**AN ACCOUNT
OF TWO CASES OF
RUPTURE OF THE URETER,
OR PELVIS OF THE KIDNEY,
FROM EXTERNAL VIOLENCE, FOLLOWED BY LARGE
EFFUSION OF URINE INTO THE ABDOMEN.**

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A RUPTURE of the urinary bladder by external violence is not of rare occurrence, and in the instances of it which have been recorded, it is shown, that according to the part of the bladder which suffered, the urine was effused either into the cavity of the peritoneum, or into the cellular tissue between the peritoneum and the abdominal parietes. Nearly all the cases of this injury hitherto reported have been fatal, yet in a few of these, where the patients lived several days after its occurrence, on examining the injured parts, processes were observed apparently tending to their recovery; these processes consisted in the confinement of the effused urine within a sac bounded by false membrane, the product of inflammation in the surrounding tissues, and they have

been observed not only in cases where the urine had been effused into the cellular tissue on the outside of the peritoneum, but alike in the instances of its effusion into the peritoneal cavity. I am not aware of any record of injuries followed by similar results in the higher parts of the urinary apparatus, as the ureter or pelvis of the kidney, and have, therefore, thought that the narrative of the following cases would be of interest to the Society, especially as in one of them the life of the patient was preserved, it may be presumed, by the treatment which was adopted.

A boy, aged nine years, was brought to St. Bartholomew's Hospital immediately after the occurrence of an injury to the lower part of his body, which, it was stated, had been squeezed between the wheel of a cart and a curb-stone; the immediate consequences were, severe contusion of the soft parts around the pelvis, inability to walk, and great pain in the lower part of the abdomen; he lay helpless, apparently suffering from severe internal injury. Much ecchymosis ensued in the integuments around the pelvis, and extensive suppuration in the subcutaneous cellular tissue, from which several ounces of matter were discharged by puncture near the left sacro-iliac symphysis. By the end of the sixth week, recovery of the injured soft parts around the pelvis had considerably advanced. At this period, my attention was directed to a fulness not before observed on the right side of the abdomen, and on further examination, a cir-

cumscribed, oblong swelling was recognized through the abdominal parietes, extending from the base of the chest downwards to within a short distance of Poupart's ligament; anteriorly, it terminated abruptly at the linea alba; posteriorly, it could be traced into the lumbar region, but it here presented no distinct boundary; the liver appeared to be pressed upwards by the swelling, so that the right lung did not extend below the sixth rib, the admission of air into it here ceasing in a defined line. Pressure on the swelling gave no pain, but a deep fluctuation in it could be recognised. The urine passed naturally, as it had done throughout, and that there was no distension of the bladder was ascertained by the introduction of a catheter. I could but suppose the swelling to be an abscess, but there was difficulty in adopting this opinion of it from the absence of pain and constitutional derangement. To discover the nature of the swelling, I made a small puncture in it with a lancet, from which a little clear yellow fluid escaped; this was followed by much pain in the abdomen, which yielded to the application of leeches. By this exploratory proceeding, I learned that the fluid was situated immediately beneath the abdominal muscles, and that it was not pus. Three weeks afterwards, the abdominal swelling having become more tense and pointed, I punctured it with a small trochar midway between the last rib and crista of the ilium, and discharged from the opening fifty-one ounces of a clear yellow fluid. Pain in the abdomen followed this puncture,

but it yielded as before to the application of leeches. Eleven days afterwards, the swelling having again enlarged, I discharged from it by puncture fifty-eight ounces of a clear yellow fluid. In sixteen days from this puncture, the swelling having again greatly increased, I removed from it sixty-four ounces of fluid. The swelling returned, and having acquired a certain size, it remained stationary, on which account it was not interfered with for nearly three months, when I again punctured it, and discharged seventy-two ounces of fluid of the same characters as before. Three weeks afterwards, I punctured the swelling the sixth and last time, but discharged only six ounces of fluid, and it appeared to me that a larger quantity was not obtained from the existence of some obstacle to the canula fairly entering the cavity in which the fluid was contained. The other parts of the treatment consisted in the repeated applications of leeches, in the application, on one occasion, of a large blister to the swelling, and in the use for a considerable time of the ointment of iodide of potassium: but, with the exception of the leeches, which relieved the pain in the abdomen recurring more or less after each puncture, it is doubtful whether the other measures were of any service. Throughout, the general health had been good, and all the functions of the body appeared to be perfectly performed. From this period the swelling continued without increase or obvious diminution: it still extended from the linea alba into the right lumbar region, and as any further inter-

ference by operation or otherwise, was now considered inexpedient, I discharged the boy from the hospital nine months after the occurrence of the accident. At several subsequent periods I have seen him in good health, with the abdominal swelling still distinct, but, as we have thought, slowly diminishing, and with less evident fluctuation.

Three questions of interest here arise—what was the nature of the fluid so largely accumulated in the abdomen ; where was it situated ; and, if it was urine, from what part of the urinary apparatus was it derived. First, of the nature of the fluid.—My friend Mr. Edward Ormerod, upon whose accuracy I can rely, has reported to me the following results of his examinations of the fluid—that a portion of it obtained at the second puncture of the swelling was slightly alkaline, highly albuminous, of specific gravity 1008, depositing no precipitate, and destitute of the phosphates and lithic acid in sufficient quantity to be shown by common analysis—that a portion of it obtained at the third puncture was of a clear urine colour, inodorous, highly albuminous, and formed, by the addition of common salt, crystals stellated with arborescent radii, thus affording evidence of the presence of urea—that a portion obtained at the fourth puncture was acid and free from albumen. Mr. Taylor, whose ability in chemical analysis is proved by his recent satisfactory examination of the calculi in the Museum of the Royal College of Surgeons, was so good as to examine some of the fluid obtained at the sixth and last

puncture of the swelling, and has favoured me with a report, from which the following is an extract :—
“ That urea was detected in it in the most unequivocal manner, that it was slightly turbid, yellowish, alkaline, highly albuminous, inodorous, of saline taste, and specific gravity 1008. That with urea, it contained chloride of sodium, alkaline carbonates and sulphates, together with the peculiar extractive matter of urine.” Mr. Taylor further observed, “ that from the absence of mucus in the fluid, the inference would be that its communication with the urinary apparatus is not free, and is probably high up, as at the commencement of the ureter, certainly not with the bladder.”

Thus does the analysis of this fluid seem to justify the conclusion that it was urine. It is true that recent observations have shown urea to exist in other animal fluids besides urine, that especially it has been found in dropsical fluids accompanied by disease of the kidneys. Dr. J. F. Simon quotes a case in which the fluid obtained from the abdomen by tapping, contained a large quantity of urea.* Dr. Corrigan has also recorded an instance in which the fluid obtained from the abdomen by tapping, contained so large a quantity of urea, that Professor Kane, to whom he sent the fluid for analysis, could scarcely believe it was not urine.† Further, Dr. Simon states that some fluid obtained by incisions into the legs of a man suffering from granular

* Medical Chemistry.

† Dublin Journal, vol. 21.

disease of the kidneys, was found on examination to contain a considerable quantity of urea, with albumen and chloride of sodium. If however the history of the case now related be considered in connection with the composition of the accumulated fluid, which contained, in addition to a large quantity of urea, the other ordinary ingredients of urine, its nature can scarcely be doubted. If, moreover, healthy urinary salts had been but indistinctly recognised in this fluid, we should still hesitate to conclude it could not be urine, since, in a case to be presently related, it will appear that urine unquestionably derived from the ruptured pelvis of a kidney, and effused into the surrounding cellular tissue, here underwent such modifications in its chemical qualities, that a portion of it which had been removed during life by tapping the abdominal parietes, when submitted to examination by a high authority in animal chemistry, was pronounced not to be urine, as it contained so little of the healthy urinary salts.

With respect to the source of the effused urine in the case which has been related, in the absence of direct evidence on this point, we may refer to the observation of Mr. Taylor, that from the absence of mucus in it, the probable source was high in the urinary apparatus, as at the commencement of the ureter; and with respect to the situation of the fluid, was it within the peritoneal sac, or had it formed for itself a cavity by detaching the peritoneum from the abdominal and lumbar muscles? That the fluid was not within the peritoneal sac

seemed to be indicated by the circumscribed character of the swelling, and especially by its abrupt termination at the linea alba, where its further progress would be impeded by the firm connection of the peritoneum with the abdominal aponeuroses. The circumscribed character of the swelling would not alone determine the situation of the fluid to be on the outside of the peritoneum, for there have been cases recorded, wherein the effusion of urine into the peritoneal sac was followed by an abundant deposit of lymph and formation of false membrane, confining the fluid to a portion of the abdominal cavity by the adhesion of the surrounding peritoneal surfaces. Under these circumstances the effused urine formed a circumscribed swelling, and as such was recognised through the walls of the abdomen.* In this way the case before us cannot be well explained, since there had been no peritoneal inflammation, and the abdominal tumour arose gradually without pain or constitutional derangement.

The next case which I have to relate occurred in St. Bartholomew's Hospital, under the care of Mr. Vincent.

A woman was admitted immediately after having been knocked down, and, as it was stated, pushed some way before the wheel of a cart. The left femur was found to be broken in its centre, and she was besides much hurt, especially in the right hypochondrium, where pressure gave considerable pain. On

* Archives Générales, Juin 1834. Dublin Journal, vol. 9.

the following day there was much febrile disorder, accompanied by severe pain and distension of the abdomen. She was bled from the arm, large applications of leeches were made to the abdomen, and calomel with antimony was freely administered. In a few days the general distension and pain of the abdomen had subsided, but there remained a circumscribed and painful swelling in the right hypochondrium, which it was thought must be connected with the liver. This swelling increased, taking the form of an enlarged liver, and after some days, a feeling of deep fluctuation in it was discovered. The swelling then became stationary in respect to size, but the fluid in it advanced nearer to the abdominal parietes; at the same time the patient suffered occasional shiverings, with paroxysms of pain and throbbing in the swelling, which were relieved by opium. From the progress of the symptoms it was supposed that suppuration had taken place, and that the abscess was probably connected with the liver.

Mr. Vincent accordingly punctured the swelling with a small trochar, when, contrary to expectation, there was discharged through the canula between two and three pints of a straw-coloured urinous smelling fluid. The patient was much relieved by the operation. Slight tenderness over the whole abdomen ensued, but it gradually subsided. The urine had been throughout passed freely, and in full quantity. In about ten days the fluid had again accumulated in the abdomen so largely as to occasion much distress. A trochar was again passed

into the swelling, and about six pints of fluid were discharged of the same characters as before. Much relief was thus afforded, but in a few days the uneasiness and swelling returned as the fluid re-accumulated. From this period she gradually sunk, and died in the tenth week from the receipt of the injury. The fluid obtained from the abdomen was found to be albuminous, and to contain a small quantity of urea, but from the indistinct recognition of the healthy urinary salts in it, a high chemical authority pronounced it not to be urine.

Upon examination of the body, a large cyst was found on the right side of the abdomen behind the peritoneum extending upwards to the diaphragm, and downwards to the pelvis. The boundaries of this cyst were formed by lymph and thickened cellular tissue; within it was a large quantity of fluid presenting the characters of a mixture of pus and foetid urine. A passage was found extending from the upper part of the cyst into the pelvis of the right kidney. The aperture in the pelvis of the kidney was large and irregular; the appearances were such as might be expected to result from laceration of the membranous structure composing it. The liver presented in its anterior border, the marks of a slight laceration of its tissue, which was in progress of healing. The kidneys were slightly granular.

It will I presume scarcely be doubted that the case first related was an instance of lesion of the urinary apparatus, probably a slight laceration of

the ureter permitting the escape of urine slowly into the cellular tissue behind the peritoneum. Both cases illustrate the difficulties that may arise in the diagnosis of such injuries. They show moreover that the rupture of the ureter, or pelvis of the kidney, may present this remarkable feature when contrasted with the consequences of a rupture of the bladder; that whilst in cases of the latter injury, symptoms immediately arise directly pointing to the organ which has suffered; in cases of the former kind, (the lesion of the ureter or pelvis of the kidney,) no symptoms may immediately occur leading to a suspicion of injury to any part of the urinary apparatus.

The favourable result of the measure of withdrawing the urine from the cyst in which it was contained, by puncture of the abdominal parietes, would, I apprehend, justify the repetition of it in another case of the same kind. It may, however, be a question whether the best proceeding would be gradually to withdraw the fluid by repeated punctures of the cyst, and thus to favour the collapse and adhesion of its sides, upon the plan recommended by Mr. Abernethy for the treatment of lumbar abscess, or whether the urinary cyst should be punctured at its lowest part, in the view of maintaining the aperture free for some time, that the fluid may drain from it, upon the plan which has been adopted in cases of empyema, for the discharge of the fluid from the chest.