THE PRESSURE IN THE RENAL, PORTAL AND GLOMERULAR CAPILLARIES OF THE FROG'S KIDNEY.

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(From the National Institute for Medical Research.)

(Preliminary Note.)

By making an incision through the skin and abdominal wall in the lumbar region of a urethanized frog and removing the ileum on the same side the kidney is exposed. The cautery is used to stop all haemorrhage. A ligature is tied round the membrane attached to the outer edge of the kidney. By very gentle traction the kidney is then drawn on to the transparent peritoneal membrane which covers a small brass chamber with a glass floor, similar to that used by Roy and Graham Brown in their measurement of capillary pressure in the frog's web. A glass cover is then brought down on to the upper surface of the kidney so that it can be squeezed between the membrane and glass cover when air is blown into the chamber. A water manometer indicates the pressure used for compression. The kidney is examined under the microscope, using a magnification of one hundred times. The kidney appears closely covered with a network of branches of the renal portal vein, through which blood flows slowly in copious streams. On compressing with a pressure of about 2 centimetres of water these vessels are squeezed empty, and the tubules and, in successful preparations, the glomeruli then come into view; the arterial blood is seen rapidly circulating through the glomeruli. The Bowman capsules can be seen surrounding some of the glomeruli, and the glomeruli hanging in a clear space within these. In some glomeruli the afferent and efferent vessels are clearly seen, and the blood corpuscles can be watched racing through the afferent vessel, whirling round the twisted capillaries of the glomerulus and out through the efferent vessel. On the inner edge in one preparation a row of glomeruli were seen fed by the branches of one of the renal arteries.

The pressure required to stop the renal artery and the flow in the glomeruli is of the same order as that in the arteries of the web of the frog's foot—for example, when there has been little loss of blood and the circulation is vigorous, 30 to 40 cm. of water. A pressure of 7 to 9 cm. of water in this case sufficed to modify the flow in the glomerular capillaries, making it a little slower. By increasing the compression the corpuscles in the glomeruli could be driven out, the flow reversing through the afferent vessel. In a kidney in which the blood flow had stopped a pressure of 7 cm. of water sufficed to squeeze blood from the larger vessels through the glomeruli and produce a rapid flow. This preparation of the living frog's kidney seems likely to afford a valuable additional means of studying the renal secretion under various conditions.

A CASE OF COMPLETE PNEUMOTHORAX IN AN INFANT, DUE TO PULMONARY TUBERCULOSIS.

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This case is published for two reasons: First, the condition is extremely uncommon. Secondly, some light is shed as to the probable mode of transmission of the tubercle bacillus to the lungs in childhood in certain cases of pulmonary tuberculosis.

The patient, a boy aged 18 months, was admitted with cyanosis, cough, and dyspnoea, to the wards of the East London Hospital on May 11th, 1920. The history was that he had been in his usual health until three months before, when he contracted measles. Since then he had been in poor health, the chief symptoms being lack of appetite, constipation, wasting, and slight cough. For the last three weeks the cough was decidedly worse; food had frequently been vomited in association with it. The

acuteness of symptoms during this latter period had been distinctly accentuated. He had become bluer during the last few days.

Condition on Examination.

On admission the temperature was 102° F., the pulse rate 142, and the respiration rate 40. The child appeared to be extremely ill. Cyanosis was very marked, being especially obvious in the lips and finger-nails.

Examination of the chest gave the following physical signs: Respiratory movement was slightly diminished on the left side, the intercostal spaces on this side appeared to be fuller. Cardiac movements were visible in the fourth space to the right of the sternum. Cyrtometric examination showed the left side of the chest to be the larger by a quarter of an inch. By percussion the heart was found to be displaced two inches to the right. The whole of the left side was hyper-resonant. Over the right side the note was less resonant than normal, the impairment was particularly intense at the right base and less so in the right axilla. The respiratory murmur was very much diminished all over the left side, both back and front. Expiration was prolonged over the right lung in front; in the right axilla the breath sounds were bronchovesicular. Numerous fine râles were present over the right lung, back and front, especially at the base. No cardiac murmurs were heard.

The liver and spleen were both easily palpable, otherwise no abnormality was discovered in the abdomen. Clubbing of the fingers was not present.

A condition of complete pneumothorax of the left side, associated with bronchopneumonia of the right lung, was diagnosed.

The temperature fell to 98°, the pulse rate rose to 180, and the respiration rate to 70, within the next twelve hours, and the child died.

Post-mortem Examination.

The child appeared to be well nourished. Cyanosis was extreme; the nails of the hands and feet were light-blue in colour. Hypostasis was well marked. The brain was congested, and the subarachnoid in the basal region had a milky appearance; no gross tubercles, however, were seen.

Thorax.—The heart was normal. No pericardial tubercles were found. The left lung was collapsed down upon its root, except at the apex, where it remained adherent to the parietal pleura. The left parietal pleura was studded with miliary tubercles; none were seen on the right side. No excess of pleural fluid was found. The left lung was a solid mass of yellow tubercles. It sank in water. At the apex, where it was adherent to the pleura, a cavity the size of a hazel nut was present. The walls of this were formed by greyish ragged granulation tissue; it was surrounded by an area of extreme caseous change, and its interior communicated by means of a small rent with the left pleural cavity. The right lung was not solid, except in a few small areas. It contained many miliary tubercles. The glands at the hilum of both lungs were slightly enlarged, hyperaemic, but definitely not caseous anywhere.

Abdomen.—No free fluid was present. The liver was seen three inches below the costal margin, and the spleen was also visible. Both were studded with miliary tubercles. Section of the liver showed the presence in its substance of miliary tubercles, some of which were bile-stained. The spleen was adherent to the tender surface of the diaphragm; it, too, had many miliary tubercles within it. Both kidneys showed subcapsular tubercles. A few subperitoneal tubercles were found on the walls of the small intestine. The testes were normal. The parietal peritoneum had escaped except where it came into contact with the hepatic and splenic surfaces.

The right knee-joint was normal.

Bibliography.

Cruchet¹ states that of the causes of pneumothorax in children tuberculosis is the least common. He quotes, in addition to his own experience, Lenz, who found tuberculosis in 40 per cent. of his fourteen cases, and Chryanowska, whose figure is 38 per cent. of twelve cases. He states that in the tuberculous cases tuberculous bronchopneumonia was the commonest cause, but that the opening