origin of the blood. The patient was fat and the kidneys could not be palpated. X-ray examination was negative. Ureteral catheterization showed a specific gravity of 1015 on the left side as against 1025 on the right. There was a little blood in the specimen obtained from the left side by the ureteral catheter, but no colour was seen in the efflux before the catheter was passed. The case was further complicated by the presence of a trace of albumin on the right side. The flow on the left side was scanty compared with that on the right. The chloride output was 0.33 per cent. on the left side as compared with 1.25 per cent. on the right. The question here was whether the small amount of blood in the specimen obtained from the left side was due to trauma inflicted by the ureteral catheter. I determined, however, to explore the left kidney, assuming that a diminished flow of non-purulent urine of low specific gravity on that side indicated much encroachment on the kidney substance, probably by tumour. At operation a large hypernephroma was discovered occupying almost the whole of the posterior surface of the kidney. A strip of kidney substance remained anteriorly and at the poles.

In the condition known as symptomless renal haematuria or essential renal haematuria there is less likely to be a diminished specific gravity on the affected side on account of the absence of gross changes in the kidney. A difference in specific gravity on the two sides is therefore in favour of new growth rather than the less serious complaint. The significance of this point in diagnosis, should it be substantiated by further observation, is obvious.

I am now engaged with Professor Milroy, of the Physiological Department of Queen's University, Belfast, in an investigation of the relative chemical composition of the specimens from the two sides in these cases of unilateral diuresis. Up to the present I have been chiefly concerned with the specific gravity test as a help in diagnosis. The following is a short summary of the statistics given in my previous paper with this point in view.

Renal Calculus.—Forty-one unilateral cases were examined. In 31, or over 75 per cent., the specific gravity was diminished on the affected side.

Tuberculous Kidney.—Thirty-eight unilateral cases were examined, and the specific gravity was diminished on the affected side in 37, or 97 per cent.

Unilateral Pyelitis.—Thirty-nine cases were examined, and of these 33, or a little over 84 per cent., showed a diminished specific gravity on the affected side.

Tumours of the Kidney.—Nine cases were examined, and in 7 of these, or 77 per cent., the specific gravity was lower on the affected side. A tenth case (quoted above) was lately examined and here again the specific gravity was lower on the affected side—1015 as against 1025 on the sound side.

Congenital Cystic Kidney.—Two cases were examined, both bilateral. In one the disease was more advanced on one side and the specific gravity on that side was 1005 as against 1010 on the opposite side.

Hydatid Cyst of the Kidney.—One case was examined, and the specific gravity on the affected side was 1005 as against 1015 on the sound side.

Hydronephrosis and Pyonphrosis.—Nineteen cases were examined, and all showed, as might be expected, a diminished specific gravity on the affected side.

Morbid Kidney.—Fifteen cases were examined, and 8 showed a diminished specific gravity on the affected side.

Renal Haematuria (including such diverse conditions as congenital haemophilia, Henoch's purpura, bilateral nephritis, and the condition known as "essential renal haematuria" or "symptomless haematuria").—Thirty-seven cases were examined, and in 9 only of these was there a diminished specific gravity on one side. It is quite possible that in these exceptional cases unrecognized stone, tubercle, or tumour may have been present.

Renal Pain.—I have examined 44 cases of what has been described in the notes as "renal colic." In 27 of these, or just over 61 per cent., there was a diminished specific gravity on the side of the pain. Further investigation of these cases might have revealed some of the conditions I have referred to above, but for various reasons I had not the opportunity of continuing my observations on them.

Wounds of the Kidney.—These cases were investigated while on service in France during the war.² In 19 bilateral catheterization was carried out, and of these 9 showed a diminished specific gravity on the affected side.

In my previous article I discussed the causes of the phenomena just described. It will be sufficient here to repeat what I said on the question of anuria and polyuria in renal calculus.

"While much has been written on unilateral and bilateral anuria, very little has been said of the occurrence of unilateral diuresis from whatever cause produced. My own experience is that unilateral diuresis is a much more common result of renal calculus than anuria. The explanation of both phenomena is afforded by a study of the nerve supply to the kidney and its influence on the blood flow. Through the splanchnic the kidney receives vaso-constrictor and vaso-dilator fibres. The stimulus of a calculus in kidney or ureter may cause vaso-constriction and reduction or cessation of the secretion of urine on that side, due to diminished blood flow through

the glomeruli. On the other hand it may cause vaso-dilatation, increased blood flow, and diuresis. My observations lead me to believe that the latter is the more common occurrence."

Unilateral diuresis may occur without any pain whatever. Cushny³ discusses "pressure diuresis" seen in animals when one ureter is slightly obstructed, and states that it is almost certainly due to reflex vaso-dilatation and disappears at once when anaesthesia is deepened. He suggests that a slight stimulus arouses a dilator effect, while a stronger one, such as the pain of a calculus, sets the more powerful constrictor in action and thus leads to anuria. My observations, however, tend to show that severe pain in renal calculus is much more commonly associated with diuresis than anuria.

In some rarer cases the specific gravity is increased on the affected side. These occur occasionally when some slight obstruction is present, as in cases of movable kidney, where a kink is presumably the cause. Cushny explains a similar phenomenon in animals by saying that the effect of the obstruction is to oppose the filtration pressure in the capsule. A low resistance may reduce the amount of the filtrate considerably. The smaller amount of filtrate passes more slowly along the tubules and more time is allowed for the reabsorption of water and sodium chloride. It is difficult to understand why the same cause should produce at one time reflex diuresis and at another diminished flow and increased concentration of the urine.

I have brought this subject forward to emphasize the value of a sign that may help in diagnosis where the surgeon is perhaps deprived of more accurate methods of investigation. I have myself been placed in circumstances where even a reliable x-ray plant has not been available, and have had to act on the information obtained by such examination of the patient as I could myself conduct.

The statistics just quoted and the cases here recorded seem to me to be sufficiently striking to warrant greater attention being paid by urologists to the value of diminished specific gravity of the urine on one side as a sign of diagnostic importance in certain unilateral affections of the kidney.

REFERENCES.

¹ *Surgery, Gynecology, and Obstetrics*, January, 1923, pp. 16-23. ² *British Journal of Surgery*, 1917, v, No. 18. ³ *The Secretion of Urine*, Longmans, Green and Co., 1917.

RESECTION OF RIBS, SPLENECTOMY, AND SUTURE OF THE STOMACH AND DIAPHRAGM: RECOVERY.

BY

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A CHINAMAN, who had in his possession one hundred rupees in notes, was walking at night along the local mountain railway track with a friend with whom he was discussing the ways and means of sending this money to China. As they sat down for a rest the friend stabbed him deeply in the left thorax. A fight ensued, during which the assailant made off, having been struck about the face. The wounded man, still in possession of his money, made his way to the station, where he collapsed in a Burman's hut. The distance he walked was about one and a half miles along a railway track.

The assault took place about 9.30 p.m. The engineer in charge of the station took down the dying declaration prior to the arrival of the police. Eventually the wounded man was transferred to the Namtu General Hospital about 2 a.m., when another ("official") dying declaration was taken by the Government magistrate in the presence of the accused, police, and Chinese interpreter. This ceremony (which involved the burning of paper when taking the oath) took place in the operating theatre, where everything was in readiness for operation.

The patient was a well built robust Chinaman, a Corporation Mine coolie, aged 22. There was an incised wound of the left chest wall, in the anterior axillary line, through which protruded a piece of omentum, and air whistled loudly in and out of the opening. The wound was 1½ in. long and vertical in direction. There were other wounds—namely, an incised wound in the scalp

above the left ear, an incised wound of the left cheek, a punctured wound of the neck (left side), and an incised wound of the left middle finger. Surgical emphysema was well marked and extended over the lower part of the left thorax and upper abdomen. A director passed into the chest wound penetrated very deeply downwards, medially, and somewhat backwards, and on withdrawal was followed by a gush of blood. During his evidence before the magistrate the patient had one fit of explosive vomiting and his general condition became much worse.

Operation.

The patient was anaesthetized with chloroform. The original wound was extended inferiorly and medially diagonal-wise. The stab was found to have severed the costo-cartilage of the eighth rib, opening the pleural cavity and passing through the left cupola of the diaphragm, which was incised vertically for about $3\frac{1}{2}$ in. The eighth and ninth ribs in this situation were resected. Further exploration showed that the spleen was wounded, and a portion of it had been sliced off and was free in the abdominal cavity. Considerable haemorrhage was taking place. As the wound was not large enough to deliver the spleen a horizontal incision across the upper left rectus was made. While delivering the spleen a tear in the omentum close to its attachment along the greater curvature of the stomach was noticed, which on inspection disclosed an opening in the posterior wall of the stomach, the cut being $1\frac{1}{4}$ by $1\frac{1}{2}$ in.; through it gastric contents escaped. This opening was securely clamped. The pedicle of the spleen was tied in two halves with thick silk and the spleen removed.

The wound in the stomach was next attended to. The rest of the abdomen was shut off to prevent further contamination and the rent sutured with catgut. The peritoneal cavity in this situation was cleaned and mopped out with saline. The tear in the diaphragm was next sutured with interrupted stitches of stout catgut. The diaphragm was then carefully inspected from both pleural and abdominal surfaces. The left lung was collapsed and was about 4 in. distant from the upper edge of the operation wound. The edges of the pleura were sutured with interrupted catgut and the peritoneum with continuous catgut. A drainage tube 5 in. long and $1\frac{1}{3}$ in. diameter, to drain the left subphrenic area, and another 4 in. long of the same diameter to drain the left pleural cavity, were inserted. The rectus muscle was sutured with stout silk, as also the muscles and fasciae involved in the diagonal incision.

During the operation and as soon as the pedicle of the spleen had been clamped half a pint of saline was given intravenously. Saline was also left in the peritoneal cavity before closure. Immediately after operation the following was given per rectum: glucose $\frac{1}{2}$ oz., sod. bicarb. 30 gr., brandy 2 oz., saline to 10 oz. Digitalin and strychnine, of each gr. 1/100, was given every four hours, and the patient laid over on his injured side to allow freedom of the good lung and to facilitate drainage.

After-History.

The patient had a long convalescence. He had severe vomiting, developed pneumonia in his left lung, and his blood disclosed a heavy infection with subtertian malarial parasites, while he discharged freely and copiously through both tubes. At one time a thick milky discharge from the abdominal tube was thought by the patient and his attendants to be milk. We feared a gastric fistula. His milk was therefore coloured with methylene blue, but our fears were proved to be groundless.

He was given breathing exercises which involved blowing water out of one receptacle into another. This caused him some amusement, but later he looked upon it as a religious rite and did it conscientiously and seriously.

A month from the day of the operation the patient walked about with the aid of a crutch; the abdominal wound was healed, whilst the thoracic opening still allowed air to whistle in and out, and a fairly copious discharge to flow. His appetite was enormous. (In this connexion we believe that experimental removal of the spleens of cats causes those animals to develop voracious appetites.) He always complained of pain in his left shoulder, however, and later still his general condition became bad. He continued to get thinner and the pain in his left shoulder region became much worse. The discharge from his pleural cavity contained staphylococci and streptococci. We did not think he was draining properly, and under local anaesthesia opened up the wound and withdrew 5 oz. of thick pus. A drainage tube $\frac{3}{4}$ in. in diameter was put in and the free end inserted into a bottle containing tincture of iodine and distilled water in equal quantities. The patient was able to blow bubbles into this solution and on expiration fluid was sucked into his pleural cavity. This did not produce coughing. As the result of this treatment for six hours he developed severe iodism, but from that moment the septic temperature ceased and his condition continually improved. The solution in the bottle was changed to one containing 1 in 100 lysol, while large doses of potassium iodide were given by the mouth. He used to walk about the hospital carrying his bottle slung from his shoulder like an army water bottle.

He was eventually quite cured and left hospital with a very sound scar after having been in for nearly four months. Auscultation of his left lung showed that the upper lobe was functioning.

Remarks.

1. It will be agreed that the patient's vitality was very good; that and his desire for revenge pulled him through his first week when things seemed hopeless. (His assailant got six years' transportation, and the trial in its several

phases took place at the hospital whenever the patient's evidence was required.)

2. The diagnosis between prolapsed omentum and lung tissue is apt to be confusing, especially when air is whistling through the wound and the tissue expands and collapses with respiration.

3. The path traversed by the knife must have been: (i) thoracic wall (including rib cartilage); (ii) pleural cavity below the level of the lung tissue; (iii) left cupola of diaphragm on its steep parietal aspect where it, with the thoracic parietes, forms a deep cul-de-sac; (iv) parietal peritoneum; (v) large sac; (vi) visceral peritoneum; (vii) spleen; (viii) large sac; (ix) small sac; and (x) stomach. It will be remembered that the spleen forms part of the "stomach bed" (Birmingham), but that it is separated from it by a "niche of the great sac of the peritoneum" (Cunningham). The other organs which take part in the formation of the bed are separated from the stomach by the small sac. As the peritoneum covering the posterior surface of the stomach forms part of the anterior wall of the small sac, the knife after traversing the splenic niche of the great sac must have entered the small sac, before piercing the stomach wall.

4. The movement of the knife and its rewithdrawal during the struggle might also have caused: (i) the tear in the omentum near the stomach wound; (ii) slicing off of a portion of the spleen; (iii) the length of the wound in the diaphragm; and (iv) prolapse of the omentum.

5. The direction taken by the weapon would have been chiefly downwards, inwards, and also backwards. Previous to this case we had to make a *post-mortem* examination for the police in a stab case. The path traversed by the knife on this occasion was—thoracic wall, pericardial cavity just missing the left ventricle, left cupola of diaphragm near its summit, peritoneal cavity, extreme left edge of liver, extreme upper and innermost edge of the spleen, and so into the stomach (posterior surface). In this case a portion of spleen tissue intervened between stomach and liver, due to the enlargement of the spleen. In this district it is "normal" for Chinamen to have large spleens. We recently removed one weighing $5\frac{1}{2}$ lb. from a Chinese carpenter who had been stabbed.¹ He made an uneventful recovery. The usual weight of a healthy spleen in European countries is 5 to 8 oz.

REFERENCE.

¹ Hefferman: *Indian Med. Gaz.*, July, 1923, p. 315.

THE EFFECT OF THYROID AND OVARIAN GLAND EXTRACTS IN CASES OF PREVIOUS MIS-CARRIAGE AND STILLBIRTH.*

BY

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THIS paper is based entirely upon work done during the last eighteen months at the maternity clinic held at the Sheffield Maternity and Child Welfare Centre.

Any expectant mother requiring advice may come up on Saturday morning at 10 o'clock to see the medical officer, it being clearly understood that no treatment is available beyond ordering the aperients liquid paraffin and molevac, or a malt preparation or a dried milk with a view to strengthening a mother who is being insufficiently nourished owing to the present economic situation, thus enabling her to be strong enough to feed her baby at the breast when it arrives. The clinic is informal and entirely run by women. Patients often wish to know if their confinements should be straightforward and whether it will be sufficient only to engage a midwife; and midwives wish to have this information before undertaking to attend a primipara. This is exceedingly wise, and when the charts are completed after the arrival of the baby it is seen that an accurate forecast can be given.

From February 1st, 1922, when the clinic was taken over, until December 31st, 1922, 73 charts were completed; in

* A paper read before the Sheffield and District Branch of the Medical Women's Federation.