AN ADDRESS

ON

TWO CASES OF UNCOMPLICATED INTRA-
PERITONEAL RUPTURE OF THE
URINARY BLADDER.

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THE subject of rupture of the urinary bladder presents points of interest in many directions. My attention has been called to it by the occurrence of two cases within a short period, which presented many points in common, and, in the conditions found after death, offered some matters of surprise both to the clinical observer and to the pathologist. Both of the cases came under the category of uncomplicated intraperitoneal rupture, that is to say, there was no other injury or disease which had any direct relation to the rupture, and the whole group of phenomena were simply the result of that accident. I will first relate the cases briefly and then make some remarks on the points of special interest. For the clinical notes in the first case I am indebted to Dr. Oswald, of Gartnavel Asylum, the patient having been an inmate of that institution.

CASE I. *Notes by Dr. Oswald.*—"March 11th, 1893. This morning at 9 A.M. the writer was called to see Mr. D., as he was seriously ill. He was found in bed looking pale and collapsed; his pulse small and 60 at the wrist. His abdomen was slightly distended. There was a clear area round the umbilicus, relative dullness on the right side, and dullness in both flanks, slight in extent. There were no external marks of violence. He had had a bad night; had only slept three hours and a-half, and had been noisy for a time. He rose at 9 A.M., washed and dressed as usual, and at 8 took his porridge. Afterwards he walked from the dining room to the sitting room, and talked for a time with an attendant. At 8.30 he was seen to be sitting with his head on his hands, the elbows on the knees in rather a cramped position, and he half slipped to the floor; but he said he was all right. The attendant saw he was looking very ill. He moaned as he was carried to bed, and lay in bed with his knees drawn up and complained of pain over the lower abdomen. (It may be taken as a fact that there was no violence.) The bladder was not unduly distended, but he had not passed water since 1 A.M. His bowels had been freely moved the previous day. Through the day he vomited a good deal, and was very restless, and his mental condition bad.

"March 12th. Complaints of pain low down in the abdomen. No motion of bowels and no passage of flatus. Passed no water since last night. Soft catheter introduced, and 12 ounces of clear urine drawn off. It is healthy, containing no albumen. Temperature slightly subnormal; 97.6° last night, 98° this morning.

"March 13th. Sick through the night. Passed about 3 ounces of urine during the night; 10 ounces drawn off this morning. Seen by Dr. H. C. Cameron, who saw no grounds for operative interference. To-night he passed some urine containing some blood.

"March 14th. Seems rather better. Pulse 104, and fairly good. Abdominal distension is greater, and there is more changing dullness in the flanks. No passage of flatus, no motion of bowels, and no more vomiting.

"March 15th. Seen again by Dr. H. C. Cameron.

"March 16th. Died suddenly this morning, rather unexpectedly. He had had two free bowel motions, and seemed rather better, but collapsed and died at 9 A.M. All through, his mental condition was one of sub-acute mania, and his extreme restlessness and incoherency prevented much being done for him."

Post-Mortem Examination.—I was asked by the friends of the patient to make a *post-mortem* examination in this case, and I wrote the following account of the results. The examination by direction of the friends, was limited to the abdomen. The surface of the body was pale, and there were no marks of injury visible on the abdomen. The wall was incised in several places, to see if there was any hemorrhage in the structures, but none was found. The abdomen contained a large quantity of fluid of a dark straw colour. There was no exudation of a solid character on the surface of the peritoneum. The urinary bladder was found empty and collapsed. The posterior surface showed a ragged, rounded aperture, with everted edges, which were to a slight extent infiltrated with blood. On removing the bladder the rupture was found sufficient to admit two fingers. The mucous membrane was not ulcerated, and the edges of the aperture were everted as if the rupture had taken place from within. Microscopic examination revealed no disease of the bladder. There was simply the tear whose edges were slightly infiltrated with blood, and there was very little, if anything, of inflammatory exudation.

As I was asked to give my opinion of the cause of death, I added to the report given above the following words: "I am of opinion that death has resulted from rupture of the urinary bladder. In the case of an excited patient, if the bladder happened to be distended with urine, an accidental blow or fall might be sufficient to cause such a rupture."

CASE II.—W. S., aged 30, an ironmoulder, was admitted to the Western Infirmary with symptoms which pointed to acute peritonitis. The history was that he had on a Friday night been intoxicated and slept out. There was also an obscure history of his having fallen downstairs whilst intoxicated. On the Saturday morning he had a severe rigor. When admitted on Sunday evening the abdomen was tympanitic and very tender, the face pinched, the tongue dry and leathery, the pulse rapid and soft, and the temperature 99.2°. There was a good deal of vomiting

of dark fluid matter, with a faecal smell. Shortly before death, which took place early on the Monday morning, the temperature rose to 103.8°.

At the *post-mortem* examination, which was made on the Tuesday morning, it was expected that the usual evidences of peritonitis would be present. On opening the abdomen, however, whilst there was a considerable quantity of blood-stained fluid, there was not a trace of the ordinary fibrinous exudation which we associate with peritonitis. There were some flakes of blood, but these were few, and they were chiefly in Douglas's pouch. The source of the mischief was found in a rent in the posterior wall of the bladder, which is thus described in the *post-mortem* record. The posterior aspect of the urinary bladder shows a transverse rent 2 cm. (about three-quarters of an inch) in extent, and the tear is continued on either side in the peritoneum to the extent of 3 cm. on the left, and about 2 cm. on the right, making in the peritoneum a tear of about 7 cm., or nearly 3 inches. Around the lips of the gaping wound there is a deposit of light brown coagulum. In Douglas's pouch there is also coagulum partly dark and partly paler, but there is nowhere anything that can be called a proper fibrinous exudation. Viewed from within the rent is seen to be situated about 2 cm. from the fundus. The mucous membrane is everted, passing well outwards into the wound. The rest of the mucous membrane of the posterior wall is markedly cedematous. The bladder was almost fully contracted, and it contained a small quantity of red fluid and a crumbling altered coagulum. It is to be presumed that the contraction of the bladder had diminished the size of the rupture, and that in the distended bladder the rent was at least as great as that in the peritoneum, namely, about 3 inches.

REMARKS.—In studying these two cases the points which seem to me to emerge as worthy of comment, are these, which I will take up seriatim, namely, the absence of a clinical diagnosis in both: the seat of the rupture; the interval of time between the rupture and death; the question of inflammation of the peritoneum as a consequence of rupture; the state of the wound; and the mode in which death was brought about.

The existence of rupture of the bladder was not suspected during life in either of the cases, and the condition was a "find" at the *post-mortem* examination. There was no clear history of violence in either case, and the patients themselves were not able to give any proper account of the origin of the disease. The one patient was acutely maniacal, and the other had been deeply intoxicated. It is noted by Rivington¹ that "in 41 out of 107 cases of simple intraperitoneal rupture it is distinctly specified or implied that the patients had been drinking alcoholic liquors freely or were actually drunk, at the time of the accident." The frequency of this accident in intoxicated persons is to be explained chiefly by the tendency to over-distension which alcoholic excess brings about. The liquor imbibed increases the amount of urine, and the state of blunted consciousness makes the call to empty the bladder less appreciated. It may be added to this that the intoxicated person is liable to falls, and that the body is not so readily protected by the active movements of the limbs as in a sober person. The drunk man falls like a heavy bag, and a distended viscus may be more readily burst. In this connection I may refer to the remark of Ferraton,² that ruptures of the bladder occur much more frequently in England and Germany than in France. He accounts for this by the use, frequently in excess, of alcoholic drinks, such as beer, which provoke an excessive diuresis. Whether this be the explanation or not, there seem to be more cases recorded in England than in any other country. Of 90 cases summarised by Ferraton no fewer than 60 are by English or American observers, chiefly the former.

The seat and size of the rupture were similar in the two cases. It was the posterior wall of the bladder, a short distance from the fundus. The rupture was distinctly transverse in the second case, whilst in the first it was nearly circular. It was noted in the second case that the peritoneal tear was considerably greater than that of the muscular and mucous coats. The explanation of this clearly is that the muscular wall of the bladder had contracted more than the peritoneal coat, which latter, however, must have shrunk considerably as compared with the stretched condition that existed when the bladder was over-distended. It is noted that in this contracted condition the crack in the peritoneum was about 7 cm., or nearly 3 inches in extent, and we may infer that the tear when produced must have been considerably larger. We can picture to ourselves the greatly distended viscus with a great rent in its posterior surface.

The interval of time between the rupture and the death of the patient is an important matter both in its practical and pathological relations. In the first case the patient was observed to be seriously ill on the morning of March 11th, so

ill that he "half slipped to the floor," and he died on the morning of the 16th, an interval of five days. I think that the rupture must have occurred on the date mentioned, as already, on the 11th, there is mention of pain low down in the abdomen as a prominent symptom. Dr. Oswald has suggested that there had first been a small rupture and afterwards a larger one, but I scarcely think this possible. In order to cause a rupture in a perfectly normal bladder sufficient to admit two fingers there must have been a considerable distension of the bladder, and it is scarcely conceivable that such a distension could occur if there were already a tear, even if it were small in size. The duration of this case may be set down as five days. In the second case the duration is shorter. The patient slept out intoxicated on a Friday night, and he died early on Monday morning, so that the duration here is only two to three days.

In this connection it is interesting to note the duration of life after the rupture as collated by Rivington.³ He states: "Out of 85 fatal simple intraperitoneal ruptures 8 died within twenty-four hours, 15 within two days, 15 within three days, 16 within four days, 10 within five days, 4 within six days, 5 within seven days, 5 within eight days, 1 within nine days, whilst 1 lived twelve days (Anton Graw), 1 more than twelve days (Montagu), 1 fourteen days (Von Roonhuysen), 2 about fifteen days (Ellis and *Gazette des Hôpitaux*), and 1 sixteen clear days (Crossley)." That is to say, more than half the cases lived over three days after an intraperitoneal rupture of the urinary bladder, and some lived for much longer periods.

The question of peritonitis in connection with rupture of the bladder is one which is not without difficulty. I confess that when I examined these two cases and found none of the ordinary evidences of acute peritonitis I was surprised. I feel now that I should not have been surprised, because acute peritonitis is a septic inflammation, and healthy urine, being aseptic, is incapable of producing a septic inflammation. I was also aware that urine may be injected into the peritoneal cavity of animals not only without producing any peritonitis, but without apparently affecting the health of the animals. Thus Wegner,⁴ in his important paper, states that large quantities of normal urine may be injected into the peritoneum without evil result. Grawitz⁵ also states that, along with Israel, he made an experiment in a rabbit in which, by dividing the ureter, the secretion of one kidney was passed for months into the peritoneum without producing any acute peritonitis, the only result being a fibrous adhesion of the intestine.

The observations of Wegner, Grawitz, and more recently the confirmatory experiments of Waterhouse,⁶ demonstrate the extraordinary absorbent power of the peritoneum, and show also that, on account of this absorbent power, even pyogenic microbes, when introduced, do not produce peritonitis unless the peritoneum is so altered as to interfere with absorption, or the conditions are such as to offer to the microbes a sufficiency of nutritious matter for their rapid growth. Normal urine must be readily absorbed by the peritoneum and even if it be present in considerable quantity it should do no material injury to the membrane. And yet Rivington, writing in 1883,⁷ regards it as "an erroneous opinion prevalent that the peritoneum often tolerates the presence of pent-up urine." The truth obviously is that, unless there is an introduction of septic matter along with or subsequently to the rupture, there will be no appearance of ordinary peritonitis whatever, and this was the state of matters in our two cases.

This observation is far from an isolated one. Ferraton, in two cases which he observed, found the peritoneum free from inflammation. This author, in spite of the statement commonly found in published works that in rupture of the bladder death usually occurs from peritonitis, asserts that "usually at the necropsy no sign of peritonitis is to be found." Surgeon-Major Hamilton records a case⁸ of a soldier who had been drinking and fell from a window-sill 20 feet. The patient lived five days and four hours after the fall, and yet at the *post-mortem* examination "the peritoneum was perfectly normal; not a sign of peritonitis could be detected anywhere." In a case recorded by Macewen in 1873⁹ the ordinary signs of peritonitis were absent, although there was a considerable quantity of fluid in the abdomen. The patient

had been ill for four days at the time of death, and the absence of peritonitis was taken to indicate that rupture had not occurred at the beginning of his illness, but had taken place shortly before death. In view of what has been adduced above this can scarcely now be contended, and the case seems to have been one of rupture during intoxication, with survival for four days without any of the ordinary signs of peritonitis.

Absence of inflammatory reaction in the wound of the bladder was particularly noted in the first case. As the case was one to which special interest attached on general grounds, I made a careful microscopic examination of the wall of the bladder and of the edge of the wound. Not only was there no evidence of disease of the wall of the bladder such as to give occasion to the rupture, but the wound itself presented an extraordinary freedom from inflammatory reaction. It had the characters of a wound which had been quite recently inflicted, scarcely any leucocytes were in or around it, and very little dilatation of vessels. Yet there is reason to believe that this wound had been in existence for five days. I should not expect even a wound protected by all aseptic precautions to show such entire absence of evidences of inflammation. The process of healing by the first intention involves a certain inflammatory exudation and proliferation, and it looked in this case as if even the process of healing had been paralysed. Having these facts vividly in my memory I was much interested at certain observations recorded by Ferraton in his memoir. The matter is of such consequence that I venture to give an exact translation of one of the paragraphs bearing on it:

"Our observations are very interesting in this respect that they are concerned with patients who, at the same time that they sustained rupture of the bladder became the subjects of wounds, the one on the hand, and the other on the forearm with fracture of the forearm. In these two cases there presented itself this remarkable fact, the importance of which we shall develop further on, that at the moment of death these wounds had precisely the same aspect as at the admission to the hospital—they presented no tumefaction, no redness, no secretion, in a word no trace of a process of inflammation and repair."

I do not know whether this observation of Ferraton's will be confirmed by further investigation, but the two cases seem to have been carefully observed. It would seem as if the presence of urine in the peritoneum and its absorption, so as to accumulate in the blood, had the effect on wounds of preventing those processes which we are accustomed to observe in freshly-inflicted wounds, and which are in some degree to be associated with the process of healing.

It may further be suggested that this circumstance of the non-healing of the wound may possibly account for the exceeding rarity of recovery from intraperitoneal rupture of the bladder. Rivington, in his work already referred to, gives a detailed analysis of cases reported to have recovered from this condition, and seems to throw doubt on all of them; and yet, under ordinary circumstances, it might be expected that a wound in the bladder would sometimes unite sufficiently to allow of retention of the urine for a time and so of ultimate recovery. It need scarcely be added that, if the abdomen be opened, its urinary contents thoroughly removed, and the wound in the bladder fully united by sutures, there is no reason to doubt that union would occur as readily as in other peritoneal wounds and that recovery would generally be secured.

The mode of death in intraperitoneal rupture of the bladder is, I think, to be directly related to the absorption of urine by the peritoneum and its continuous accumulation in the blood. If the bladder be ruptured the case is not like that of Grawitz's rabbit, where the ureter was severed and the secretion of one kidney passed into the peritoneum. In that case, as one kidney remained in communication with the bladder, there would be a continuous elimination of urine, although there would probably be a constant excess of the urinary constituents in the blood. In the case of rupture of the bladder, however, the urine absorbed from the peritoneum, when eliminated afresh by the kidneys, would only pass back into the peritoneum to be again reabsorbed as before. In this way a vicious circle would be established, with the result that the blood would be progressively loaded

with the urinary constituents. I do not presume to determine whether this condition is precisely that known under the designation uræmia. In ordinary uræmia the process of secretion in the kidney is interfered with, and the products which ought to be removed accumulate. In rupture of the bladder the products have been secreted, and may have undergone considerable chemical change in the process. The absorption of these altered products may well produce a different complex of symptoms from that of a typical uræmia. Perhaps it would be more convenient to speak of urinary poisoning as the condition in these cases.

In considering the cause of death the condition of the peritoneum is not to be ignored altogether. The presence of a fluid of a different constitution from that of the normal peritoneal fluid may well have an influence on the membrane, and may affect its nervous and vascular arrangements. The symptoms of the patient indicate this in many cases, so that the diagnosis of peritonitis may be made, as in our second case. This must, however, be a subsidiary element, as the experiments of Wegner seem to prove that large quantities of urine may be infused into the abdomen without producing any pronounced symptoms.

REFERENCES.

- ¹ *Rupture of the Urinary Bladder*, by Walter Rivington, F.R.C.S. Eng., London, 1884, p. 12. ² *Ferraton, Des Ruptures Intrapéritonéales de la Vessie*, Thèse de Paris, 1883. ³ *Loc. cit.*, p. 9. ⁴ Wegner, *Experimentelles zur Lehre von der Ovariectomie*, *Langenbeck's Arch.*, XX. ⁵ Grawitz, *Charité Annalen*, 1886, p. 809. ⁶ Waterhouse, *Experimentelle Untersuchungen über Peritonitis*, *Virch. Arch.*, 1890, Bd. 119, p. 342. ⁷ *Loc. cit.*, p. 42. ⁸ Hamilton, *BRITISH MEDICAL JOURNAL*, 1883, I, 1166. ⁹ Macewen, *Lancet*, 1873, I, 448.

A NOTE ON CHLOROSIS IN THE MALE.

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CHLOROSIS is almost universally regarded as a disease which, if not peculiar to women, is at least of importance merely as it concerns the female sex—an idea which is likewise borne out by the name so often applied to it, morbus virgineus. Many authors, indeed, deny utterly its existence in members of the male sex, while others, though recognising its rare occurrence in men, have regarded it as a condition present only in connection with other feminine attributes, and existing thus only in men whose general characteristics and constitution render them effeminate. Thus Eichhorst, while denying that chlorosis is exclusively confined to women, and insisting on its occasional occurrence in men, considers that male chlorotics are always slender individuals, of feminine build, and frequently engaged in effeminate occupations, such as tailoring, etc.

In a recent article in the *BRITISH MEDICAL JOURNAL* Dr. Lloyd Jones states that in a research covering more than eight years he has been unable to discover a single case of chlorosis in the male. From the article mentioned it is inferred that these observations were founded merely on estimations of the specific gravity of the blood as a basis for testing the chlorotic condition. While doubtless there may be a definite relation between these two features, nevertheless the distinct relative decrease in the hæmoglobin has, during these last years, been considered as the crucial test for chlorosis, and on this altered relationship—first, I believe, insisted upon by Gruber—Dr. Osler lays special stress.

Regarding then chlorosis as an essential anæmia whose main characteristics are a greenish sallow tint of the skin, accompanied by a definite relative diminution of the hæmoglobin in the blood, we may say that such statements as those of the authors above mentioned fail to coincide with observations made by us during the past few months in Montreal, and hence the mention of a few cases which have led to the conclusion that, whether or not a true chlorosis be at times present in males, it may at least be said that occasionally in men a condition is found very closely approximating the chlorotic condition.

In estimating the hæmoglobin, a Fleischl hæmometer was employed, the instrument having been previously thoroughly tested on normal subjects, and due allowance made for the slight inaccuracies found.

CASE I.—J. S., a doctor of medicine aged 24, had observed that for several months a gradually increasing pallor and sallowness had deve-

loped, accompanied by gastro-intestinal symptoms, of which the most prominent were prolonged and obstinate constipation, anorexia, and fulness after eating. In addition he suffered greatly from headaches and severe intercostal neuralgia. The patient was of a decidedly neurotic temperament, had a personal history of hard work and prolonged studying at night. The family history was good. On physical examination there was found no evidence of organic disease. Estimation of the blood however revealed on an average 5,300,000 red corpuscles, white cells 1 to 400, and hæmoglobin 68 per cent. Treatment by arsenic was recommended and carried out. The patient was greatly improved thereby. Inasmuch as he left town soon after, there was no possibility of making further investigations, though letters received indicate a complete restoration of health.

CASE II.—H. G., a merchant, aged 27, having a history of prolonged dyspeptic disorders, was observed to have a markedly anæmic appearance; he had epigastric pain and fulness after meals, flatulence and marked constipation. Mental depression, almost approaching true neurasthenia, was superadded. Neither the personal nor family history could afford any light on his condition. Physical examination showed a normal state of all the organs, while the estimation of the blood gave the following result: Red cells 5,300,000, white cells about 1 to 350, hæmoglobin 72 per cent., this being the average of several examinations. Under treatment with arsenic and iron rapid improvement resulted, and when examined about two months later the patient's general condition was practically normal, and the blood examination showed the hæmoglobin to be 96 per cent.

CASE III.—E. H., a medical student, aged about 25, was likewise examined, inasmuch as a distinct greenish sallow complexion gave some indication of abnormal blood condition. The patient was of a nervous disposition, but had no complaint other than constipation. Physical examination of the organs was negative. During the examination of the blood the patient became very faint, almost losing consciousness. Red corpuscles numbered 6,030,000, hæmoglobin 77 per cent.

CASE IV.—M. S. This case resembled in nearly all its features Case No. II. An average of several blood examinations revealed 4,800,000 red cells, hæmoglobin 77 per cent. A soft systolic murmur was held at the base.

In these various cases presented, a blood condition has been obtained indicating a disease identical with the chlorosis described by many authors, and inasmuch as no other cause can be discovered with which to associate that anæmia, there seems good reason to believe that in them we have found an ordinary chlorosis. Although in no case there has been an extreme diminution of the hæmoglobin, yet it may be presumed that, as in these, so in many men, from some cause as yet not fully ascertained, an anæmia may be found whose main characteristic is a diminution of the hæmoglobin.

While being unable to contribute in any way to the subject of its etiology, yet that the condition described does sometimes exist in a mild form in males is at least worthy of mention, and that it may be perhaps more frequent than is generally supposed seems borne out by the experiences we have here met with during the past few months.

A REMARKABLE CASE OF INTUSSUSCEPTION.

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On May 1st, 1893, I was called in to see a lad, aged 13 years. I found him to present all the symptoms of acute peritonitis. He had had two or three well-marked rigors. He complained of vomiting, retching, and intense shooting pain in the abdomen. He lay on his back, legs drawn up; the face looked anxious; tongue small, red, and dry; intense thirst; respirations 50 per minute; temperature 104°; pulse 138, hard and wiry. The abdomen was distended to a marked degree. He could not bear the slightest touch without calling out in agony.

I got the following history of the attack: Eight days previous to my visit the patient had had a severe wetting, and was put to bed when he got home, a warm drink being administered. He got up next morning apparently none the worse, and went about as usual for four days. His bowels, however, had not been moved since the wetting. A dose of castor oil was then administered, but, having no effect, the friends, after waiting two days longer, gave him half an ounce of mag. sulph. This caused him a great deal of pain, so that several times "he cried out," but there was no evacuation.

On the evening before I was called in two "strong" purgative pills had been given, and I was informed that he had been much worse since he had taken them, and that the bowels had not moved.

I ordered turpentine stupes to be applied to the abdomen. The only food was to consist of milk in small quantities,