THE AFTER-RESULTS OF 21 CASES OF ILIO-COLOSTOMY PERFORMED FOR TUBERCULOUS BONES AND JOINT DISEASES.

WITH A NOTE ON THE FUNCTION OF THE SHORT-CIRCUITED COLON.

BY

HAMILTON DRUMMOND, F.R.C.S. EDIN.,

SENIOR ASSISTANT SURGEON TO THE ROYAL VICTORIA INFIRMARY,
NEWCASTLE-UPON-TYNE.

A FEW years ago the condition known as intestinal stasis was held responsible for many lesions, and among them tuberculous bones and joints. Arising out of this an operation known as ilio-colostomy came into fashion, and was carried out by many surgeons in this country and America.

The operation consists in dividing the lower end of the small intestine, closure of the distal end, and transplantation of the proximal cut end into the uppermost part of the rectum or lower pelvic colon. The idea was to short-circuit the large intestine so that it would cease to function. This procedure was introduced by Sir William Arbuthnot Lane. Professor Rutherford Morison, with an open mind on this subject, visited Sir Arbuthnot Lane's clinic, and after seeing the operation performed by him, and inquiring into his results, decided to give the treatment a fair trial for septic tuberculous bones and joints.

The cases selected for operation by ilio-colostomy were those which had defied all methods of treatment and were gradually losing ground. The operative technique as advised by Sir Arbuthnot Lane was followed, and is not discussed here, the object of this paper being, first, to follow up the late results of twenty-one of the cases operated upon as regards the general health and the local condition; secondly, to ascertain how the functions of the colon had become modified by the operation after the lapse of a number of years.

Table of Cases.

No. and Initials.	Age.	Primary Focus for which Ilio-colostomy was Performed.	Results.
1. M. W.	15	Tuberculous hip, infected.	Well and healed 2 years later; since then cannot be traced.
2. T. H.	7	" "	Well and able to work. See attached note.
3. R. B.	8	" "	Died of meningitis 1 year 7 months after operation.
4. T. M.	7	" "	No better; died 13 months after operation, after amputation through hip-joint.
5. E. W.	20	" "	No better; died 2 years after operation.
6. W. T. S.	34	" "	No better; died 1 year after operation.
7. M. T.	25	Tuberculous disease of metatarsus	Well and healed 2 years after operation; since then cannot be found.
8. N. O.	9	Tuberculous spine	Died 5 days after operation from intestinal obstruction.
9. E. B.	25	" "	Died of general tuberculosis 1 year after operation.
10. S. T.	18	" "	Left hospital much improved; lost sight of 3 months later and cannot be traced.
11. A. K.	11	" "	Died 2 years 3 months after operation from lardaceous disease.
12. J. H.	10	Multiple tuberculous foci in neck, limbs and back	No better 18 months later; cannot be traced.
13. W. C.	26	Tuberculous spine	Died from intestinal obstruction 8 days after operation of ilio-colostomy.
14. R. B.	23	Tuberculous spine	Died 2 years 6 months after operation from general sepsis; the local lesion was no better. Greatly improved. See note.
15. F. T.	20	Tuberculous spine	
16. J. M.	9	Tuberculous hip	Died of general tuberculosis 5 years after operation; local lesion remained unhealed.
17. J. T.	12	Tuberculous gluteal bursitis	Died 19 days after operation from intestinal obstruction.
18. L. B.	8	Multiple tuberculous glands	Unhealed a year later; cannot be traced.
19. A. P.	26	Tuberculous hip-joint	Died 4½ years after operation of ilio-colostomy from septic absorption; local lesion remained unhealed.
20. J. H.	10	Multiple tuberculous—thigh, legs, neck glands	No better 4 months after ilio-colostomy, complete colectomy performed. Patient now greatly improved but not cured. See note.
21. J. H.	23	Tuberculous hip-joint	Died 1 year later; cause unknown.

Professor Rutherford Morison was most careful in his selection of cases, choosing those which seemed the most hopeless, and they all were examples of tuberculous lesions with superadded sepsis.

He performed the operation of ilio-colostomy on twenty-one patients during the years 1911, 1912, 1913. Of the twenty-one cases operated upon, three are known to be alive at the present time; one, a case of hip disease, is cured, while the remaining two are greatly improved, as will be seen from the notes printed below.

Five cases cannot be traced up to date; two of these were known to be well and healed two years after operation; the remaining three were not cured when last seen, eighteen months, twelve months, and three months respectively after the operation.

Three died from intestinal obstruction following the operation of ilio-colostomy, one on the fourth day, one on the eighth day, and one on the nineteenth day. In all three cases the diagnosis of intestinal obstruction was made early and they were operated upon at once, but the serious general condition of the patients interfered with recovery. Another case—a boy with a discharging left hip-joint—was no better as the result of the operation, and succumbed to amputation at the hip-joint thirteen months later. The remaining nine cases when traced were found to be dead as the result of tuberculosis either from the primary focus or from meningitis. They lived for periods varying from one to five years after the operation.

Cases Living at the Present Time.

CASE I.

T. H., aged 7, a feeble, anaemic boy, first came to the hospital in 1910 with a discharging tuberculous hip-joint. Operations to cure the local disease were performed in November, 1910, and again in 1911; during this time he was kept on the balcony of the ward in the open air.

In March, 1911, as there was no improvement in the local condition, ilio-colostomy was performed. When he left the hospital six weeks later the sinuses around the hip-joint were still open, but the discharge was diminished.

When seen again nine months after the operation the sinuses over the hip-joint were all healed, and he was greatly improved in health. A year later he commenced to work as a boot repairer, and now works regularly at this trade, earning £1 a week. In July, 1921, the following note was made: The local lesion shows a firmly healed scar over the left hip-joint, with many old healed sinuses and no active hip disease. The hip-joint itself has healed in the third stage of disease, and he wears a patten on the good foot and walks well.

To find out whether or not the large bowel was functioning after being short-circuited for so long a period as ten years he was given a meal of half an ounce of barium sulphate and examined with x rays. Five hours after the meal the salt was seen to be entirely in the small bowel in the region of the pelvis. Twenty-one hours after the meal the whole of the large intestine was seen to be filled with the salt and the small bowel to be empty. Two days after the meal barium was still present in the splenic flexure of the colon and rectum, the greater part having been evacuated; three days later no trace of the salt was visible. X rays, therefore, show that the short-circuited colon is still functioning after ten years.

CASE II.

A youth, aged 20, had caries of the spine at the age of 14. Six years before admission he had an abscess in the right femoral region, which was incised and drained. When admitted in 1913 he had a discharging sinus in the dorsal region, and another in the right thigh, which was also discharging freely. The dorsal spine showed marked kyphosis.

In February, 1913, ilio-colostomy was done. Eleven months later he looked much better, but the wounds were not healed. He stated that they did not heal until three years after the operation. This patient was not seen again until August, 1921, when he informed me that in 1918 he went back to work and worked at the pithead for one year, doing light work; an abscess then developed in his back and discharged freely. He stopped work, and in six months the wound was healed, and he has remained well.

A meal was given, and on x-ray examination six hours afterwards was found to be in the lower end of the small intestine. Twenty-four hours afterwards the salt was seen to be in the colon, reaching up to the splenic flexure. Thirty hours afterwards another x-ray examination showed the salt to be in the colon as far as the hepatic flexure, and in forty-eight hours in the splenic flexure and descending colon. In three days the bowel was empty with the exception of a small amount in the rectum.

In this case the barium was not actually seen in the ascending colon and caecum, but may have been there between the radiograms taken thirty and forty-eight hours after the meal.

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

A. W. SHEEN, M.S., AND SWALE VINCENT, M.D.,
F.R.C.S., D.Sc.

(From the Physiological Laboratory, Middlesex Hospital Medical School.)

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 Lehnndorff, 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

W. R. MACKENZIE, L.R.C.S. EDIN.,
SURGEON TO THE SAMARITAN HOSPITAL, BELFAST.

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.