fluctuating swelling contained besides its fluid contents a large papillomatous malignant growth. The epithelial cells lining the papillomatous parts of its structure are columnar.

In the main parts of the tumour the epithelial cells are rigidly confined within what presumably is the cyst wall; but at isolated intervals the epithelial cells can be seen most definitely passing through the wall and invading the surrounding connective tissue. There was a blood clot in this cyst. In other parts of this breast in the neighbourhood of the tumour can be seen ducts the epithelial linings of which are in a marked state of desquamative hyperplasia, very similar to that seen in Fig. 1. Upon the condition of things being discovered by microscopical examination the patient was advised to undergo a complete operation.

The sections have been cut too recently to enable me to get them drawn for reproduction in this article. At a future date I will publish drawings made from them. The sections are at the disposal of all who care to see them.

SUTURE OF RUPTURED LEFT DOME OF DIAPHRAGM.

BY

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With Radiographic Commentary by ROBERT KNOX, M.D.,
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[WITH SPECIAL PLATE.]

A YOUTH of 19 was admitted to hospital for injuries sustained by being thrown from his bicycle. While riding, he was thrown by a skid in front of a motor bus; he fell with the right knee undermost and then lost consciousness for a while. Unfortunately, no further details of the accident were available. At any rate, it was certain the bus passed over no part of his body. I saw the patient after attempts had been made to reduce a supposed dislocation of the knee.

There was severe shock on admission; temperature 97°, pulse rate 120, respirations 20 to 24. The right knee presented a fracture separation of the femoral epiphysis with a longish piece of diaphysis attached on the inner side. The lower end of the diaphysis presented on the outer side of the joint subjacent to the skin, which was whole. This particular displacement of fragments was probably accounted for by the manipulations.

Pain was complained of in the chest at the left costal margin about the eighth and ninth cartilages. There had been no dyspnoea, no sputum, no nausea or vomiting. The pain disappeared at the end of four days, and there was no symptom of trouble at all.

The skin showed no sign of trauma. The left chest moved but little, and was less expanded than the right. Slight cardiac pulsations were seen on the right side of the sternum; the right border of the heart was made out nearly two inches to the right of this; the left border was not determined.

Over the front of the left chest was tympany, extending up to the second rib and out to mid-axilla, where it began to yield to what became at the back slight relative dullness. Auscultation over the tympanitic area showed distant breath sounds at the upper and outer margins, none at the inner and lower part. Elsewhere the chest gave signs of partial collapse of the lung. At the left margin of the sternum there was heard at intervals a loud, intensely metallic clanking, synchronous with the heart beat. After a fortnight borborygmi were heard in the chest; they were infrequent, but had great intensity even as high as the apex of the axilla. Against the possibility of their being transmitted one noted: (1) their maximum intensity was thoracic, (2) their loudness, and (3) apparent origin very near the stethoscope. On a few occasions it was possible, by a sudden dipping of the finger-tips in the epigastrium, to cause a splash to be heard in the thorax. Diaphragmatic hernia was diagnosed on these grounds clinically.

On the fifth day the femur was plated under spinal analgesia. As the lower fragment offered nothing on the outer side but a very short cancellous strip, the incision was made on the inner aspect. Anatomical reposition was effected. Movement of the joint was begun a week later, and the other forms of physiotherapy added as soon as the scar permitted.

The condition of the lower limb had for this time made a proper x-ray examination of the chest impossible. The patient was screened in the supine position. The cardiac displacement was evident; the left pleural "cavity" was poorly illuminated compared with the right, and the diaphragm on that side was some one and a half inches lower. Bismuth gruel swallowed by the patient passed rapidly, to lie as a mass 3 inches by 2 inches transversely at the level of the fourth left costal cartilage.

It was thought that operative interference was indicated, though in bed the patient had no symptom, alimentary, respiratory, or cardiac. It is probable, however, that the condition of affairs on exertion might cause considerable embarrassment; further, the possibility of internal strangulation had to be borne in mind.

Intratracheal ether with the patient in the lateral position was given, the table being angled opposite the lower costal margin to "open out" the chest towards the operator. Five inches each of the eighth and ninth ribs were resected in the axilla. The pleura was opened at the upper part of the lower periosteal tube, for its

whole length. The in-sucking of air was very slight and there was no respiratory disturbance (as, indeed, was to be expected, nearly the maximum mediastinal displacement already being present). The first structure encountered was the omentum at the greater curve of the stomach. This organ, distended to the size of a coco-nut, lay uppermost; below it was the transverse colon, and on the inner side were many coils of small intestine. The left edge of the liver just projected into the pleural cavity. The spleen was not seen.

The rent in the diaphragm began through the oesophageal opening and extended outwards and forwards for three inches, skirting the back of the trefoil. Except at the oesophageal end of the anterior limb of the tear, omentum was adherent to the edges (on the abdominal aspect chiefly). The lesser curve of the stomach appeared only at its middle, while three-fourths of the greater was seen. The cardia and the lower end of the gullet were not displaced or loosened. The gap in the diaphragm was a little over an inch at its widest; the edges were strongly resistant to a greater increase than half an inch in this direction. It seemed that strangulation was a very distinct possibility. The viscera were reduced and retained by a moist pack. At first this seemed almost impossible of accomplishment, but when the head was elevated by adjusting the table, and a supporting sandbag removed from the front of the abdomen, it became a matter of the utmost simplicity. The edges of the rent were freshened, and omental adhesions separated. Four mattress sutures were used to draw the inner edge a quarter of an inch under the outer, whose loose edge was then attached by a close row of interrupted sutures to the upper surface of the inner edge. A widely imbricated line of union was thus secured. There was but little tension to overcome in getting the edges together.

The parietes were then closed, the pressure of intratracheal insufflation being considerably increased. It was observed that the lung inflated rapidly, particularly the lower lobe, whose margin at the completion of the parietal suture extended below the line of incision and actually touched the chest wall.

Convalescence was interrupted only by bronchitis for three days. The absorption of the remaining air was gradual, H.A.B. becoming normal in six weeks.

The patient was seen again eight months afterwards. There were no symptoms of any kind. He indulges in cricket and other sport, cycles and does heavy work. The range of knee movement was 70° to 180°.

To suspect such a condition is usually to diagnose it. Symptoms offered no help, except that the complete absence from the start of dyspnoea seemed rather striking. The mechanical condition was very similar to that in pneumothorax—lung collapse, mediastinal displacement, air in the pleural cavity, albeit enclosed in bowel.

The loudness and superficial character of the rare borborygmi were nearly conclusive. The succussion splash induced by a jerk in the epigastrium may be worthy of note. The fact that the heart does not return to its place is suggestive if one has a case suspected as pneumothorax under observation for some time. A positive bismuth meal result is conclusive, as the stomach must almost inevitably be the viscus first herniated. It is conceivable that a part of the fundus might be so gripped as to prevent the entry of the bismuth. Obviously the supine position is to be adopted. The rare herniation of intestine alone—for example, colon—could be excluded or detected only by frequent examination.

With regard to the operation itself, the whole procedure was emphatically easy. While resection of ribs might have been avoided by a powerful retractor, I doubt whether the access would have been so comfortable. A longer incision would have been needed, and the window into the chest would have had ends not so wide as the middle, which here seemed a helpful feature. One thing is certain: approach from the abdomen would have been far more difficult, reduction would have been more difficult, and a deliberate imbrication of the rent could not have been done. I should like to emphasize the very striking help of posture in effecting reduction. It was noted how tough is the diaphragm—one felt satisfied that no sutures could possibly tear out.

While one did not fear any sudden change of intrathoracic tension, insufflation ether seems to be far the best for this purpose; the anaesthesia given by Dr. Richards was entirely uneventful, and at the end provided the most gratifying feature of the whole procedure—the rapidly expanding lung after its two months' collapse. The upper lobe did not expand anything like as much as the lower, possibly as this received the direct blast from the trachea.

Comments on Radiographic Appearances.

The radiograph, taken on the first visit (September 4th, 1920) to the x-ray department, shows an interesting condition on the left side of the thorax. The outline of the diaphragm is irregular and very ill defined. Above it, as high as the second intercostal space, is a translucent area which is limited in the mid-line by the spine and laterally by the ribs and intercostal spaces. Its upper margin is well defined

and apparently composed of pleura which is thickened in that region. Through this clear area the details of the ribs and scapula can be made out; there is very little evidence of detail of the lung. The lower margin is irregular and ill defined, and shows strands of denser tissue with clear areas between. The general appearance is strongly suggestive of air in the pleural cavity. It has not the typical appearance of a large pneumothorax, and is more typical of gas within a distended viscus. The nature of the appearances described was clearly indicated when an opaque meal was given to the patient and a series of radiograms composed. The whole of the meal was seen to be retained on the left side, extending from a sharply defined point at the level of the first lumbar vertebra, and extending upwards to a point at the level of the seventh dorsal vertebra. The opaque shadow, with the gas-distended space above it, occupied about two-thirds of the total thoracic space on the left side. Above the shadow of the opaque material in the viscus was a clear area, and at a still higher level a dome-shaped structure representing the limitations of the above-described air space. This structure most probably consisted of thickened pleura, and formed a limiting membrane for the herniated stomach.

The x-ray examination with the opaque food showed clearly that the stomach was situated in the thoracic cavity; the irregularity of the diaphragm and the gas formation seen in the earlier pictures are suggestive of the diagnosis, but no positive opinion could be expressed until the stomach had been filled with the opaque food. It is interesting to note that later negatives showed that limiting structure of the air space was capable of contracting to some extent upon the stomach, and this is shown by the negatives, in which the stomach is seen to contain less of the food than in those of an earlier period.

The radiograms taken on June 28th, 1921, after the patient had been operated upon, show a different appearance from those taken when he was first examined.

The upper surfaces of the diaphragm are practically on the same level. On both sides of the chest the lung detail is well seen; there is no sign of the gas, the heart now occupies a normal position, in strong contrast to the position it assumed in the first pictures, in which it was displaced well over to the right. The lungs show an increase of the root shadows, and there is evidence of enlarged glands at the roots with peribronchial thickening extending into the lung substance.

AN UNUSUAL CAUSE OF DEATH FROM CANCER.

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[With Special Plate.]

THE case recorded below seems to me of sufficient interest to warrant publication. The microphotographs printed in the special plate are self-explanatory, but the accompanying diagram will indicate the relations of the low-power view.

History.

E. E., female, aged 43, was admitted to the Christie Hospital, Manchester, on January 11th, 1922, suffering from an inoperable carcinoma of the larynx, which had required tracheotomy at the Manchester Royal Infirmary twelve days previously, to relieve urgent symptoms. She was comfortable until early in the morning of January 24th, when she awoke with severe pain over the precordium. At 1 p.m. she suddenly became very much worse, and was reported as almost pulseless. After the administration of camphor, ether and brandy hypodermically, and of mustard leaves over the precordium she was somewhat relieved.

Examination.

The patient was very pale and obviously dying. The pulse was almost imperceptible and the heart sounds were very weak, but there was no dilatation of the organ and no bruits could be heard. There were moist sounds at the base of the left lung. These were the only *ante-mortem* findings of note except for slight sepsis round the tracheotomy tube. The diagnosis seemed to lie between cardiac embolus and an acute mediastinitis. The patient died at 2 a.m. the next day, January 25th.

Post-mortem Examination (3.30 p.m., January 25th, 1922).

The tissues around the tracheotomy wound were infiltrated with the primary carcinomatous growth. On opening the chest there was found a left-sided pleurisy with a small amount of fluid and some collapse of the lung. An abscess of this lung was seen

to have burst into the pleural cavity. Nodular secondary growths were found on the pericardium and the left pleura, and there were deposits in the bronchial glands.

The heart was of normal size, firmer than normal, and on opening the cavities *ante-mortem* clot was found in all but the left ventricle. The clot was particularly firm in the right auricle, and on removing it a papillomatous mass the size of a pea was found projecting into the cavity from the smooth endothelial wall. There was no indication of this mass on the outer aspect of the auricle, and it seemed to be arising immediately under the endocardium.

Histological examination of this growth shows the typical structure of squamous-celled carcinoma (see high power microphotograph). From the facts that it is infiltrating the subendothelial heart muscle and is separating the muscle fibres (as seen in the low-power microphotograph) it would appear that the embolus had arrived via the blood or lymphatic system, and that it was not an implant on the auricular endothelium from embolism down the superior vena cava.

The position of the tumour is of interest, and by promoting thrombosis in this cavity it accounts, in my opinion, for the fatal termination of the disease within twenty-four hours of the onset of acute symptoms.

My thanks are due to Dr. Charles Powell White for his histological investigation of the case and for allowing me to prepare the microphotographs from one of his sections.

SOME NOTES ON ORAL SEPSIS IN ITS RELATION TO GENERAL DISEASE.*

BY

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[With Special Plate.]

SINCE the year 1900, when Dr. William Hunter first wrote in regard to oral sepsis and its connexion more particularly with anaemia, increasing attention has been given to it as a factor in many other diseases. Sir Thomas Barlow at that time made reference to its importance. The practical result was the recognition of oral sepsis as the greatest septic infection in medicine, and oral antisepsis as one of the most important, simplest, and easiest means for the prevention of groups of maladies affecting almost every system of the body.

It has been said that the alveolar process—with the exception of the intestines—is the largest and the most frequently diseased part of the body from which toxins are liable to be absorbed. A very small amount of toxin absorbed from the alveolar process will do more harm than a large amount absorbed from the intestinal tract, as the toxins are carried direct into the circulation, and not—as in the latter case—through the portal vein into the liver.

Oral sepsis is a comprehensive term, and includes pyorrhoea, alveolar abscess, and the pathological conditions existing at the root of a dead tooth. With regard to pyorrhoea we have to remember that it could not occur without streptococci and staphylococci. It is the penetrating activity of the streptococcus which creates the bleeding lesion, thus opening the way for the staphylococcus, which dissolves the tissue and creates the pocket. Probably the most common of the ill effects of oral sepsis is a state of malaise, in which the patient complains of tiredness, slackness, lassitude, and a general though indefinite feeling of unfitness. We may get functional cardiac effects, such as palpitation, or a state of nervous debility and depression.

Oral Sepsis and Disorders of the Heart.

In speaking of its effect upon the heart, in addition to the functional disturbances associated with indefinite malaise

* Read at a meeting of the South-Western Branch of the British Medical Association

JENNINGS MARSHALL: SUTURE OF RUPTURED LEFT DOME OF DIAPHRAGM.

FIG. 1.—Radiogram of chest, showing hernia (on left side), stomach, and transverse colon (without bismuth meal).

FIG. 2.—Radiogram of chest, showing bismuth meal in stomach (in hernia).

J. M. ACKLAND: ORAL SEPSIS IN RELATION TO GENERAL DISEASE.

FIG. 1.—Normal lower incisors.

FIG. 2.—Pyorrhoea.

FIG. 3.—Apical abscess.

FIG. 4.—Root abscess.

E. A. LINELL: UNUSUAL CAUSE OF DEATH FROM CANCER.