only of the more interesting features which our case presents. A perusal of the literature makes one regard it as very typical in its symptomatology.

The characteristic intermittency of the symptoms is well exemplified. To quote Dandy¹: "Intermittent headaches are unquestionably of mechanical origin. They indicate a ball-valve obstruction to the outflow of fluid from some part of the ventricular system. The fluid increases until the pressure reaches a stage when the ventricular channel, wherever it may be, is again opened, thus permitting the excess of fluid to pass the obstruction. Such periodicity continues, usually with gradually shortening intervals, until eventually the obstruction becomes complete." In three out of Dandy's five cases there were present, in addition, curious attacks, mentioned also by some other writers, in which headache, dimness of vision, or giddiness was brought on by certain changes in the position of the head. These, however, were entirely absent in our patient.

It should be noted that the fatal ending in this condition occurs in coma during one of the attacks of severe headache. Rinder and Cannon² thus describe the terminal stage:

"The fatal ending began on the afternoon of November 27th, 1929. The patient stopped work because of a severe headache. At home she began to have attacks of vomiting, which increased until they became projectile. There was excruciating pain over the right eye and in the temporal region, and she complained of dimness of vision. She refused to call a physician, as she believed the attack would stop as had the previous ones. At 3 a.m. on November 28th she was found lying on the floor in a coma; she was cyanotic, and breathed with difficulty. Death ensued shortly thereafter."

From the history and neurological examination the diagnosis of these lesions can at best be but surmised. Ventriculography is required. Our case exemplifies very well the fallacy of relying on ventricular estimation and dye injection. It will be noted that the dye passed readily across from one lateral ventricle to the other in the presence of what was apparently a complete obstruction of both foramina of Monro. At operation the reason for this was obvious, in the finding of a large perforation of the septum lucidum, easily visible on inspection of the interior of the right lateral ventricle. The occurrence of this secondary perforation of the septum lucidum in cases of chronic hydrocephalus, with the fallacious diagnosis of an obstruction in the cerebro-spinal fluid pathways below the third ventricle to which it may give rise, should be emphasized. It is by no means uncommon, and several instances of the kind have lately presented themselves.

The recent occurrence in our patient of two epileptiform fits is to be regarded as a sequel to the transcortical incision into his lateral ventricle. Such seizures may occur after any brain operation in which the integrity of the leptomeninges is impaired, and come under the heading of traumatic epilepsy. According to Dandy they are seldom frequent, and tend to become less so over a period of time.³

We have to acknowledge our indebtedness to a number of individuals for their co-operation in the investigation of this case. Our thanks are due to Dr. Bell of Falkirk for his records of the patient while in Falkirk Infirmary, and to Dr. Conway and Dr. Walker for their ophthalmological and radiological examination while in the Victoria Infirmary. Lastly, on the pathological side, we owe a debt of gratitude to Dr. John Anderson, director of the clinical laboratory of the Victoria Infirmary, for a great deal of assistance and advice.

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FUNNEL-CHEST AND PULMONARY TUBERCULOSIS

BY

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(With Special Plate)

Funnel-chest ("Trichterbrust") is a depression of the lower part of the sternum, which is usually due to a congenital anomaly. The chief clinical symptoms are disturbances in the functions of the heart, which have been described in detail by Ebstein, Barié, Groedel, von Pohl, and Carr. Less attention has been paid to the fact that funnel-chest can be combined with pulmonary tuberculosis, as seen, for example, in the cases of Ebstein, Curschmann, Versé, and R. von Pohl. The question arises whether a pathogenic part is played by the funnel-chest in the development of pulmonary tuberculosis. The following case seems to be a contribution to the solution of this problem.

Case Record

Male, aged 30 years. Increasing cyanosis during the last eight years (1926-34); occasional small pulmonary haemorrhages since 1926. Father known to have suffered from tuberculosis forty years before the patient's admission to hospital (1926). Patient died on April 1st, 1934, with increased symptoms of cardiac insufficiency, especially dyspnoea and cyanosis. Tubercle bacilli were not found in the sputum until 1931, and never again until 1934.

POST-MORTEM EXAMINATION

Corpus sterni 10 cm. in length, with a depression 7 × 7 cm. from the third rib downwards (Fig. 1 on Plate). The area of depression included the cartilages of the ribs on the right side, the departure from the normal contour (the depth of the depression) being 3 cm. The manubrium of the sternum was 5 cm. long, the length of the whole sternum being 18 cm.

The heart was enlarged, particularly in its right section. The anterior surface of the enlarged right ventricle showed a depression of 5 × 2.5 cm. in size, corresponding to the depression of the sternum (Fig. 2). The pericardiac surface of the margins of the depression was thickened by scarring. When opened the right ventricle was seen to be bipartite, the inlet part comprising the right venous ostium being the larger, whereas the outlet part, with the right arterial ostium, was narrow, with smooth valves and vessels (Fig. 3). Beneath the right posterior semilunar valve of the pulmonary artery was a deep pocket in the muscular substance. The descending anterior branch of the left coronary artery diverged from the trunk of the aorta 2 cm. above the semilunar valves. The cardiac muscle in the region of the depression was to a great extent replaced by fibrotic tissue (histological examination).

Lungs.—Left upper lobe showed a notch like a lobus azygos. Three tuberculous foci were observed in the right upper lobe; the first, in the region of the ramus apicalis, and the second, in that of the ramus subapicalis of the dorsal bronchus, were the size of a hazel-nut, while the third, in the region of the ramus horizontalis, was the size of a walnut. All were liquefied. There were some smaller nodules due to aspiration in the lower lobes, and extreme blood stasis in all organs.

Discussion

The depth of the depression of the sternum, typical of funnel-chest, in the present instance did not reach the extreme figures of some of the cases described. The depression, which included the cartilages of the right ribs, was neither symmetrical nor confined to the body of the sternum. The heart was not displaced towards the left side to the extreme degree that has sometimes been observed, but it showed a peculiarity which seems to me of greatest importance, and which hitherto has not been noted as occurring in such a definite and marked manner—

namely, the depression mark on the anterior surface of the right ventricle corresponding to the depression of the sternum. In the case under consideration the depression of the heart led to a constriction of the outlet of the right ventricle, and was responsible for the symptoms of cardiac insufficiency, which gradually increased and eventually caused death. Apparently functional conditions resembled those of congenital stenosis of the right arterial ostium.

Depressions in the heart wall, although neither so deep nor so extensive, have been mentioned in cases of funnel-chest by Bien, Fruehwald, and Henschen and Naegeli. Von Pohl, after careful radiological examination of the chest, came to the conclusion that the antero-posterior diameter of the heart in the region of the funnel must have been considerably diminished by the indentation of the heart in front corresponding to the in-bowing of the anterior thoracic wall.

If the functional conditions were similar to those of congenital stenosis of the pulmonary artery a relationship between the deformity of the heart and the pulmonary tuberculosis is obvious. The cases of von Pohl, being of tuberculosis, demonstrate this relationship. Fruehwald did not mention the condition of the lungs in his case of pericarditis. The absence of pulmonary tuberculosis in the case described by Bien may be explained by the smaller extent of the depression and its situation in the anterior wall of the heart, involving mainly the right atrium and thereby differing from the present case and presumably from those observed by von Pohl.

It is well known that pulmonary tuberculosis in its development and extension depends largely upon the circulatory conditions in the organ involved. I observed a similar coherence in a case of syphilis of the pulmonary artery. Innumerable caseous tuberculous foci were to be seen in the right lung with an extreme syphilitic constriction of the right branch of the pulmonary artery, whereas the left lung was entirely free from tuberculous foci and the left branch of the pulmonary artery was wide and smooth. The same applies to cases of unilateral miliary tuberculosis, where one lung is not involved on account of blood stasis due to post-pleuritic atelectasis. The description of one such case which I have already given in this journal may be consulted. Several congenital deformities, as in the case under discussion, such as the abnormal fissure of the left upper lobe and the abnormal origin of the left coronary artery, are combined with a general asthenic habitus, which is frequently found in cases of funnel-chest (Groedel) and often regarded as a predisposition to pulmonary tuberculosis.

Summary

The post-mortem findings of a case of funnel-chest with pulmonary tuberculosis have been described. The presence of a deep depression in the anterior wall of the right ventricle corresponding to the depression of the lower part of the sternum and causing dilatation of the right heart with constriction of the right arterial conus has led to the suggestion that in cases of funnel-chest a disturbance of the pulmonary blood supply may be responsible for the development of pulmonary tuberculosis.

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PRIMARY CARCINOMA OF THE SMALL INTESTINE

BY

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(With Special Plate)

Primary carcinoma of the small intestine is sufficiently rare to warrant the publication of individual cases. Many surgeons of wide experience have never actually encountered a case in either their hospital or their private practice. Raymond Johnson¹ states that out of 343 cases of intestinal carcinoma seen at the Vienna General Hospital only ten were in the small intestine. He also mentions that Hinz collected records of 584 cases, with only eighteen in the small intestine. In 1930 Rankin and Mayo² collected thirty-one cases from the Mayo Clinic, but this number comprised only 0.064 per cent. of the intestinal carcinomata treated. It is difficult to account for this difference between the figures for the Old and the New World—namely, 3.5 and 0.064 per cent. respectively.

The following is a brief account of two cases recently operated on by one of us (D. J. H.).

CASE I

History.—A married woman, aged 43, was admitted into the Mountain Ash General Hospital on June 6th, 1933, with loss of weight, increasing constipation, and attacks of severe colic during the previous three months. She made the statement that in one hour or so after taking food she felt it stopping when it reached the left lower abdomen. When asked to show the exact spot she pointed to the left iliac region.

Examination.—The patient was emaciated, and had a flaccid abdomen. A small tumour could be felt in the left iliac fossa, and was naturally taken to be a ring carcinoma of the iliac colon.

Operation.—The abdomen was opened through a right paramedian incision, and a ring carcinoma of the lower part of the jejunum was brought outside and resected, with about six inches of intestine on either side. On account of the dilatation and hypertrophy of the upper segment, a lateral anastomosis was made. A careful examination failed to show any secondaries.

After-history.—The patient made a good recovery from the operation, but in about a month she started losing weight and became very anaemic. She got rapidly weaker, and died in six weeks from the date of the operation. There were no obvious signs of secondaries in the chest or abdomen before death. A post-mortem examination was unfortunately not obtained.

Pathological Report on the Specimen and Sections C. V. H.).—The specimen consists of a segment of small intestine with a well-marked constriction in the centre, the intestinal wall being thickened on the proximal side. In the interior a large cauliflower-like fungating tumour, completely encircling the gut and narrowing the lumen, arises at the point of constriction and extends along the lumen for about two centimetres on either side. The surface of the tumour is necrotic, but not deeply ulcerated. At the point where the tumour is attached the muscular coat is seen to be infiltrated and destroyed. There is no evidence of polyposis or other tumours in the segment of gut examined. A section was taken from the centre of the specimen, to include both the tumour and the adjoining intestinal wall. Histologically the section shows a typical adenocarcinoma, such as is commonly found in the large intestine. Many of the cells

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FIG. 1.—Funnel-chest. Depression of lower part of sternum, including cartilages of right ribs.

FIG. 2.—Anterior surface of right ventricle. Depression corresponding to that of the sternum. (Funnel-chest.)

FIG. 3.—Right ventricle of the heart from inside. Dilatation of the right part of ventricle, and constriction of the left part of ventricle, caused by depression of the anterior surface of the heart.

FIG. 4.—Heart of a man with chronic pulmonary tuberculosis and dilatation of right ventricle, for comparison with condition shown in Fig. 3. In Fig. 4 there is no constriction of left part of right ventricle, the dilatation of right part being definitely smaller.