

phenomenon. Whether such a spleen would serve the organism more beneficially than a more fully developed myeloid organ is difficult to decide. Most probably it would not, as undoubtedly the needs of the body would be better served by an organ whose power of manufacturing and sending into the blood stream an excess of fully developed neutrophile cells was well maintained.

The above considerations lead me to think that in the interests of the patient it would be advisable to exercise the greatest caution in continuing x ray treatment once the total leucocytes have attained normal limits. This is all the more necessary when one remembers the startling results of Halber and Linser's experiments which, though still lacking confirmation, suggest to us the greatest circumspection in the employment of radio-therapy under the conditions indicated; indeed, in the very few recorded cases of leukaemia which have ended fatally during or after x ray treatment the effects of leucotoxic products or liberated ferments have been assigned as exciting causes. As yet the only fatal case in which an accurate histological examination of the organs has been made is that recorded by Lossen and Morawitz. Krause¹⁷ reported shortly in one case that it was impossible to demonstrate in the hæmopoietic organs changes which are not usually associated with leukaemia, and Lommel¹⁸ who examined the spleen in a case of pseudo-leukaemia which had been exposed to the rays, noted that the organ was very poor in lymphocytes.

Lossen and Morawitz's case did not respond satisfactorily to the x rays. The leucocytes were profoundly influenced but the general condition did not improve. The histological changes they reported were briefly as follows. The spleen pulp showed a great scarcity of leucocytes, especially of myelocytes and lymphocytes. Fibroblasts were numerous. The lymph glands were also greatly deficient in lymphatic elements. The marrow especially showed great hypoplasia with regard to its myeloid and lymphatic elements. The interstitial tissue of the marrow was also increased. As a result of their findings the authors believe that in certain cases the x rays may give rise to a recognisable hypoplasia of the blood-forming organs. No satisfactory explanation has yet been given of the enormous improvement which almost invariably occurs in the general condition of the patient under the x rays. It is at least difficult to bring it into relationship with the blood changes. Of course, on the assumption of Senn and Ahrens that the x rays inhibit the development of, or actually destroy, the hypothetical parasite of leukaemia (Löwit), this improvement in the general condition would find ready explanation.

Certain investigations (to be recorded elsewhere) which I have made on the rôle played by the leucocytes of spleno-medullary leukaemia in the process of phagocytosis of bacteria have shown that in the leukaemic serum the substance preparing the bacteria for ingestion by the phagocyte ("opsonin" of Wright and Douglas) is generally in normal amount as measured by normal leucocytes, while a very much lower index is obtained when measured by the patient's own phagocytes. The myelocytes have exceedingly feeble phagocytic power and hence any factor that increases the number of ripe polynuclears in the circulating blood must also render the normal supply of opsonin more available for purposes of efficient phagocytosis and removal of effete matter from the tissues. It may be noted that in chronic lymphatic leukaemia the conditions appear to be reversed. At least in the two cases which I had the opportunity of examining frequently the polynuclear leucocytes, though constituting only 2 or 3 per cent. of the total, had almost double the phagocytic power of leucocytes of healthy people. In these cases the true opsonic indices as measured with the patient's own serum and phagocytes were relatively high. In performing these tests staphylococci and tubercle bacilli were employed.

Elstree.

¹⁷ Krause: Fortschritte aus dem Gebiete der Röntgenstrahlen, Band viii., Heft 3, 1905.

¹⁸ Lommel: Münchener Medizinische Wochenschrift, 1905, p. 904.

SEAMEN'S HOSPITAL, GREENWICH.—On Thursday, Feb. 15th, the members of the local branch of the British Medical Association are to visit the Seamen's Hospital, Greenwich, in connexion with the new post-graduate school which has just been established at that institution. The staff of the hospital wish it to be known that any medical man, whether belonging to the local branch or not, will be welcomed. There will be an exhibition of cases and it is intended to hold the meeting at about 4 P.M.

A CASE OF BILHARZIA INFECTION OF THE VERMIFORM APPENDIX.

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With a Pathological Report by ERNEST H. SHAW,
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THE patient, a well-developed but rather anæmic man, aged 36 years, was a goods clerk in a railway station in South Africa. He was admitted to St. Bartholomew's Hospital on June 24th, 1905, on account of a sinus in the right gluteal region. The sinus had persisted since January, 1904, when an abscess was opened there by Dr. J. B. S. Greathead at the Albany General Hospital, South Africa. He had come from South Africa to have the sinus cured. His history was as follows. In January, 1899, he had a slight attack of appendicitis which cleared up after rest in bed for ten days. In April, 1902, a large tender swelling developed in the right iliac region; he had fever and was constipated. He was sent to the Albany Central Hospital by Dr. E. G. D. Drury. At this time the swelling could be felt per rectum; it was painful and fluctuated. The pelvic swelling became smaller and the patient was discharged in six weeks without any operation being performed. But the swelling never entirely disappeared and the patient was very weak and unable to do any work till October, 1902, when the abscess pointed on the right lumbar region. Two incisions were made into this between the last rib and the iliac bone and some foul-smelling, dark brown pus was let out. In December, 1902, he was able to work again, wearing a drainage-tube in the sinus.

In January, 1904, another abscess developed in the upper part of the right gluteal region outside the posterior superior spine of the ilium and the patient was readmitted into the Albany Hospital. The appendix region was then explored by the usual oblique incision in the anterior abdominal wall. Dense adhesions were found and a fluctuating swelling was discovered behind the pelvic peritoneum in the region of the sciatic notch. The anterior incision was therefore closed. The abscess in the right buttock was opened up and its cavity was found to lead into the pelvis through the sciatic notch into an abscess in front of the sacrum, whence several ounces of dark fæcal smelling pus were let out. This sinus was still discharging on the patient's admission to St. Bartholomew's Hospital under Mr. C. B. Lockwood in June, 1905. His condition was as follows. There was a scar about four inches long in the anterior abdominal wall, which was the seat of a ventral hernia. Behind there were four scars in the right lumbar and gluteal regions, in the lowest of which there was a sinus leading forwards and inwards for about four inches. The sciatic notch could be felt with a probe but the bone was not bare. There were resistance and tenderness in the right iliac fossa. The urine was natural and did not contain blood or pus cells although systematically examined.

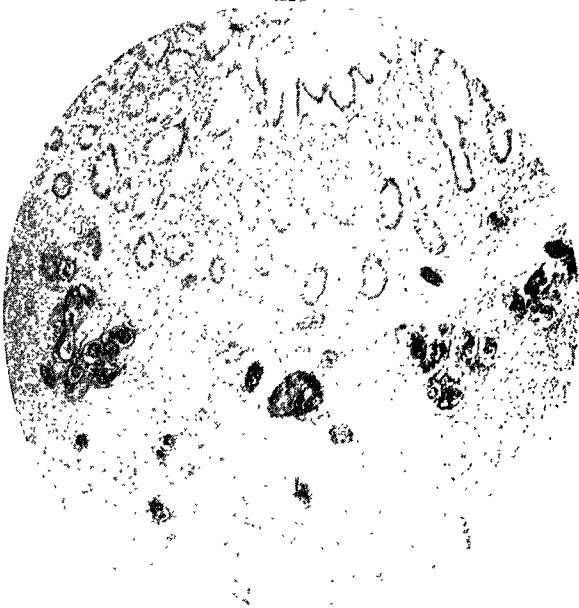
On July 14th, as the sinus showed no signs of closing, Mr. Lockwood explored the appendix region through the scar in the anterior abdominal wall. After a long and tedious search, lasting over an hour on account of the dense adhesions, the proximal end of the appendix was found very firmly adherent to the posterior pelvic wall near the sciatic notch; this part of the appendix was removed. The distal end had apparently sloughed away. A small drainage-tube was left in and the abdominal wall was sutured in layers. The patient left the hospital five weeks after the operation; the abdominal wall had soundly healed. The posterior sinus was healing quickly and was only about one inch in length.

On cutting sections of the appendix ova of bilharzia hæmatobia were seen; they are shown in the accompanying micro-photographs (Figs. 1 and 2). There was nothing to suggest bilharzia infection of the genito-urinary tract or of the rectum; the patient never had diarrhoea and no blood or mucus was ever seen in his stools. Apart from the extreme rarity of bilharzia infection of the appendix, this case is instructive because it throws some light on the way by which the parasite may enter its host.

Dr. F. M. Sandwith, in an article on bilharziosis,¹ points out that there are three possible routes by which the myracidium or embryo trematode may arrive at its destination: (1) by the mouth; (2) by the skin; and (3) by the urethra or rectum. Of the above, Dr. Sandwith thinks the mouth is the most probable.

1. People who do not bathe in the rivers, ponds, &c., and who do not drink water which has not been boiled, can live

FIG. 1.



Magnified 65 diameters. Shows ova in clumps just outside the muscularis mucosae, and two internal to it.

in the countries in which this disease is endemic (e.g., Egypt, South Africa, Syria, &c.) and seldom contract it. Against this theory may be urged that: (a) bilharzia eggs or embryos have never been discovered in any molluscs or other articles of diet—in fact, the intermediate host of the bilharzia is unknown, if, indeed, there be one; and (b) that the embryo or myracidium which usually hatches in about half an hour after the ovum is voided in the urine is quickly killed if it is placed in an acid solution of equal strength to the gastric juice.

FIG. 2.



Magnified 210 diameters. Two ova just outside muscularis mucosae.

2. Infection by the skin. Dr. John Harley, who first discovered bilharzia in South Africa in 1864, supported this view. I do not know of any other evidence in the favour of it except, if we may judge from analogy, ankylostomum duodenale has lately been shown to attack its host in this manner.

3. The third possible means of entry is by the urethra or less often by the rectum.

Dr. Sandwith states that in the Cairo hospitals the proportion of males to females suffering with this disease is 24 males to one female; and also that when females are attacked it is often the vagina alone that is affected. There is also a good deal of evidence in favour of the disease being contracted when bathing. The only place in the human body where the bilharzia has been found sexually active is in the portal veins; it would be easier for the embryos to get into the portal system from the urethra or rectum than from the mouth, where they would have to traverse the acid gastric juice.

In the case which I am describing we unfortunately only found the bilharzia ova in the appendix after the patient had left the hospital and was on his way to South Africa, so no special search for bilharziosis could be undertaken. However, the patient had incidentally said that he had frequently bathed since he had had the sinus in his back.

From the above facts I conclude that the patient first had an attack of appendicitis, which eventually left him with a sinus, leading to an abscess cavity, in close connexion with the proximal part of his appendix, and that afterwards the sinus was the means of entry of the bilharzia while he was bathing. This is, I think, a more probable explanation than that the original appendicitis was due to bilharzia infection.

On looking through the recent literature on the subject I have been unable to find any account of a case of primary infection of the vermiform appendix with bilharzia. Dr. H. A. Kelly, in his treatise on the appendix, mentions cases in which each of the common parasitic worms that are found in the human body, including ascaris lumbricoides, tape-worms, and echinococcus, was found in the appendix. Thread-worms are not by any means so rare as the above, especially in children. Dr. Kelly also mentions that Aireton had a case of bilharzia of the appendix. I have been unsuccessful in tracing this further as no reference is given. Mr. F. R. S. Milton, surgeon to the Kasr-el-Ainy Hospital, Cairo, in a series of lectures on the Surgery of Bilharziosis² does not mention any case in which the appendix was the seat of infection. Mr. Milton, however, reports a case in which the only manifestation of the disease was a sinus leading from the buttock to the sacrum. How far the case is analogous to the one now recorded it is impossible to say.

PATHOLOGICAL REPORT BY MR. SHAW.

Macroscopic.—The specimen is that of a vermiform appendix about two inches in length; it is about one-third of an inch in diameter; its peritoneal and muscular coats are torn in places, exposing the mucous membrane, and its peritoneal surface is discoloured and covered by old adhesions. A piece was cut out from each end after being hardened in Müller's fluid and microscopic sections were prepared.

Microscopic examination.—(a) *Proximal end.*—The lumen of the appendix is small and contains numbers of cast-off epithelial cells and leucocytes embedded in mucus, the lining epithelium is intact, and the glands of the mucous membrane are very numerous. A few nodules of lymphoid tissue are present. Outside this the submucous layer contains large numbers of wide lymphatic spaces. The muscular coats are of normal thickness and are deficient in places, having been torn during the removal of the appendix. The peritoneal coat is irregularly thickened and contains many small round cells; blood-vessels are numerous and large. There are collections of small round cells in all the coats of the appendix and dilated lymphatic vessels full of leucocytes are also seen. The evidences of inflammation are present mostly in the outer part of the wall of the tube. In the submucous coat immediately outside the muscularis mucosae there are numbers of darkly-stained bodies grouped together in some places in colonies of from four to eight in number; some are lying singly and some in pairs. The bodies are darkly stained with hæmatoxylin and lie in the connective tissue spaces. Seen in their long diameter they are about 0.1 millimetre in length and are oval in shape, some with rounded ends, others with tapering extremities, others again have one end rounded and the other prolonged to a sharp point. In several instances there is seen a kind of blunt spine on one side. On cross section the bodies are round. With the low power (Leitz's $\frac{1}{3}$) a definite envelope can be made out and inside this there is in some of the bodies a mass of broken-up structureless material, while in others there are

¹ Practitioner, October, 1904.

² Journal of Tropical Medicine, June and July, 1902.

collections of round granules about one-third of the size of a red blood corpuscle. Stained with methylene blue these granules are dark blue in colour, and around them and filling up the remainder of the envelope is a structureless hazy-looking mass lightly stained with blue. The envelope is also stained deeply blue. Some of the bodies are distorted and broken up and, from their staining reaction, give one the impression that they have undergone some degenerative change—i.e., calcareous degeneration. With the high power (Leitz's $\frac{1}{2}$) the granules and the definite chitinous-looking wall can be seen much better. A few of these bodies, which correspond exactly in size and shape to the ova of the bilharzia hæmatobia, and are no doubt the ova of that worm, are seen in the lymphoid tissue of the mucosa, and there are many in the peritoneal coat. None are seen in the lumen of the appendix, nor can any be seen in the muscular coats.

(b) *Distal end.*—The tissues show very little evidence of inflammation and there is no ulceration of the mucosa. But the ova are present in the same situations and in large numbers. This points to an invasion of the whole length of the wall of the appendix by the ova.

The accompanying illustrations, which were prepared by Mr. Albert Norman, show the general distribution and structure of the ova. Another section has since been made from about the middle of the tube and shows the same appearances with, in addition, a very interesting feature—that is, an ovum in a lymphoid nodule and partly surrounded by large multinucleated giant cells.

We are much indebted to Mr. Lockwood both for his kind help in the preparation of this article and also for his permission to publish it.

St. Bartholomew's Hospital.

A CASE OF TORSION OF THE TESTICLE.

By R. M. GOING, F.R.C.S. ENG.

With Notes on the Pathological Condition in Three Specimens by ARTHUR KEITH, M.D. ABERD., F.R.C.S. ENG.

THE patient, aged 17 years, was first seen on Sept. 11th, 1905, for pain and swelling of the left side of the scrotum. It was difficult to get a complete history as the lad was mentally deficient since birth. About four years previously he had a blow on his scrotum which became swollen; he was attended by a medical man who kept him in bed till the swelling had disappeared. Several times since then he complained of pain in his scrotum but not severe enough to cause him to lie up. For some months past his mother noticed that his gait had been different from what it was previously—namely, he walked with his thighs kept close together. On Sept. 9th he complained of pain in the left side of his scrotum after defæcation. On the 11th I first saw him. The left side of his scrotum was swollen; the skin over it was red and slightly œdematous; it was very tender and the swelling extended up as far as the external abdominal ring, but the spermatic cord could be distinctly felt above the swelling. His pulse and temperature were normal and he had no other symptoms. It appeared to me to be a case of acute orchitis but I could not find any satisfactory cause for it. On the 12th he was seen by my partner, Dr. F. H. Alexander, who found the local condition much the same. The patient, however, had vomited several times and complained of headache; his bowels had not acted since the 9th and there was difficulty in micturition. On the 13th I again saw him; the local signs were as before, though the swelling was somewhat larger and there was a bluish discolouration of the skin over the testicle. We came to the conclusion that the case was one of torsion of the testicle. On the 14th I made an incision over the swelling; the tissues were greatly œdematous and on exposing the tunica vaginalis it was found to be greatly enlarged and adherent to the surrounding tissues. On opening the tunica vaginalis, which was greatly thickened, a dark purple-coloured mass was seen in front, which afterwards was found to be the globus major of the epididymis, and behind it was the testicle of a fairly normal colour and not much enlarged. There was very little, if any, fluid in the tunica vaginalis. I then dissected the tunica vaginalis from the surrounding parts and having ligatured the cord with fine silk close to

the external abdominal ring excised it. A small drainage-tube was placed in the lower end of the scrotum through a small incision. The original wound was closed with silk-worm-gut sutures and dressed with cyanide gauze. The drainage-tube was removed in 48 hours and the wound healed by first intention, the patient being allowed up on the fourteenth day. Since then he has been quite well and walks normally.

The case is interesting from the following points. 1. The rarity of the condition, only two cases occurring at the London Hospital in the last six years. I can find very few recorded cases, the last one being by Mr. G. H. Edington in THE LANCET of June 25th, 1904, p. 1782. 2. Recurring attacks with apparent recovery for several years. 3. The difficulty of diagnosis with an incomplete history from orchitis. 4. The apparent confusion between this condition and that of torsion of the spermatic cord.

Notes by Dr. KEITH.—With the addition of Mr. Going's case there are now three specimens in the London Hospital Museum representing strangulation of the testicle caused by the twisting of an abnormally long and narrow testicular mesentery. The normal attachment of the testicle is shown in Fig. 4; the whole length of the posterior border of both testicle and epididymis is bound firmly by a mesentery containing much fibro-muscular tissue between its widely separated layers. It is impossible to conceive that the normal attachment of the testicle could become twisted so as to give rise to strangulation in any circumstances whatsoever. Mr. W. McAdam Eccles¹ and Mr. E. M. Corner² attribute the possibility of such a twisting to the presence of such an elongated mesentery as is frequently found in imperfectly descended testes and this explanation I believe to be right.

So far I have not used the term "mesorchium" because, strictly speaking, it should not be applied to the mesentery that binds the testicle and epididymis to the posterior wall of the tunica vaginalis; that attachment represents the common mesentery of the testicle and of the Wolffian body, out of which the epididymis is developed. At first the testicle and Wolffian body have each their mesentery, which even then, however, fuse at their bases to form a common mesentery, but in the normal course of development in the male these bodies approach each other and their independent mesenteries disappear. I would willingly overcome any scruples about the strict use of the term mesorchium and apply it to the mesentery that normally binds the testicle to the tunica vaginalis and cord were it not that Mr. Corner³ has figured the occurrence of a true mesorchium (see Fig. 6), which binds the testicle to the epididymis and common mesentery, just as the mesovarium binds the ovary to the broad ligament. In the female the mesentery of the Wolffian body forms the mesosalpinx; the basal part of the broad ligament represents the common mesentery.

A search amongst comparative and embryological material has not brought to light any animal in which the male genital gland is attached by a long narrow mesentery such as occurs in the three cases figured in Figs. 1, 2, and 3. But there is certainly one error of development in these cases, a malformation or maldevelopment of the gubernaculum testis. In Fig. 5 it will be seen that the gubernaculum grows up not only within the posterior or caudal end of the common mesentery of the genital gland, but also within the mesenteries of the Wolffian body and mesorchium and seizes the globus minor of the epididymis and caudal or posterior pole of the testis. A remnant of the gubernaculum is seen in the adult testis in Fig. 4 (7). In none of the three cases of strangulation of the testicle due to twisting dealt with here was there any trace of the gubernaculum; it is evident in Figs. 1 and 2 that the gubernaculum had laid hold of, not the testis and epididymis, but of the vas deferens which is seen to make a loop on the tunica vaginalis; further, it is inconceivable that a gubernaculum could ever have reached the testicle through such attachments as are shown in Figs. 1, 2, and 3. It is probable that such genital glands are provided *ab initio* with abnormally long mesenteries and that the gubernaculum seizes the peritoneum near the mesenteric base, but the elongated, pedunculated form of the mesentery of the testicle in these cases is produced on the arrival of that organ at the internal abdominal ring. The

¹ Mr. W. McAdam Eccles: The Imperfectly Descended Testes, 1903.

² Mr. E. M. Corner: The Wandering Testicle, Clinical Journal, vol. xxv., 1904-05, pp. 302-04.

³ Ibid.