The third case was not any better after ilio-colostomy, but complete colectomy was followed by improvement.

CASE III.

J. W., a sickly-looking and thin lad, presented himself with multiple tuberculous foci but with no bone lesion. He had abscesses in both legs, in the right hip, and in the neck. Numerous operations had been performed, and he still had abscesses when the ilio-colostomy was performed in 1913. He left hospital in due time, when his wounds showed some improvement.

Two months later, however, he was readmitted with the foci discharging as badly as ever; four months after ilio-colostomy was performed, as there was no improvement, Professor Morison took out the whole colon. The patient was lost sight of until July, 1921, when he was found to be greatly improved in condition, and although the wound was not healed he was able to do light work and sew canvas cover-sheets in the pursuance of his occupation. His wounds are now healed, but every now and then he is laid off work on account of sores breaking down over the left knee-joint. He has fluid in the knee-joint, which, when last seen, was hot and showed active signs of inflammation. He states that his bowels are moved once daily with a solid motion, and that he has no diarrhoea.

I am indebted to Professor Rutherford Morison for his kindness in allowing me to publish these cases.

THE FUNCTION OF THE CHROMAPHIL TISSUES IN RELATION TO SPLANCHNIC STIMULATION.

BY

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THE rise of blood pressure brought about by stimulation of the peripheral end of the splanchnic nerve is not simple, and the alterations (if any) produced in the curve by the elimination of the secretion of the chromaphil tissue of the adrenals from the circulation has not yet been precisely determined. The normal curve of splanchnic stimulation, according to several observers (¹ to ³) consists of a rise on which is usually a "hump" followed by a marked "dip," and succeeded by a secondary rise prolonged as long as the stimulation lasts. Such a curve has been consistently obtained in dogs, cats, and rabbits.

When the adrenal secretion is eliminated, then, according to Pearlman and Vincent,⁵ in all these animals the "dip" is abolished, and the result of stimulation is a simple and prolonged rise. Gley and Quinquaud,² on the contrary, maintain that there is a difference between dogs and cats. They think that in the cat elimination of the adrenals makes no difference to the splanchnic stimulation curve, "dip" and secondary rise being maintained, while in the dog their results conform to those of Pearlman and Vincent, the "dip" and secondary rise being abolished.

The difference between these two sets of observers is fundamental, because the observations govern the interpretations of the curves. Gley and Quinquaud consider that the alteration of the curve in the dog is due to damage to some of the splanchnic vaso-constrictor fibres necessarily brought about while tying off the adrenals because of the anatomical conditions present, while in the cat the anatomy is such that the adrenals can be tied off without damaging the splanchnics and therefore the curve is unaltered—that is, withdrawal of adrenal secretion from functioning by way of the circulation has no effect on the curve.

Pearlman and Vincent, who found the "dip" abolished in all animals they investigated, naturally concluded that the alteration is due to withdrawal of adrenal secretion. There is no doubt that the anatomical connexions of the main splanchnic trunk and its associated ganglia with the adrenal body are more intimate in the dog than the cat. We have confirmed this by dissections. A drawing in Ellenberger and Baum's book⁶ shows well the condition in the dog. We consider, however, that while undoubtedly some nerve damage takes place in tying off the adrenals in the dog, it is not of such a character as to interfere with the main characteristics of the splanchnic curve. All observers are agreed that the main pressor effects persist. While in the cat the anatomical connexions are not so intimate certain nerves are undoubtedly damaged in it, as in all animals, in tying off the adrenals—namely, the nerves to the adrenal itself and the nerves to the kidney lying close behind the adrenal.

The majority of the experiments of Pearlman and Vincent were carried out on dogs. The present series has, therefore, been conducted on cats, with the simple object of ascertaining

whether the "dip" and secondary rise after adrenal elimination are abolished or maintained.

The animals were anaesthetized with ether or ethanesal and anaesthesia maintained by intravenous injections of urethane. Blood pressure was taken from the carotid artery. After opening the abdomen the splanchnic—usually the left—was isolated between the diaphragm and the semilunar ganglion, divided where it left the muscular fibres of the diaphragm, and the peripheral length of nerve thus obtained—about 3 to 4 cm.—stimulated with various strengths of current. Prior to stimulation preparations were usually made for tying off the adrenals completely, or tying or clamping the adrenal veins, so that as short a time as possible should elapse between the stimuli. The anatomical conditions in the cat are such that the adrenals can be easily tied off without interfering with the main splanchnic connexions.

The results of these experiments show that by any method of adrenal elimination the normal curve is seriously altered. The "dip" is frequently abolished and is always considerably reduced. But a small "dip" sometimes persists after total elimination of the adrenals, and if this observation be true there is no escape from the conclusion that a part of the "dip" is due to factors other than the passage of a certain amount of adrenin into the circulating blood. Further investigations are required to determine completely the origin of the "dip," and we realize that one experiment where the "dip" is not entirely abolished is of more significance than any number where it is.

It should be added as confirmatory of adrenin effect that in two experiments the "dip" was practically abolished when the veins were clamped and subsequently restored to its full extent when the veins were released.

The "dip," in part at all events, is probably due to liberation of adrenin into the blood through vaso-constrictor impulses reaching the adrenals and causing them to contract, the small amount liberated having a vaso-dilator effect on the peripheral arterioles. This effect is quite temporary, the rise being again produced and maintained as long as the stimulation lasts.

SUMMARY.

1. Peripheral splanchnic stimulation in cats produces a characteristic curve in which an initial rise is followed by a marked "dip" and a prolonged secondary rise.

2. Elimination of the adrenals from the circulation abolishes or reduces the "dip," the more usual effect of splanchnic stimulation being a simple prolonged rise.

3. While the adrenal elimination is probably an important factor in altering the curve, further experiments are required to determine completely the origin of the "dip." Since some "dip" may occur after adrenal elimination, a part of the effect must be normally due to influences other than chromaphil secretion.

NOTE.—A portion of the expenses of this research were defrayed from the Scientific Grants Committee of the British Medical Association and the Government Grant Committee of the Royal Society to one of us (S. V.).

REFERENCES.

- ¹ Elliott: The Control of the Suprarenal Glands by the Splanchnic Nerves, *Journ. of Physiol.*, 1912, 44, 374 (see also v. Anrep, *ibid.*, 1, 12, 45, 307). ² Gley and Quinquaud: *C. R. Acad. Sci.*, 1913, 157, 66; *Ibid.*, 1916, 162, 86; *C. R. Soc. Biol.*, 1917, 80, 15; *Journ. de Physiol. et de Path. gén.*, 1918, 17, 807. ³ Johanson, T. E.: Die Reizung d. Vasomotoren nach der Lähmung der Cerebrospinalen Herznerven, *Arch. f. Anat. u. Physiol.* (Physiol. Abt.), 1891, 103. ⁴ Lehdorff, A.: Über die Ursachen der typischen Schwankungen des allgemeinen Blutdruckes bei Reizung der Vasomotoren, *Arch. f. Anat. u. Physiol.* (Physiol. Abt.), 1908, 362. ⁵ Pearlman and Vincent: *Endocrinology*, April-June, 1919, p. 121. ⁶ Ellenberger and Baum: *Anatomie des Hundes*, 1891.

THE RELATION OF THE CORPUS LUTEUM TO MENSTRUATION AND PREGNANCY.*

BY

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THE ovary, according to our present knowledge, performs a double function—the production of ripe ova and the elaboration of internal secretions, of which the chief is formed in the corpus luteum.

Fraenkl in 1903, experimenting on rabbits, formulated the theory that the corpus luteum regulates the blood supply of the uterus and thereby controls the process of menstruation and the implantation of the ovum in the uterus. I find that if this controlling influence be removed, either by excision or rupture of the corpus luteum, a woman will either menstruate

* Read before the Ulster Medical Society.

or abort depending upon whether a false or true corpus luteum has been injured.

Some very interesting observations have been made by American veterinary surgeons on cows. They found that if the false corpus luteum remained unabsorbed the cow did not come in heat (which corresponds with menstruation in women), but that if the corpus luteum was expressed manually the condition developed in a few days. I find that if during an abdominal operation the corpus luteum be excised the patient will have a period two or three days afterwards, even if she has only recovered from her previous period a few days before the operation. The following cases illustrate this:

CASE I.

Mrs. E., aged 29, married two years; menstruation was of the four weeks type. Bimanually there was a tender tumour to the right of the uterus which was normal in position when felt. Her last period terminated two days before operation. I found on opening the abdomen a right hydrosalpinx adherent to the ovary, which contained the false corpus luteum. In removing the tube the corpus luteum was resected. The patient menstruated forty hours after the operation.

CASE II.

Miss S., aged 25; menstruation of four weeks type, always regular; the uterus was retroverted and the ovaries prolapsed; her last period had occurred thirteen days before the operation. Ventro-suspension was performed and the corpus luteum excised from the ovary. The patient menstruated two days after the operation.

Another very interesting point is that the size of the corpus luteum has a distinct bearing on the amount of haemorrhage lost at a period. On examining the ovaries during an operation, patients who have given a history of a heavy loss at their periods invariably have a large corpus luteum, and in those with only a slight loss the corpus luteum is small.

With regard to the true corpus luteum the veterinary surgeons made a very important discovery, that sometimes in expressing what they consider a false corpus luteum they have actually expressed or ruptured a true corpus luteum, in which case the cow has either aborted or bled to death. The following cases have a bearing on this observation:

CASE III.

Mrs. A. R., aged 28, married ten years, had had five children and one abortion; her last pregnancy was three years earlier. She was curetted at a hospital in October, 1919. She returned to this hospital during the first week of March, 1920; having missed two periods, she wished to know if she was pregnant. During the examination she felt a pain in her right side, became weak, and on going home went to bed. The next morning she noticed slight haemorrhage, which she took to be her period returning. As it continued for two weeks she consulted her own doctor, who sent her to me at the Samaritan Hospital. I found slight tenderness in the right iliac fossa; bimanually the uterus was about the size of an orange, freely movable, with a soft, round, tender tumour in the right and posterior fornices. A pre-operative diagnosis of an extrauterine gestation was made. The abdomen was opened by median subumbilical incision. The left ovary and both Fallopian tubes were normal, and lay above the fundus of the uterus. The right ovary was not seen. On exploring the pouch of Douglas I found a mass of old blood clot intimately connected with the right prolapsed ovary which contained a ruptured corpus luteum. This I removed. Not being satisfied that I had found the cause of the haemorrhage I explored the uterus vaginally and removed a foetus.

CASE IV.

Mrs. McC., two months pregnant, was operated on for recurrent appendicitis. The apex of the appendix was adherent to the right Fallopian tube. In removing it I must, by handling the right ovary, have injured the corpus luteum, as the patient aborted next day.

CASE V.

Mrs. C., four months pregnant, had a subperitoneal fibroid about the size of a large orange, situated just below the right round ligament; it was removed without handling the ovaries. The patient made an uneventful recovery and went to term.

These observations throw very interesting light on the part played by the corpus luteum in abortion, sterility, premature menopause, and internal haemorrhage simulating extrauterine gestation.

During pregnancy, if a woman receives an injury to the abdomen, as, for instance, a fall or during bimanual examination (Case III), it is not the traumatism to the uterus which brings on the abortion, but rather that to the ovary, causing the corpus luteum to rupture; if rupture takes place through a blood vessel in the wall of the corpus luteum, intra-abdominal haemorrhage occurs, showing all the physical signs of an extrauterine gestation.

Frequent and often recurring abortions during the early months of married life are, I believe, brought on by injury, during coitus, to a corpus luteum contained in a prolapsed ovary.

In sterility, especially in elder women, why is it that after a course of pelvic massage they will become pregnant? Has a false corpus luteum been expressed? The same question arises with regard to the operation of dilatation for sterility. Is it possible that we unknowingly express a false corpus luteum when bimanually examining the patient, and by thus producing menstruation and its accompanying ovulation we prepare the way for conception, rather than by the dilatation and curetting of the uterus?

Conclusions.

I believe that the above data justify the following conclusions:

1. That injury to either a true or false corpus luteum will simulate a ruptured extrauterine gestation.
2. That injury to a true corpus luteum will bring on an abortion.
3. That rupture of a false corpus luteum will bring on menstruation and its accompanying ovulation.

REFERENCES.

Marshall, *Physiology of Reproduction*, London, 1910. Ochsner, *Surg., Gyn., and Obstet.*, vol. xxxi, No. 5, p. 496.

MUCOCELE OF THE FRONTAL SINUS.

BY

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THE notes of the following case may be of interest, first, because there seems to be strong reason to infer that the condition was due to trauma in early life, a cause which apparently is somewhat rare, and secondly, because it produced no more distress than that occasioned by occasional diplopia and a "pricking sensation in the right eye," as occurred in the case reported by Mr. J. A. Gibb (*BRITISH MEDICAL JOURNAL*, November 25th, 1921), and slight headache.

In January, 1917, Miss L., aged 28 years, consulted me on account of a small swelling at the inner and upper angle of the right orbit and of occasional diplopia. I thought the swelling was probably an osteoma. The first sign of anything wrong—the presence of the swelling—was noted about six months before she saw me. She took up war work as a masseuse, and three months before she came to me began to feel run down and to have headaches after a hard day's work or after reading, and at such times the diplopia troubled her more. She had seen an ophthalmic surgeon, who wrote to me that he considered the swelling was an osteoma or a fibrosarcoma. Immediately before seeing me she had consulted a surgeon who considered the condition to be due to nasal sinus disease. A skiagram was taken, which was negative in every respect.

On September 12th, 1921 (the description holds good for the first consultation in 1917), I made the following notes. Inspection showed slight proptosis of right eyeball with displacement downwards and outwards; neither of these features would have been noticeable on casual observation, the right pupil being about 3 mm. lower than the left. Across the bridge of the nose, which was broader than normal, was a linear oblique scar three-quarters of an inch long; it was the result of an accident when the patient was 3 years old which broke the nose and laid bare a considerable area of bone. A bilateral symmetrical bony boss could be felt on either supraorbital ridge about the position of the inner side of the supraorbital notch. The swelling complained of was below the boss on the right supraorbital ridge. Estimated by palpation it was about the size of an ordinary pea; it was bony hard, did not fluctuate, and was immovable but tender to deep pressure; there was no redness. The eyelids were freely movable; there was no lachrymation, and no history of nasal trouble, excepting that the patient thought the right nostril seemed narrower than the other. Headaches were confined to pain behind the right eye. Both fundi were normal; vision R. and L. = 6/6. In the diplopia the images were vertical without lateral displacement. Intranasal examination showed a deformed septum deviated to the right in the upper part and posteriorly. The nasal mucous membrane was apparently perfectly normal and healthy,