discriminate between water at 25° and 35° C., epicritic sensibility is certainly present.

The last form of sensibility to be restored is that of exact localization, tested by the ability of the patient to appreciate as two the points of a pair of compasses when separated to the normal distance for that part of the body. This power may be regained after primary, but is rarely, if ever, restored after secondary suture.

To sum up, after division of a peripheral nerve there is a large area of loss of light touch, a smaller loss of sensibility to prick, and a still smaller loss of sensibility to deep touch.

Turning now to the motor side, there is one lesson to be learned, and unless it is applied many cases of nerve injury will be missed, and mistakes made in interpreting results. In examining into the functions of the muscles you must remember to investigate the action of individual muscles, not certain movements you believe these muscles produce. For example, in this case the patient has learned to flex his knee by his gracilis alone.

I would draw your attention briefly to other examples of this supplementary motility. After division of the median nerve at the wrist, the abductor and opponens pollicis muscles, together with the outer two lumbricales, are paralysed, but this paralysis is frequently overlooked. The abductor pollicis draws the thumb away from the index finger in a plane at right angles to that of the palm; this is the movement that is lost. The patient can perform what is usually considered to be abduction by means of the extensor ossis metacarpi pollicis. Opposition may be so well performed that it is impossible by inspection only to tell if the opponens pollicis is contracting, palpation over its insertion into the first metacarpal bone is necessary.

When we consider the number and importance of the intrinsic muscles of the hand supplied by the ulnar nerve, it would seem impossible to overlook their paralysis, yet this occurs not infrequently. Adduction of the thumb is often misunderstood; it is the opposite of abduction, and is movement of the thumb toward the index finger in a plane at right angles to that of the palm; this is the movement which cannot be performed if the adductors of the thumb are paralysed. But the long flexor or long extensor muscle is able to produce a good imitation, in the former case flexion of the terminal phalanx and inward rotation of the thumb always occurs, in the latter extension and outward rotation. Abduction of the little and index fingers can be produced to a certain extent by the extensor muscles, and this is commonly mistaken for interosseous action. But care in observation at once shows the nature of the movement.

After section of the anterior primary division of the fifth cervical nerve, Erb-Duchenne paralysis results, that is, the deltoid, the biceps, brachialis anticus and supinators, usually the spinati, sometimes the radial extensors of the wrist, and rarely the pronator radii teres. Mistakes occur, for the patient soon learns to flex the forearm, usually by means of the muscles arising from the external condyle of the humerus, and I have known patients say that they were recovering because of this.

Again, after division of the musculo-cutaneous or outer cord of the plexus, I have known mistakes to arise from failing to remember the action of the supinator longus, which is an efficient flexor of the elbow in these cases. Again, paralysis of the deltoid may be concealed by the vicarious action of the upper fibres of the pectoralis major, the supraspinatus, serratus magnus and trapezius. These movements have to be taken into consideration not only in diagnosis but in considering treatment.

I have brought this case before you this afternoon really to illustrate these points. I want you to remember the care that is necessary in testing sensibility, and the three groups into which the different forms are placed, and what is more important, the widespread overlap of the fibres subserving deep sensibility. Lastly, that the action of individual muscles must be investigated; for example, we must not conclude that because opposition of the thumb is present, the opponens pollicis muscle cannot be paralysed.

NOTE.—Since the lecture was given, steady improvement has taken place. At the present time—nearly six months after the operation—deep touch is appreciated and well localized over the whole of the affected area, sensibility to prick has been restored to the leg, but the foot still

remains insensitive to this stimulus. The area of loss of sensibility to light touch remains as extensive and well defined as before the operation.

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A CASE OF IDIOPATHIC DILATATION OF THE RECTUM AND OF THE COLON AS FAR AS THE HEPATIC FLEXURE.*

BY

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At a meeting of the Clinical Society of London held on April 23rd, 1905, we exhibited the patient, who presented the above lesions, as a "clinical case." The boy, who was under our care at the East London Hospital for Children, has since died, and we now give a fuller account of the case, which showed some anatomical features not usually met with in this condition.

P. V., aged 12 years, was admitted on November 15th, 1904.

History.

The mother stated that the boy had always had a "large belly" and been rather constipated, but not markedly so until within the last fortnight; otherwise he had been a healthy lad though not robust. A fortnight before admission she noticed a great increase in the size of the belly, constipation became more marked, and the boy complained of some pain on defaecation; there was no vomiting, nor was there any passage of blood per rectum. This condition with some wasting persisted until admission.

Condition on Admission.

He appeared to be a nervous lad, very sallow, and with a very distended belly. The heart and lungs, pulse and temperature were normal; the abdomen was tense, with a regular rounded outline and no widening of the costal angle; the surface veins were rather full; the percussion note was resonant all over, and in the knee-elbow position a thrill was obtained over a small area round the navel. On palpation irregular masses were felt in the region of the transverse colon. After examination peristalsis was very obvious. On rectal examination, the tone of the sphincter was normal but the rectum was very dilated. The belly measured in circumference at the navel 29 in., from navel to pubes was 5½ in., and from navel to ensiform 7½ in. His weight was 3 st. 4 lb. 14 oz.

On November 25th it was noted that there was a slight increase in girth, and the bowels were obstinately constipated; there was no response to aperient medicines, and only poor results from enemata. The weight had increased 1 lb. At no period was there tetany.

Operation.

On November 29th Mr. Robinson made a mid-line incision below the umbilicus, and on opening the peritoneal cavity about 2 oz. of clear fluid escaped. A large, tense, bluish-coloured tumour presented, with very large distended veins coursing over it, and with a lace-like pattern on its surface, due to the hypertrophied and separated muscular bundles. The bladder was attached to the lower part in front. The swelling was proved to be free at the sides and in front, and to extend upwards in the mid line to the ensiform cartilage. To explore this further the incision had to be extended considerably upwards, and the tumour was brought out of the belly. The following was found to be the condition of things: The mid-line swelling started from the pelvic floor and expanded immediately like the body of a flask; above the navel it began to narrow into the neck of the flask, but yet its circumference was as large as a man's arm. Just below the ensiform cartilage there was a somewhat acute bend to the left, and the gut, with almost the same calibre, went straight down into the left iliac fossa, formed a loop, and became continuous with the descending colon. Further exploration showed that the dilatation continued along the descending and transverse colon, with very little diminution in size until the hepatic flexure was reached. The ascending colon was only slightly enlarged, and filled with some hard faecal lumps, and the caecum and appendix were normal. The colon beyond the hepatic flexure contained many pounds of soft, dark, faecal material, which was squeezed out per anum by gradual pressure on the gut from within, with

* A paper read before the Clinical Society of London, February 8th, 1907.

dilatation of the anal canal by the assistant's finger. It was remarked at the operation when this had been evacuated that the hypertrophy of the bowel wall was so great as to feel "as thick as the sole of a boot." The finger, after passing through the internal sphincter, entered an enormously dilated cavity whose walls were touched with difficulty. No hard or enlarged glands were felt in the mesentery; there were no signs of peritonitis nor any abnormal band. The rectum before emptying was measured with an aseptic silk ligature at its greatest circumference from mesentery to mesentery, and proved to be 19½ in. The abdominal wall was closed in layers.

After-History.

After the operation the boy did well, except for slight suppuration in the superficial layers of the wound. He was put on a tonic mixture, and passed one to four motions daily without further medicine. On December 14th he had again constipation, and he was put on aperients, and the lower bowel was washed out every day. On January 18th, 1905, the belly was larger and hard lumps were felt; no motion was passed in spite of strong purgatives, and enemata also gave no result. An enema of castor oil on January 24th brought away nine actions, and after that the belly became soft and a daily enema was effectual. After a few days these were discontinued, and the boy had a daily motion; his weight increased and his abdomen was normal in size and softness.

During the following months the boy remained in excellent health; he steadily gained weight, and had a regular action of the bowels. He was seen at the hospital from time to time when he came to report himself.

On March 17th, 1906, he was readmitted under one of us (H. M. F.), and remained in the hospital for eleven days in order that his condition might be accurately observed. He appeared to be perfectly well, and, except for the scar from the operation, the abdomen seemed to be quite natural and was free from any abnormal distension. The bowels acted regularly and naturally without medicine. Rectal examination showed that there was some ballooning of the gut, but nothing else could be made out.

The boy continued in good health, except that lately the bowels had been confined, till the evening of July 2nd, when he came home from school complaining of abdominal pain. No distension was observed by his mother. The pain was relieved by ginger brandy, but shortly afterwards diarrhoea set in and continued till 6 a.m. the following morning. There was no pain during the night. The motions were dark, not offensive, and did not contain blood. No delirium during the night. Next morning at 8 a.m. his mother started from home to bring him to the hospital. According to her account he was quite conscious then, his breathing was very quick but not distressed. He was conscious when he arrived at the hospital, but became comatose immediately on admission. There was no vomiting. He died in deep coma very shortly after he was admitted. There was no abdominal distension.

Necropsy.

A *post-mortem* examination was made by Dr. Iredell. The body was well nourished, and there was no distension of the abdomen. The thoracic organs were natural. On opening the abdomen an enormously-distended viscus presented; this was the rectum and colon. The appendix was normal. A flat narrow adhesion about ½ in. wide, formed by a portion of the great omentum, was attached to the upper limit of the swelling, and this was the only adhesion present. The gut was dilated to a circumference about a quarter to a half greater than normal, and the dilatation began 1 in. below the splenic flexure. Both muscular coats were hypertrophied. There was a balloon-like dilatation filling up the whole of the pelvis and the greater part of the abdominal cavity, which was continuous with the sigmoid loop, as described at the operation. The wall was universally thickened and its longitudinal fibres were coarse and prominent, forming an interlacing network most marked on the aspect furthest from the mesentery. A distinct mesentery 1 in. in length was present, uniting it to the posterior abdominal wall and allowing free mobility of the gut. In no place was there any marked contraction or any sign of thickening of the circular muscle coat. The intestines were filled with gas and liquid faeces. All the other abdominal viscera were natural.

Examination of the removed intestine shows that the anal canal is normal, having no unusual fold or stricture. At the upper level of the internal sphincter the bowel opens out immediately into the large cavity before spoken of. The greatest diameter of this cavity is seen in the rectum proper, which appears considerably lengthened as well as dilated; the peritoneum remains still *in situ*, and indicates the region of bowel affected. The walls of the cavity are much thickened, both muscular layers appearing hypertrophied. The lining membrane seems quite healthy, with no signs of present or past ulceration; the longitudinal columns are reduced in size, and separated owing to the dilatation, but they normally converge at the pelvic floor. There is no abnormal fold, sacculus, or constriction which might be a contributory cause of the dilatation. The rest of the bowel examined shows no further abnormality beyond what has been described as seen at the operation—namely, general dilatation, but no obvious great hypertrophy of the walls.

The chief points of clinical interest in this case appear to us to be the following:

1. *The Absence of Symptoms in Early Life.*—Except for the large size of the abdomen and a tendency to constipation nothing was noticed by the parents until about a fortnight before admission to the hospital, although we believe the condition to have existed from a very early date.

2. *The Suddenness of Onset of Symptoms.*—The rapid wasting with great abdominal distension, accompanied by vomiting and obstinate constipation, suggested an acute condition and closely simulated tuberculous peritonitis.

3. *The great improvement* in general health and the practically complete absence of the earlier symptoms which followed the operation. This, as we have stated, consisted only in completely emptying the gut, and was followed by careful dieting and regulation of the bowels.

4. *The Duration of the Improvement.*—In many of the cases described by other writers improvement follows operation; but this has very rarely, if at all, lasted for so prolonged a period and has been so completely successful that the patient has been to all appearance in ordinary health.

5. *The Sudden Termination with Coma.*—The terminal enteritis may have been due to the ingestion of some toxic substance taken in by the mouth, such as tinned meat, or it may have been infective in origin; but the question arises, Was its severity due to the abnormal condition of the gut with its greatly increased absorbing surface? As far as we can gather from published cases, this form of termination would appear to be most unusual, if not unique.

As to the pathology of the condition we can add nothing further. We would agree to the division into two groups—the one due to mechanical obstruction, the other probably congenital in origin, in which no obstruction can be found. In the absence of any kinking, bands, sacculi or diverticula, diaphragms, or other conditions which have been described as causing obstruction, we must include the case in the second group, known by the unsatisfactory term of "congenital or idiopathic dilatation of the colon."

As to the surgical procedure adopted in this case, it may be said that it stopped at the first stage, because of the satisfactory result produced. What we had decided to do if further treatment was necessary was to open the caecum, so as to wash out and give complete rest for a time to the bowel beyond. Should this not have produced the required contraction, the question then to be considered was the performance either of some form of anastomosis or of excision of the dilated bowel. Both these procedures have been adopted, but this case, unlike any other previously described, presented conditions which would have made either of them a very doubtful remedy. As to the resection, it would have been necessary to remove the dilated rectum and the mucous membrane of the anal canal, following the plan adopted by Treves, and to place here healthy intestine which would have been the ascending colon, or the terminal part of the small intestine. In both such considerable difficulty and risk would be encountered in attempting these measures as to almost prohibit its trial.

If an anastomosis had been attempted it would have been between the ileum and the large rectal dilatation. This might have had some success provided the dilated bowel had been thoroughly emptied of its contents at the time of making the anastomosis; but then, again, there would have been a possibility that the intestinal contents might have accumulated in the dilated rectum and made matters much as before. To overcome this liability to accumulation plication of the redundant rectal walls might have been performed.

From the degree of success of our case we would urge that a similar procedure of emptying the bowel by abdominal section be attempted as a routine measure before proceeding to more serious operations. The *post-mortem* appearances of the bowel showed that considerable diminution in the calibre of the intestine had taken place, and we know that this improvement had been accompanied by loss of his previous symptoms, constipation, distension and wasting. We assume that but for his somewhat accidental death he might possibly have completely recovered. In most of the cases previously recorded there was ulceration of the bowel, and the fact

that in our case the bowel showed no ulceration but a healthy condition of the mucous membrane may have contributed to the favourable result.

THE SCIENCE COMMITTEE

OF THE

British Medical Association.

REPORT XCII.

OBSERVATIONS ON THE PARATHYROIDS AND ACCESSORY THYROIDS IN MAN.

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[PRELIMINARY COMMUNICATION.]

SANDSTRÖM, who in 1880 first described the parathyroid glands, concluded from his observations that these bodies were embryonic, their microscopical appearance being similar to that of the thyroid gland in its first stage of development. This view was independently advanced by Baber, and remained unchallenged for over ten years until the experimental work of Gley, Moussu, Vassale and Generali, Kohn, Edmunds and others claimed a greater importance for the glands. Briefly put, the conclusion of these observers is that the parathyroids are not merely embryonic rests of thyroid tissue, but organs with a proper function, the loss of which entails a speedy death. Other workers, however, among whom are Hürthle and Zielinska, adhere to the older view, and more recently Vincent and Jolly have cast serious doubt on the reliability of past experimental work.

At the present time the conflict of opinion is sharp. Our lack of knowledge of the anatomy, distribution, histological variations and pathology of the glands debars us from correctly appraising their value, renders attempts at their complete removal uncertain and the results of the operation inconclusive. It therefore seemed to me that an investigation of these aspects was essential to a settlement of the question, and could not fail to bring to light facts of importance. I have accordingly been working on these lines for the past few years, and have examined the parathyroids in a number of human beings and in over seventy different species of animals. The present preliminary communication is to record some of the facts elicited by an examination of nearly sixty human subjects.

MODE OF INVESTIGATION.

The procedure adopted was the following: The subjects, which were not specially selected, except in so far as to include a variety of diseases, were examined as soon after death as practicable. A median incision was carried from the chin to the sternum; the sterno-hyoid, sterno-thyroid, omo-hyoid, and, if necessary, sterno-mastoid muscles, were reflected, and the thyroid gland exposed. This, or one of its lobes with the corresponding part of the isthmus, was freely removed, together with all the connective tissue, fat, etc., in the neighbourhood, and a search for suspicious-looking glandular bodies made in the tissues remaining from the jaw to the sternum. The structures excised were at once dissected, and every gland without exception preserved for future microscopical examination. The thyroid itself was carefully cleaned, and all bodies found on its surface retained for similar purpose. A sketch having been made of the thyroid to record the position, size, appearance, etc., of the specimens, the glands were placed in one of various fixatives, precautions being observed to facilitate the identification of each at later stages. The thyroid itself was fixed entire for twenty-four hours, and then cut into thin slices 2 to 3 mm. thick, and the surfaces of each slice examined with a magnifying lens. Every section which showed at any place any deviation from the usual vesicular appearance of thyroid tissue was retained for microscopical identification. This detailed examination ensured, I be-

lieve, that, with the exception to be mentioned immediately, no parathyroid either embedded in the thyroid or on its surface or in its neighbourhood could escape detection, while few if any lying between the jaw and sternum would be overlooked. The exception referred to is that of the parathyroid which Welsh calls the posterior superior parathyroid, and which he has shown to bear a very constant relation to the oesophagus and pharynx, lying almost invariably on the posterior wall at or near the junction between the two. Accepting this observation, I restricted my attention to parathyroid glands other than this constant one.

NUMBER OF PARATHYROIDS.

The number of the parathyroids in man, as in many animals, is stated to be two on each side. I find the number to be very variable. Excluding the above-mentioned posterior superior parathyroid, I have found on one side of the neck one parathyroid to be present in less than half the cases, two in about one-quarter the cases, in a few cases three, in two cases four, in two cases five, and in one case six parathyroids. In a few subjects no parathyroid at all was found. Other observers have failed to discover any gland in certain individuals, and I am inclined to doubt the conclusion that this result necessarily implies imperfect search.

POSITION.

This is inconstant, and there is rarely symmetry between the two sides. The most frequent site is on the lateral surface of the thyroid gland, at or near its posterior border beneath the inferior thyroid artery (that is, at the junction of the middle and lower thirds of the thyroid); more than one-third the total number of parathyroids found lay in this locality. A corresponding position, but at the junction of the superior and middle thirds of the thyroid, and therefore above the inferior thyroid artery, constituted the next commonest site, for here over a quarter of the number revealed themselves. Another fifth had taken up positions at the inferior pole of the thyroid or in the adjacent connective tissue; others lay buried in the substance of a thyroid lobe, giving no sign of their presence on the surface. Lastly, in a few instances the gland was found at the oral pole of the thyroid, in a few on the tracheal surface of the thyroid, discoverable only after dissecting the latter from the trachea. In one case a parathyroid found shelter behind the upper part of the sternum. In no dissection did I find a glandule at any great distance anterior to the thyroid gland.

APPEARANCE.

The parathyroid cannot be identified with certainty except by microscopical examination. In its more typical appearance and at its commonest sites it may be recognized with a high degree of probability, but many specimens which I believed to be either lymphatic gland, accessory thyroid, or fat, disclosed in the event parathyroid structure, and, per contra, glands whose features suggested a parathyroid nature proved to be lymphatic, thymic, or thyroid. The most characteristic form for the parathyroid to exhibit is that of an elongated, slightly flattened, ovoid body, of a pale pink hue, with a smooth surface, on which ramify a few branching vessels. Part of it has the yellow appearance of ordinary adipose tissue, and there is frequently a distinct line of demarcation between the pink and yellow. Sometimes the gland presents few features save those of a nodule of fat; on other occasions fat is entirely absent, and the appearance is that of a lymphatic gland or thymic residue. In others, again, the gland is dark and brownish, suggesting an accessory thyroid, while rarely it is absolutely black, like many bronchial glands. A few specimens were found to consist of thyroid and parathyroid tissue, of lymphatic and parathyroid tissue, or of thymus and parathyroid tissue. In one instance thyroid, parathyroid and thymus tissue appeared in the same section. In every case, however, the parathyroid tissue was isolated by interposing connective tissue. In size the parathyroid varies from little more than a pinpoint up to nearly 2.5 cm.

AGE.

A reference to the ages of the subjects examined shows that parathyroids occur in greatest number in the first year of life, and that from that period to old age they are found with progressively decreasing frequency. Under