being 233 mg. per 100 ml. Blood counts showed R.B.C. 5,890,000, Hb 120%, C.I. 1.02—the result of a mild degree of haemoconcentration.

At this stage I was asked to see him. The condition was regarded as one of high intestinal obstruction, and after rectifying the chloride deficiency it was decided to explore.

First Operation (October 1, 1951).—This was done through a right paramedian incision. In the region of the duodeno-jejunal junction was a hard mass, the size of a golf-ball, obstructing the duodenum and causing considerable distension of its more proximal part. On the surface of the bowel at the site of the swelling were small nodules of carcinoma invading the lymphatics, and there were hard glands in the upper part of the mesentery. The tumour was straddling and adherent to the aorta, and was obviously irremovable. An anterior gastro-enterostomy was therefore performed at about 8 in. (20 cm.) from the junction, this distance being chosen with the hope of being beyond the diseased bowel, and the abdomen was closed in layers.

Progress.—Careful watch was kept on fluid and crystalloid balance, and by means of a mixture of saline, glucose, and Hartman's and Darrow's solutions this was maintained. However, vomiting continued intermittently, and it became obvious that the stoma of the anastomosis was not working properly. It was therefore decided to reopen the abdomen.

Second Operation (October 13).—The abdomen was opened through the original wound. A little free fluid was present. The efferent loop of the gastro-enterostomy was adherent to the back of the first wound; it was thickened and dilated, but there was no mechanical obstruction. The efferent loop was opened, and with a finger the stoma was explored and found to be patent. The afferent loop was also explored, and on its posterior wall, just at the termination of the duodenum, was felt a small ulcer crater with hard edges, but it could not be brought into view. The jejunal incision was sutured and the abdomen closed in layers.

Progress was promising for 24 hours, but the patient then developed a rigor, collapsed, and died at 5.30 a.m. on October 15.

Post-mortem examination revealed a carcinoma of the body of the pancreas invading the last part of the duodenum.

Case 2

A married woman aged 59 was admitted under Dr. Trevor Cooke. She had been perfectly well until two months before when she suddenly vomited one to one-and-a-half hours after a meal. There was no discomfort other than a feeling of heaviness, but from this time onwards she vomited frequently, usually in the evening. The vomit was copious, and often contained food taken 12 hours previously, and also bile. The longest spell of freedom during these two months had been a fortnight, and at its worst the vomiting was at least once a day. The appetite had become poor and she had lost weight. Latterly she had less energy, had noticed herself becoming pale, and had become breathless on exertion. Mr. B. N. Brooke was asked to see her.

On examination a mass could be felt in the left hypochondrium which did not move much with respiration. No other abnormality was found in the abdomen, and the rectum

and pelvis were clear. R.B.C. 3,690,000, Hb 48%, C.I. 0.65, W.B.C. 4,900. The cardio-respiratory and renal systems were normal. A barium meal showed a 24-hour residue; the second part of the duodenum was dilated, the first part not seen, and it was suggested that a chronic duodenal ulcer was responsible. The report on a second barium meal taken five weeks later stated that no definite ulcer was seen, but that there was a diverticulum of the second part of the duodenum. A fractional test meal revealed achlorhydria, which was unaltered by histamine or insulin, and nearly all specimens contained bile.

Operation (January 2, 1951).—It was decided to explore, a pyloric neoplasm being thought to be the likely lesion. After the usual preparation this was carried out by Mr. B. N. Brooke; the following is his operation note.

"Through a right upper paramedian incision a tumour about $\frac{1}{2}$ in. (1.9 cm.) in diameter was felt in the third part of the duodenum. It was hard, like carcinoma, and there was a gland between the duodenum and head of the pancreas. The duodenum was divided distal to the tumour and the distal end closed in three layers. The duodenum was also divided proximal to the tumour, and the part containing the tumour was removed. The stump of the proximal duodenum was anastomosed to a loop of upper jejunum brought up in front of the transverse colon."

Convalescence was uninterrupted. The pathological report was: "(1) Portion of duodenum invaded on its external surface by well-differentiated adenocarcinoma. Histological character resembles that of a tumour of the large bowel rather than intrinsic duodenal growth. (2) The lymph node shows no evidence of metastatic involvement."

Case 3

A man aged 62 was admitted as an emergency case under Dr. E. Bulmer on December 7, 1951. Until nine days previously he had been in perfect health, but then developed severe epigastric pain after a public dinner, and 12 hours later he began to vomit, this continuing right up to admission to hospital. Both solids and fluids were returned almost immediately after swallowing, and the vomit contained bile but no blood. On admission he was constipated and thirsty.

On examination he was found to be a restless, alert, and intelligent man of good physique. The tongue was dry. There was guarding in the left hypochondrium, but, apart from this and a palpable left colon, nothing was discovered in the abdomen. The rectum was normal, the prostate slightly enlarged. There was severe dehydration, and the blood urea was 146 mg. per 100 ml. The serum chloride ion was 286 mg. per 100 ml.

On a regime of gastric suction and intravenous fluids his condition greatly improved, the blood urea being 52 mg. per 100 ml. and the serum chloride ion 315 mg. per 100 ml., and after two days he seemed in every way so much better that the gastric tube was removed, the intravenous drip was discontinued, and fluids by mouth were allowed. Within a few hours he vomited 22 oz. (624 ml.) and on the passing of another Ryle's tube a further 52 oz. (1,474 ml.) was aspirated from the stomach and bile was present. Intravenous saline and glucose was restarted, and the general condition further improved, serum chloride ion rising to 366 mg. per 100 ml.; proteins were 5.6 g. per 100 ml. However, stomach aspirations continued to exceed intake by mouth. It was assumed that there was a high small-intestinal obstruction, and because of its similarity to the two previous cases I ventured to place it at about the duodeno-jejunal junction.

Operation, on December 15, proved this correct, and a small stenosing carcinoma was found involving the last inch (2.5 cm.) of the duodenum. The growth was infiltrating the peritoneal coat, but there were no palpable glands and no secondaries in the liver. The duodenum was divided 1 in. (2.5 cm.) proximal to the upper end of the growth, and the jejunum 8 in. (20 cm.) below the junction, the proximal end being anastomosed to the front of the second part of the duodenum. The specimen contained a small mass of

fat from the back of the duodeno-jejunal junction, a few tiny glands being included therein. The pathological report reads: "Adenocarcinoma of jejunum, with mucoid change in the deeper portions. Penetration of the bowel is complete. A small lymph gland shows no secondary invasion."

Convalescence was satisfactory, and he remains well.

Case 4

A bus-driver aged 35 had been in hospital a year previously under Professor Melville Arnott with thrombophlebitis migrans, which led to thrombosis of the superior and inferior vena cava; no satisfactory explanation had been found for this.

On April 11, 1952, he was readmitted under Professor Arnott, this time as an emergency case. He said that since his previous spell in hospital he had been perfectly well until a month previously, when he began to suffer epigastric pain, which went through to the back and was colicky in nature. It was unrelated to meals, and was relieved by heat and "veganin" tablets. Alkalis were ineffective. He began to vomit four days before, at first in small quantities, but then in larger amounts. The vomit was yellow, and on admission occurred every half-hour. On the day of admission the vomit was darker brown, and contained a little blood. With the onset of vomiting the pain became easier. The bowels had acted regularly each day, including the morning of admission.

The patient did not think he had lost any weight, though his appetite had become poor. He regarded himself as cured from the former thrombosis trouble, having been at full work since then, and had not noticed any swelling of arms, legs, or face. However, he became breathless on exertion and admitted to some swelling of the face after walking more than 200 yards.

On examination he was thick-set and looked ill, flushed, and anxious, and he vomited coffee-ground material frequently during the interview. Temperature 99.8° F. (37.7° C.) and pulse 80. Micturition and urine were normal. In the epigastrium was a tender rounded mass transmitting pulsation. The liver was enlarged to three fingerbreadths below the costal margin. Neither spleen nor kidneys were palpable, and no abnormality in the pelvis was found on rectal examination. The axillary glands were enlarged. The neck veins were full, but no other abnormality of cardiovascular or respiratory systems could be found. The testicles were normal.

At this stage I was asked to see this man, and did not feel I could be more precise than to say that he had high intestinal obstruction and required laparotomy; but I remarked to one of my team that the case reminded me of the three cases described above.

Operation (April 13).—The abdomen was opened through a left paramedian incision. The lump previously felt on examination was found to be a retroperitoneal mass, which on closer examination proved to be part of a gross generalized intra-abdominal adenopathy. The glands along the aorta and both iliac arteries were enlarged and fused together, as also were those in the mesentery, mesocolon, and mesosigmoid, and there was a further mass in the hollow of the sacrum to which the rectum was tethered. In the region of the main mass—namely, behind the stomach and duodeno-jejunal junction—the peritoneum was puckered, giving the appearance of being infiltrated by growth, and the transverse mesocolon was so shortened thereby that the colon was drawn right back on to it. In the same way the duodeno-jejunal junction was affected, but, so far as could be detected, there was no involvement of the stomach wall itself. The effect of this adenopathy was therefore to narrow the duodeno-jejunal junction considerably. An anterior gastro-jejunostomy was performed as a short-circuiting device. No secondary deposits could be felt in liver or spleen. A gland from the mesentery was removed for biopsy. The patient made an uninterrupted recovery.

The report on the mesenteric gland was that there was no evidence of neoplasia, but marked inflammatory hyperplasia with sinusoids distended with reticulum cells. Because of this somewhat unsatisfactory explanation of his illness, glands were removed from each axilla, but precisely the same appearance was reported.

He was discharged home on May 14 in excellent condition, and has since remained so.

Conclusions

The outstanding features of these four cases are: (1) a short history—a matter of weeks only—of epigastric discomfort or pain; (2) the onset of vomiting very shortly afterwards; (3) the vomits contained bile in all four cases; (4) in all four the symptoms were those of high small-intestine obstruction of a subacute nature.

The short history and fairly sharp onset were against pyloric stenosis from ulcer or neoplasm, and so, too, was the presence of bile in the vomits and the fractional test meal. The absence of collapse from severe colic was against acute obstruction of the small intestine, but the copious and oft-repeated vomiting, together with dehydration, pointed to partial obstruction at a very high level. That several mechanisms may lead to such partial obstruction is shown by these four cases.

THE MANAGEMENT OF CHILDREN WITH PRIMARY TUBERCULOSIS*

BY

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To guide a patient satisfactorily through any illness we must be thoroughly familiar with the natural history of the disease and the possible variations of its course, particularly those dependent on the age and circumstances of the patient. In this paper we deal with the child who has his first infection with tuberculosis—that is, with a primary tuberculous focus and the accompanying tuberculous adenitis of the regional lymph nodes.

What advice should be given concerning the child with the primary tuberculous infection? How does the advice accord with the stage of the infection, the age of the child, and the circumstances in which he lives? These are the practical questions of medical practice, and to answer them we must know the natural history of the disease. It must be confessed that in spite of the vast expense and labour involved in the study of this disease process there are great gaps in our knowledge. Many of the fundamental features of the natural history of the primary and post-primary infections are still unknown.

Natural History of Primary Tuberculosis

Nine out of every ten of our population undergo a primary infection with tuberculosis before the age of 20. The entry of the tubercle bacillus into the lungs

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