A contribution to the statistics of rupture of the urinary bladder : with a table of seventy-eight cases / by Stephen Smith.

Contributors

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&c

Box 11.

SMITH

ON

Rupture of the Urinary Bladder.

Smith (S.)

A CONTRIBUTION TO THE STATISTICS

OF

RUPTURE

OF THE

URINARY BLADDER;

WITH

A TABLE OF SEVENTY-EIGHT CASES.

Box 11.

BY

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STATISTICS

OF

RUPTURE OF THE URINARY BLADDER.

The case of rupture of the urinary bladder, published in the last No. of this Journal, occurring to parties known to me personally, I was led to make a collection, as far as in my power, of the reported cases of this lesion, at first only with reference to the legal settlement of that case, but subsequently, to append them to it in a tabular form when published. Beside their incompleteness at the issuing of the March No. of the Journal, I was convinced upon reflection, that their separate publication, with such conclusions as they necessarily enforce, would be the most useful disposition I could make of them.

The importance of this collection is seen in the various views of writers upon this subject, and the conflicting and often contradictory testimony of medical witnesses in the suits at law which these accidents frequently involve. This arises in great part from the limited experience of every, even the most extensive practitioner, of cases of such rarity; and the difficulty of examining a sufficient number to come to safe general conclusions without extraordinary painstaking. The history of no disease is complete without the record of a sufficient number of cases to establish every class of symptoms, which variety of constitution or circumstance may develop; and hence the importance and necessity of a collection of well authenticated cases of every disease; especially if that disease

is of frequent, but not common occurrence; and still more if it involves the practitioner in the expression of a medico-legal opinion.

For the sake of comprehensiveness, and to facilitate reference, I have arranged them in the form of tables; by which many cases otherwise deserving a full record are necessarily much abbreviated; but where cases thus lose in their individual interest, their collective importance far more than compensates for this mutilation. To those who have undertaken a similar task I need but hint at the perplexity under which I have labored in finding cases imperfectly reported; and to this circumstance I must refer the apparent deficiency in many cases; all will be found, however, to have some points sufficiently important to make them valuable in a collection where we wish to obtain only the aggregate.

It is not presumed that these tables comprise all the published cases of this accident, but only as many as limited opportunities to consult the volumes and periodicals of a large medical library would admit of collecting. Reference was had to cases in foreign journals quite impossible to obtain; and others to catalogues* of pathological museums placed still further beyond the ordinary means of consultation.

The literature of this affection is very imperfect, consisting principally of briefly reported cases, with a few comments upon them by their writers. Dr. Cusack published, in the 2d volume of the Dublin Hospital Reports, the histories of two cases, and added some valuable remarks. Nothing further appeared but occasional cases until the publication of Dr. Harrison's paper in the Dub. Jour. Med. Sci. volume IX, 1836; who is indeed the only author who has made it the subject of extended and critical remark. Subsequent authorities have justly referred to his article, as containing the most complete exposition of the symptoms, diagnosis, and treatment of this lesion; for in these particulars he has left but little to be added, except what future cases have revealed. The largest number of cases reported at one time, were by Mr. Hewitt; published in the Lond. Med. Gaz. April 26th, 1850. In this

* See Descriptive Catalogue of the Path. Specimens contained in the Museum of the Royal Coll. of Surg. of Eng., vol. iv., p. 74.

country but few cases have been reported, although they are of not infrequent occurrence in our hospitals.

The following remarks will be founded entirely upon the results of these tables; and the inferences drawn in reference to symptoms, diagnosis, prognosis, treatment, &c., will be sustained by reference to the conclusions under these several heads.

Sex and Age.

The frequency of this lesion in the adult male as compared with the female is attributed by Dr. Harrison to the greater size of the female pelvis, the cavity of which is not so extensively occupied by the bladder when this is full of urine. Nor, says he, does the bladder incline so much backwards as in the male; on the contrary it inclines more forwards, and enlarges more in the transverse direction, while the uterus and its lateral broad folds may assist to break the shock of any external violence, applied to the hypogastric region, and so prevent the direct concussion of the bladder against the sacral promontory. It would seem from a remark of this author, that no cases of this accident in the female from external violence had come under his observation or notice, previous to the publication of this article; and hence this explanation loses much of its significancy in the fact that such cases have occurred under similar circumstances as in the male. Although the relation of the bladder to the pelvis and uterus in the female tends to diminish the chances of severe injury to the former, that it proves an exemption from this accident these tables abundantly disprove. Attaching to this opinion a relative importance, a more satisfactory explanation may be found in the difference of habits, mode of life, &c., of the two classes.

In the large majority of instances the subjects of this injury have been intoxicated and engaged in pot-house brawls, the first circumstance predisposing them to a distended bladder, and the latter to unresisted, direct, external violence; others have fallen under carts, from heights, and upon hard bodies, and under each class of causes rendered themselves the subjects of direct injury. The female, though often the subject of abuse and violence, is far less disposed to confirmed habits of intem-

perance; and infinitely less to the exciting causes of this accident, blows, falls, &c.; from the fact that her duties lie within doors, where even her fits of intoxication may pass off without the liability to external injuries. But direct violence applied to the distended bladder of the female must, as shown by these tables, result in rupture of that viscus, with all the attendant consequences. This explanation is further shown to be the correct one, in the fact that no cases of this accident are recorded, where the subject was above 60 years of age; because at this period persons may be considered as having retired from the active duties of life.

The frequency of this injury in the adult male over the boy is attributable to the circumstance that the latter seldom allow the bladder to become inordinately distended; but when distended and relaxed, it is exposed as in the female and adult male to rupture on the application of a direct blow.

The period of life at which this lesion is most liable to occur is between the ages of 30 and 40; this period comprising about one-third of the cases given in these tables. The next most frequent, being between the ages of 20 and 30. Taking the number included between the ages of 20 and 40, and adding to this the adults of whom the precise age is not given, but which most probably come within this period, and we have more than three-fourths of all the cases that occur. This period occupies the most active part of man's life—when he is especially exposed both by confirmed habits and active occupation to the predisposing and exciting causes of this accident. The extreme infrequency of this lesion under 20 years of age, and its non-occurrence above 60, can only be thus explained.

CONDITION.

The state of the bladder, most subject to this accident, is that of distension. In more than half of the cases in which its condition is given, at the time of the injury, it was distended; and adding to these the number of cases of which the only note is, that the persons were intoxicated; and in which the strong probability is, that the bladder was distended; and we have a vast majority in the distended state. In this condition,

the bladder approximates the solid viscera; having for its substance a fluid, but incompressible material, and for its capsule, a tightly drawn and overstretched membrane, scarcely capable of containing its gradually increasing contents, when quiescent; and much less so when agitated by a direct blow or general concussion. The bladder empty, and contracted down within the pelvis, can only be injured by such a degree of violence as shall separate the symphysis pubis, or crush the pelvic bones.

CAUSES.

The causes of rupture are direct or indirect violence, concussion, or internal causes. In the majority of cases, direct violence has been the cause; in several cases, concussion, as a fall from a height, has resulted in rupture of this organ; the fluid contents, in these circumstances, remaining a solid resisting body, only sufficiently disturbed by the general agitation to give a sudden and fatal determination to some part of the bladder. Civiale* remarks, that when this accident results from a blow, fall, concussion, or any direct violence impinging upon the bladder, when full of urine; the rupture depends upon the impulsion given to the liquid by the sudden force communicated. The internal causes are strictures, resulting in over distention, ulceration, and consequent rupture, or violent straining to overcome the impediment to the escape of urine; pressure of the child's head upon the urethra, during a protracted second stage of labor, giving rise to fatal distention from an accumulation of urine, or finally, retroversio uteri, in which the mal-position of the uterus had the same mechanical effect in causing retention as the child's head during labor. Three cases of rupture, from violent efforts to evacuate the bladder when retention was caused by stricture, are given in these tables; the first, case 8, rupturing into the cellular tissue; the second, case 2, into the cavity of the peritoneum; and the third, case 29, being only a partial rupture. A case of this kind is given by Mr. Brodie, (*Dis. Urin. Org.*) but is too imperfect for our use. The case of partial rupture, by Mr. Keal, though reported and referred to as authentic, and as such entitled to

* *Maladies des Organés Genito Urinares, par* M. CIVIALE. Paris, 1812. Vol. ii. p. 261.

a place in these tables, admits of some doubts as to its correctness. Rupture in the parturient female, of which four cases are given, depended in two upon a long protracted second stage ; in one the labor was easy, in one not given. In a fifth, the cause of rupture was, pressure of the retroverted uterus in a pregnant woman upon the urethra, causing fatal retention.

SYMPTOMS.

The symptoms of rupture of the bladder may be severe, slight, or absent. When severe, they consist of collapse, intense pain in hypogastric region, a great desire but incapacity to expel urine, rapid feeble pulse, hot skin, thirst, and in the progress of the case, all the symptoms of peritonitis ensue, as tension, great tenderness of the abdomen, vomiting, &c. ; power to void urine may be experienced, or desire but inability to urinate may remain a very aggravating symptom to the last ; and when, finally, dissolution approaches, all the most prominent symptoms subside, and the sufferer dies in possession of his reason. In the great majority of cases, severe symptoms continue from the first ; those of rupture into the peritoneal cavity pursuing the course of acute peritonitis, those into the cellular tissue of urinary infiltration ; or the symptoms may at first be slight, even when the seat of rupture is in the posterior wall of the bladder, not preventing sleep, or even the usual occupation of the patient ; but these are sooner or later followed by all the most aggravating symptoms of acute peritonitis, and death finally supervenes as rapidly as in the most severe forms —or primary symptoms may be entirely absent, as in case 36, where the patient, after receiving the injury, went to a convi vial party to dine, and upon relating the occurrence to a surgeon, one of the party, was for the first time informed of the nature of his accident, and died in 24 hours after. In these cases, also, severe symptoms usually soon supervene, and death follows rapidly. The desire to evacuate the bladder, generally a most harassing symptom, may not exist at all ; though present immediately before the accident, as seen in cases 27, 34, 48, &c. The power to void urine from the first is very rare, but in many it is developed in the progress of the case. Locomotion, though generally absent, is not invariably so, as is seen

in cases 30, 58, &c., in the former of which it was present in a remarkable degree. The constancy with which bloody urine is drawn by the catheter, makes it a very important symptom in regard to diagnosis; still it is not always present, clear urine being drawn occasionally throughout the whole progress of the case.

DIAGNOSIS.

The difficulty of diagnosis, in cases of rupture of the urinary bladder, will depend much upon the seat of the lesion, the character of the accident, and the complications which may exist from injuries of other parts. In reference to diagnosis, Dr. Harrison remarks, that, "In general, rupture of the bladder is attended with such symptoms as to render the diagnosis tolerably clear and certain; in some instances the nature of the case is almost manifest to the most superficial observer; in others, it is more obscure, and will require some close and careful observation to determine its existence; and in others again, it may be altogether overlooked from the pressing character of some other more urgent symptom. As rupture of the bladder is the effect of only two species of injury, the account of the accident may afford much information; thus every case on record has been the result, either of some force directly applied against the abdomen, such as a blow or a fall upon some resisting body, or of a fall from a height causing a general concussion of the whole frame; in this latter case, the injury is more likely to be overlooked, particularly if the individual have suffered in any other and more obvious manner; hence after such accidents, the attention of the practitioner should be early directed to the urinary discharge, and if there be any inability to pass urine and a desire to do so, the catheter should be introduced, from which, in all probability, some information will be obtained. When the rupture has been the effect of violence directly applied to the hypogastric region, the symptoms are more obvious, and the real nature of the injury can scarcely be overlooked; the patient is himself often aware of it, and states that he knew that his bladder was full of urine at the time of the accident, that he felt it to burst within him; together with

this account, the sensation of sinking sickness, pain in the abdomen, and peculiar feeling about the præcordia, are all indicative of the rupture of some viscus. Should the patient, however, have been intoxicated at the time of the accident (no unlikely circumstance), the surgeon will be deprived of this information, and must therefore rather depend on the symptoms present: such as the desire to make water without the power to do so; the severe pain in the abdomen and perinæum during these attempts; the tense state of the abdomen; the general fulness, and the absence of any circumscribed tumor, as in retention of urine; all these are important features, and characteristic of this serious injury; finally, the passing of the catheter will throw considerable light upon the nature of the case, the introduction of this instrument into the bladder being attended with a peculiar resistance; also the manner in which the urine flows through it, not in a stream, but as if it merely filled and overflowed the instrument slowly; at one time only a few drops passing, at another a considerable quantity—this difference depending on some alterations in the direction of the instrument, or in the degree of pressure with which it is pushed against the bladder, whereby the edges of the rupture must be separated, and more or less of the abdominal and pelvic urine be discharged."

Rupture on the anterior surface or about the neck is more generally complicated with severe injuries to the pelvis and other organs, which tends to render their true nature more obscure; but the more prominent symptoms immediately pertaining to the bladder are usually present, with infiltration into the cellular tissue and the resulting irritation, sloughing, typhoid symptoms, &c. "If immediately after any accident likely to injure the bladder, severe pain follows in the hypogastric region, with passage of blood or bloody urine by the catheter; if more than a very small quantity of blood is never voided at one time, nor drawn off by the catheter; if a peculiar sensation of pressure against the point of the catheter be felt, and if these symptoms be unaccompanied by the severe prostration of strength and depression of pulse which always follow peritoneal perforation, rupture of the bladder external to the peritoneum may fairly be inferred, and the treatment

founded on the inference."* In some cases there may be a mixture of both classes of symptoms, as in several of the cases reported by Mr. Hewitt, where the peritoneum became involved and separated from the abdominal wall; and as in case 8, by Sir E. Home, where rupture occurred in the anterior wall from stricture, and the urine infiltrated the cellular tissue as high as the umbilicus, where it ruptured the peritoneum and entered the cavity of the abdomen.

PROGNOSIS.

Although recovery has taken place both when the rupture has been into the peritoneum and the cellular tissue, yet so uniformly does it terminate fatally that the prognosis cannot be otherwise than fatal. Mr. Syme in his "Path. and Practice of Surgery," remarks, that "if the rupture takes place above or within the reflexion of the peritoneum, there cannot be the slightest chance of escape. But if the rent is at the anterior part, so as to discharge the contents of the bladder by a sudden gush into the cellular substance, and condense it in such a way that only the portion in contact with the urine may be deprived of life; it appears that the patient may be saved by timely incisions." Facts, however, prove that rupture may take place into the peritoneal cavity, and the patient survive; such is case 54, by Mr. Chaldecott, the diagnosis of which was confirmed by Aston Key; another was reported by Mr. Arnott to the Medico-Chirurg. Soc. in 1843, the particulars of which I have not been able to obtain (*Taylor's Med. Juris., Second Am. Ed. p.* 313); a third is referred to by Civiale as having been reported by him in Le Parallel.† Dr. Blundell takes the opposite ground in his prognosis of rupture. "If," says he, "the urine is extravasated in front, I fear there is little to be done; inflammation, sloughing, death,—these are successively the fate of your unhappy patient. If, however, instead of the anterior rupture, there is a laceration of the bladder behind, so that all the urine escape into the peritoneal sac, I conceive there is yet

* Mr. Wells. London Medical Gazette, N. S., Vol. xxxvi. 1845.

† Civiale Op. Cit. p. 260.

something which might perhaps be attempted."* These instances of recovery, together with those in which nature seems to have made an effort to repair the lesion, but was rendered abortive by the imprudences of the patient, as in cases 22, 32, &c., must encourage the practitioner to promptly meet all the indications which may occur, and not despair of a favorable termination.

Of the fatal cases the majority die within five days from the receipt of the injury; somewhat less than $\frac{1}{3}$ between the 5th and 10th days, while within 10 days, more than $\frac{5}{6}$ prove fatal; those which survive this latter period are rare exceptions, especially when the rupture is into the peritoneal cavity.

PATHOLOGY.

The pathology of rupture of the bladder, consists of the morbid appearances in the cavity of the abdomen, when rupture takes place in this region; of the seat of rupture in the bladder and the morbid appearances of this viscus; and finally, of those changes which infiltration of urine and inflammation may cause when rupture is into the cellular tissue, and external to the peritoneum.

When urine is extravasated into the peritoneal cavity, we have the exciting cause of acute peritonitis, and in the vast majority of cases this affection is rapidly developed, and its autopsical evidences are usually well marked. Urine is generally found in the cavity of the peritoneum, but not invariably when the rupture is in the posterior wall of the bladder; when not found the patient has usually had power to expel urine, and by this means its collection had been prevented. The signs of inflammation are generally much more abundant in the region of the bladder, especially in the pelvic cul-de-sac, where the urine tends to collect; and about the rent, consisting of effusions of lymph and adhesions of the folds of the intestines to each other and to the bladder; in some cases forming pouches which circumscribe the effused urine and prevent its

* Principles and Practice of Obstetric Medicine, by James Blundell, M.D., late Prof. of Obstetric Medicine, at Guy's Hospital, London. Lee and Rogers' edition, 1840, p. 862.

further extravasations, and a thick coating of lymph upon the pelvic peritoneum. The marks of inflammation are frequently though not universally slight in the upper part of the abdomen, which the urine does not perhaps reach; or at least where it does not collect. In some cases the peritoneum has been stripped off from the abdominal walls as high as the umbilicus, depending upon the infiltration of urine into the cellular tissue consequent upon a rupture external to the peritoneum. The exceptions to this rule are where there are no signs of peritonitis or inflammation within the peritoneal cavity, though the rupture has been through the posterior wall of the bladder, as seen in case 57, by Mr. Bower, where all the prominent symptoms of peritonitis were present, but not a trace of inflammation after death.

By far the most frequent seat of rupture is in the posterior wall, into the peritoneal cavity, and generally the result of direct violence. Rupture may, however, occur in the anterior wall from direct blows upon the bladder, and even in consequence of voluntary efforts to overcome a stricture. Dr. Harrison accounts for the posterior rupture of the bladder, by supposing that when distended it is compressed against the promonotory of the sacrum; but in very many cases the seat of rupture is in the superior fundus beyond the level of the projection of the sacrum, and not liable to be brought in contact with it. Especially must this explanation fail to account for the rupture in the posterior part of the superior fundus, when the only cause is a general concussion, where the patient falls striking upon his feet. A more satisfactory explanation would be that the posterior is far the weaker portion of the bladder, when this viscus is greatly distended, as in that condition its muscular fibres are separated, and allow rupture to take place.

Dr. Harrison thus decribes the appearances of the bladder: "The rent is generally obliquely transverse; the serous membrane is cleft to the distance of an inch and a half or two inches; the edges are clean cut, and the division in this coat extends further, particularly upwards, than that in the other tunics of the bladder; the internal or mucous coat is rugose, and rather pale or slightly reddened in parts, and generally free from any acute inflammation; near the edges of the

opening a slight submucous effusion exists, rendering them somewhat pulpy and protuberant; the muscular coat presents no peculiar appearance, except at the lips of the wound; here it appears jagged and irregular or torn, with slight ecchymosis between the fibres. In some cases the lips of the rupture have been found partly agglutinated, so as to prevent any further communication between the bladder and the peritoneum." Rupture occurring in the anterior wall or neck is very generally accompanied by extensive injuries to the pelvis, the cause being some crushing force, as a cart-wheel, and the result being laceration from the forcible separation of the symphyses or fracture of the pelvic bones. There are cases in which rupture has taken place in this situation from over-distention and even direct violence.

In the majority of instances the bladder itself, though the seat of the injury, does not suffer materially from the surrounding inflammation, except its peritoneal coat; in some cases the mucous membrane has marks of intense inflammation, with effusion of lymph, while in the last two cases mentioned in these tables, the most remarkable on record, the bladder seems to have entirely disappeared.

TREATMENT.

The treatment of rupture of the bladder varies with the seat of the lesion, whether without or within the peritoneal cavity. In the former case free incisions, to give exit to the urine extravasated into the pelvic cellular tissue and such general remedies as the nature of the case indicates, is the course of treatment which is recommended and has generally been pursued. To be successful this treatment must be early adopted, otherwise sloughing and all its severe consequences will rapidly follow. Dr. Walker of Boston, case 50, in a case of rupture external to the peritoneum, adopted a practice hitherto untried, and which not only saved his patient but seems the most rational yet pursued. This gentleman performed the lateral operation upon the bladder as for stone, and thus not only secured the escape of the infiltrated urine, but prevented its further extravasation by affording it a ready outlet from the bladder. Convalescence in this case was rapid and complete,

although the accident to the bladder was complicated with extensive injuries to the pelvis.

In regard to intra-peritoneal rupture, Dr. Harrison thus states the indications: first, to arrest peritonitis; secondly, to abstract the effused fluid from the abdomen; and thirdly, to guard against any further effusions by disposing the vesical wound to heal. In regard to the first of these indications he advises "bleeding, local and general; leeches to the perineum and anal region, small and often repeated doses of calomel and opium; the latter medicine I consider in this case peculiarly applicable; the solid opium or the watery extract, in doses of one grain or one and a half very often repeated, and a suppository of the same, together with bleeding, fomentations and the warm bath, are general remedies, on which I should place most reliance."

To remove the effused fluid from the cavity of the peritoneum, the operation of paracentesis has been performed, but invariably without success. Dr. Harrison remarks very justly of this operation: "The urine which is effused, and which is the source of all the danger, is principally lodged in the pelvic cul de sac, and is more or less confined to that region, partly from its depending position, and partly from the adhesions which we have reason to expect under proper and active treatment may have been formed between the bladder and the adjacent viscera, at the upper orifice of the pelvis. Paracentesis of the abdomen, as performed in the ordinary situations, cannot possibly evacuate this region, nay, it may rather prove injurious by inducing a more general effusion of the fluid, and of course irritation of the peritoneum by a partial removal of the urine from this depending position." To meet this second indication Dr. H. proposes the following operation, which, though it has never been performed, has received the sanction of the highest authorities, viz., to puncture this pelvic cul de sac through the rectum. The operation might be done with a trocar, or a long curved bistoury, with a sheath, and a cutting edge only on its extremity. The patient being in the recumbent posture, with his knees drawn up and somewhat separated, the finger of the left hand might be passed up the rectum as far as possible and pressed against its fore-part. The catheter in

the bladder might also assist in guiding the finger to the cul de sac behind that organ. The canula of a long curved trocar might next be passed along the finger, and, when its extremity has been placed against the fore-part of the rectum, exactly in the median line, the stillette might then be pushed through it, and the peritoneum opened.

To guard against further effusions of urine into the peritoneal cavity, I would propose the lateral operation upon the bladder as performed in the case of Dr. Walker, which would effectually drain off this fluid as fast as secreted; this the catheter cannot do, as the bladder is in the majority of instances contracted to a small capacity. This operation to be successful ought also to be performed as early as possible, to afford an immediate channel for the escape of the accumulating fluid.

Dr. Blundell proposes an entirely new operation in cases of rupture into the peritoneal cavity, which is as inconsiderate as the experiments which he instituted to prove its practicability are novel. "Were a relation of mine," he remarks, "in this condition, I should recommend the making of an opening above the symphysis pubis so as to withdraw the urine; and the thorough ablution of the abdominal cavity and its contents, by means of the free injection of distilled water at ninety-eight degrees (or more) of Farenheit's thermometer. The operation should be continued prudently, no symptoms forbidding, till the water comes away without manifesting the urinary characteristics. The peritoneum thoroughly washed, I would then recommend that the ruptured part should be drawn up to the abdominal opening; and, the bladder being, at this time, lax and dilatable, this might easily be done. This accomplished, the laceration might be closed with a ligature; the parts of the bladder lying forth beyond the ligature, being carefully cut away; and the bladder being then drawn up, by means of the ligature, to the abdominal opening internally, one of the ends of the ligature might be cut away and the other might be brought to lie out at the wound;—to separate and be withdrawn afterwards as in tying up an artery."

He thus continues in reference to his experiments, which are chiefly interesting as showing what a degree of irritation the peritoneum may be subjected to, without exciting a fatal

inflammation. "To assist in clearing the ground a little, I have already made some experiments upon the rabbit; and it may be proper to give you the results. Into the abdominal cavity of four rabbits, I threw about two ounces of human urine, and left it there for an hour; after which I withdrew the urine and washed the viscera thoroughly with tepid water from the cistern. Of these four rabbits, three died with general inflammation of the peritoneum; but the fourth lived. It follows, therefore, that this animal—though prone to disease within the peritoneum and containing many and large viscera—may, nevertheless, escape with life, even though these viscera have been bathed in urine for fifty or sixty minutes;—provided the cavity be then washed out. In another set of experiments I tied up the fundus of the bladder in the rabbit;—afterwards cutting the fundus away, I found that in a few days the ligature separated;—leaving the bladder closed. Some of the rabbits perished, some months afterwards, in consequence of chronic disease;—not, apparently, the *necessary*, but the *accidental* effect of the experiments."

MEDICO-LEGAL RELATIONS.

The bearing which these tables have upon legal medicine are not unimportant, as this accident is becoming more and more frequently the subject of litigation. The medico-legal questions which are generally raised in suits at law where this subject is litigated are stated by Mr. Taylor to be: Was the rupture the result of wilful violence or of an accidental fall? or, did it proceed from spontaneous causes as from over-distention?* The settlement of these questions depends very much upon the nature of the accident, and the previous history of the patient; little difficulty can arise except where violence and accidental injuries occur in the same case, making it doubtful which has precedence. Mr. Taylor thus remarks in reference to cases where violence alone is used. "If a man were in good health prior to being struck, if he suddenly felt intense pain, could not pass his urine afterwards, and died from

* *Medical Jurisprudence*, by ALFRED TAYLOR, F.R.S. Second American Edition from the Third London Edition, with notes and additions, by R. E. Griffith, M.D. &c. Philadelphia: 1850.

an attack of peritonitis in five or six days ; if, after death, the bladder was found lacerated, but this organ and the urethra were otherwise in a healthy condition, there can be no doubt that the blow was the sole cause of rupture and death. In such cases to attribute the rupture to spontaneous causes would be equal to denying all kind of causation." Where wilful violence and accidental injuries occur in the same case it may be difficult or even impossible to determine which was the actual cause of the rupture. In a case of this kind, reported by Mr. Syme ; the deceased, after a quarrel in which blows were exchanged, walked home, a distance of more than a mile ; and in crossing the threshold of his own door, fell forwards upon his abdomen. He began to complain of great pain, was unable to exert himself; he died in two days, and upon dissection the bladder was found ruptured at its fundus. Under these circumstances it became a question whether the rupture was caused by the violence of his companions, or by the accidental fall at the door of his own house. It was denied by two medical witnesses that a person suffering from this injury could walk the distance of a mile, and hence the accident must have happened at the time of the fall upon his door-step. This opinion involved the question of the power of locomotion after ruptures of the bladder ; and although the fall was undoubtedly the cause of rupture, we may assert with the utmost positiveness that the ability to walk a mile does not disprove the opinion that the injury was caused by the violence he received from his companions. In such cases the previous history of the patient, the nature of the accident, and a careful discrimination of symptoms, must guide in the formation of an opinion.

In regard to spontaneous rupture it is exceedingly rare, the great majority being the result of violence ; but it may occur, first, when straining to overcome a stricture, or, second, from long distention or ulceration. "The causes of spontaneous rupture are easily recognizable by ascertaining the previous condition of the deceased, or examining the bladder and urethra after death."—*Taylor.* But so infrequent is this cause compared with external violence, that it rarely need occur in forming an opinion.

Other circumstances of a medico-legal importance which these tables establish are; firstly, rupture may occur from an accidental fall, the person striking upon his feet; secondly, when rupture is produced by a blow where there is rarely the slightest apparent injury to the skin; thirdly, the patient may have the power immediately after the accident to empty the bladder voluntarily; while, in very many cases, this capacity to urinate is developed in the progress of the case; fourthly, in regard to the question of survivance for a given period, no rule can be given; for, although the majority of cases prove fatal within five days, persons may actually survive the severest forms of this injury.

Rupture of the bladder during parturition from pressure of the child's head upon the distended organ has, according to Taylor, fixed a charge of malapraxis on the medical attendant. In these cases he is expected to know the probability of such an accident, and to guard against it, if necessary, by the frequent use of the catheter.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 1.	30	Fell 15 feet.	Insensible; soon began to complain of pain in abdomen and about epigastrium.	Abdomen became swollen; symptoms increased in severity; voided a few drops of urine at each attempt; paracentesis abdominis performed, but blood only flowed through trocar.
M. 2.	23		Severe pain in abdomen, vomiting, inability to void urine.	Abdomen swelled; catheter was introduced into bladder and remedies administered without relief; belly became more tympanitic, and other symptoms increased in severity.
M. 3.	Ad.	Fell upon the ground, striking hypogastrium.	Abdomen enlarged, inability to urinate.	Symptoms increased in severity.
F. 4.	38	Parturition.	Slept well night after delivery.	2nd day complained of pain in hypogastrium, thirst, desire to pass water, could discharge but 2 or 3 oz. 3d day, urine passed stillicidium. 4th day, abdomen more painful and distended; respiration quick and labored; pain and dyspnœa increased when incumbent. 5th, worse, introduced catheter with difficulty, and drew six oz. of dark colored urine; gradually failed. Treatment, venesection, &c.
F. 5.	40	Retroversio uteri.	Suffered retention 7 days, felt something burst within her; relief to her previous symptoms followed.	Catheter removed; no urine; failed rapidly.
M. 6.	28	Retention.		
M. 7.	Ad.	Fell, striking his belly on a hard body.	Fainted; in a few hours had urgent desire but inability to urinate; severe pain in abdomen, vomiting, &c.	On following day drew off 6 oz. urine, no relief; warm bath, in which he passed large quantity of water; symptoms increased in severity.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 42 hours.	Abdomen contained a large quantity of blood; right kidney inflamed; lumbar and iliac regions ecchymosed.	Opening in posterior part sufficient to admit a hen's egg.	Bladder distended.	BONETUS. *Sepul. Anat., Lib.* 3, *sec.* 24. *Obs.* 12.
Died.	Urine effused into cavity of abdomen.	Rupture in fundus admitting two fingers.		PIERUS. *Hist. Anatomico-Medica, par Lieutaud, Lib. Primus.* Sec. xii., art. vi. *Obs.* 1279.
Died.	Effusion of urine into cavity of abdomen.	Rupture at posterior part.	Intoxicated. Bladder distended.	PLATERUS. Vide last authority.
Death on the 8th day.	14 pints of urine in cavity of abdomen; intestines not inflamed; appearance of viscera healthy; uterus contracted and healthy.	Ruptured at superior part so as to admit a finger; edges ragged and blackish; rest healthy.	Parturient, bladder distended.	MR. HAY. *Med. Obs. & Inq.* Vol. iv.
Death on 2d day.	9 or 10 pints of urine in cavity of abdomen.	Rupture at fundus sufficient to admit finger; edges of aperture gangrenous.	Pregnant; bladder distended.	MR. LYNN. *Med. Obs. & Inq.* Vol. iv.
Died.		Circular hole of an inch and a half in extent in left side of bladder; edges smooth, without appearance of laceration; this opening led into a cavity in pelvis, which contained urine.	Bladder distended.	MR. JOHNSTONE, *Mem. of the Med. Soc. of London,* 1773. Vol. iii, p. 543. ☞ Mr. Harrison considers this a case of hernia of the lining membrane, not rupture.
Lived 5 days.	Peritoneum inflamed; intestines distended with flatus.	Very large opening in upper fundus.		C. MONTAGUE. *Med. Commun.* London, 1790. Vol. vii., p. 284.

e x	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 8.	44	Stricture.	Felt a rush from upper part and severe pain in region of bladder; desire to urinate before urgent; now absent; passed no water, abdomen enlarged, painful and tender, slept much, pulse 140, feeble; thirst, tongue dry and brown.	On 2d day, still slept much; passed no water. 3d day, symptoms increased in severity. No passage of water; punctured bladder through rectum, 3 oz. of urine ran off, no relief.
M. 9.	26	Fell upon a bench.	Felt as if his heart had burst; pain at umbilicus — intense when erect; face pale and anxious.	Constant desire to urinate; abdomen tense; pulse 126; catheter drew but little water. On 2d day, by changing its direction, drew 3 pints. 3d day, punctured abdomen above pubis; large quantity of clear urine escaped; temporary relief; complained of seminal emissions; delirious on 8th day.
M. 10.	30	Fell 20 feet, striking on his feet.	Complained only of the bruise and pain about his loins and back; peculiar sensations about heart.	When placed in bed made ineffectual efforts to urinate; catheter drew off 2 oz. urine. 2d day, abdomen became tense and painful, symptoms of peritonitis increased.
M. 11.	Ad.	Straining at stool.	Felt something burst in abdomen; all the symptoms of rupture of the bladder followed.	Symptoms continued.
M. 12.	Ad.	Coach wheel passed over belly.	Inability to urinate, no swelling of abdomen, catheter drew off 8 oz. of urine, passed water voluntarily in warm bath.	Tobacco enema given, which prostrated excessively. On the 4th day had symptoms of peritonitis; slight tension of abdomen; no pain except on pressure.
M. 13.	Ad.	Horse fell upon him.	Symptoms as last case.	Severe symptoms continued.
M. 14.	35	Fall forward several feet, striking on abdomen.	Collapse; severe pain in abdomen.	Abdomen swollen, excessively tender; a little bloody urine drawn by catheter. No reaction.
F. 15.	20	Retention.	Symptoms of intestinal inflammation; inability to urinate.	Pulse small and contracted; urine passed often in small quantity; thirst.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 3 days.	Large quantity of urine in abdomen; intestines covered with coagulable lymph and adherent; urine infiltrated cellular tissue as high as umbilicus, where it ruptured peritoneum and entered cavity of abdomen.	Ruptured at anterior part of fundus, size of goose quill in mucous, an inch in dameter in muscular tissue.	Bladder distended from stricture.	SIR E. HOME, *Pract. Obs. on Treatment of Strictures.* Vol. vii., p. 239. London, 1803.
Lived 8 days.	Slight marks of inflammation in epigastric region; intense in hypogastric, especially at seat of puncture; intestines glued together; peritoneum coated with lymph; pint of urine in pelvis under the adhesions of bladder to adjacent viscera.	Contracted and empty; rupture an inch in extent, oblique, posteriorly and to right side.	Bladder distended.	DR. CUSACK. *Dublin Hospital Reports.* 1818. Vol. vii., p. 312.
Lived 8 days.	Peritoneum exhibited usual effects of active peritonitis; intestines adherent; considerable urine in cavity of abdomen.	Contracted; rupture in posterior part nearly transverse; mucous coat protruding and vascular.	Had evacuated bladder some time previously.	DR. CUSACK. *Dublin Hospital Reports.* 1818. Vol. vii., p. 312.
Death on 2d day.	Large quantity of urine in cavity of abdomen; signs of severe inflammation of peritoneum.	Rupture through posterior part of superior fundus.	Suffering retention from stricture.	~~MR. SCOTT~~. *London Med. Repos.* Vol. xvii.
Death on 5th day.	Slight effusion of urine into cavity of abdomen; peritoneum inflamed.	Aperture at superior and posterior part of fundus, jagged and sloughy; mucous membrane inflamed.	Suffered from stricture.	MR. EWBANK. *Bell on Diseases of Urethra,* p. 404. London, 1822.
Death.		Same appearance as last case.		MR. BELL. Vide last authority; p. 437.
Death on 2d day.		Rupture near fundus sufficient to admit three fingers.	Bladder distended.	DR. MOTT. Preparation in Dr. M's museum. Comm. by Dr. Van Buren.
Death.	10 or 12 pounds of serous fluid in cavity of abdomen; marks of inflammation on intestines.	Rupture nearly throughout the whole extent; tissues much reduced in thickness.	Bladder distended.	DR. FIX. *Phil. Med. and Surg. Jour.* Vol. ix.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 16.	Ad.	Blow from knee over pubis.	Severe pain set in; inability to pass water.	All the symptoms of peritonitis followed; catheter removed only bloody fluid.
M. 17.	35	Horse fell on him.	Tenderness of abdomen; vomiting; pulse very feeble; pain in left hip.	Drew off one pint of bloody urine; great tenderness of abdomen; tension; vomiting, &c.
M. 18.	27	Fell upon smooth ground.	Severe pain in hypogastrium; swelling and tension of belly.	Mind grew dull, but rational; inability to urinate; catheter not passed, treated with antiphlogistics.
M. 19.	Ad.	Fall upon a bed-post.	Complained of excruciating pain in abdomen; desire but inability to void urine.	On 2d day, catheter removed half a pint of urine; had a voluntary discharge of water afterwards.
M. 20.	21	Caught under a falling bank of earth.	Extreme pain in hypogastrium; "felt something give way in his belly;" face anxious; pulse quick; lips livid.	2d day, inability to urinate; catheter drew bloody urine; fæces mixed with blood; scrotum œdematous; symptoms more severe; pulse 124. 3d day, less suffering, but symptoms more unfavorable. 4th, sinking. Treatment, antiphlogistics.
M. 21.	Ad.	Kick on abdomen.	Acute pain at pit of stomach, sense of internal heat.	Passed no water for three days after accident; abdomen became swollen and painful, catheter not passed.
M. 22.	30	Kick on hypogastrium.	Felt instantaneous and severe pain in abdomen; catheter removed turbid urine when directed toward anterior superior portion; entered an indefinite extent, and more urine was evacuated.	Treatment; leeches to abdomen, rigid diet, &c.; severe symptoms gradually subsided, with marked improvement in every respect. On 6th day, imprudent in diet, return of severe symptoms.
M. 23.	30	Kick on lower part of abdomen.	Collapse; intense pain in hypogastrium; abdomen tense and painful.	Blood flowed from urethra. Treatment, antiphlogistics; improved; was imprudent in diet.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Death on 9th day.	Cavity of abdomen filled with urine; signs of severe inflammation.	Rupture in superior fundus.		M. CLOQUET. *North Am. Med. and Surg. Jour.* Vol. v.
Death on 3d day.	Abdomen contused; symphysis pubis separated; intestines inflamed; ilium quite black.	Empty; contracted; rupture in fundus, transverse 4 inches.	Intoxicated.	*Lond. Med. and Phy. Jour.* Sept., 1828.
Death on 5th day.	Abdomen distended; 9 or 10 lbs. of bloody fluid escaped from its cavity; no odor of urine; 3 lbs. of coagulated blood among bowels.	Rupture on superior and anterior surface, three and a half inches in length.	Intoxicated; bladder distended.	DR. DEWAR. *Ed. Med. and Surg. Jour.* Vol. xxxi.
Death on 4th day.	Signs of severe peritonitis.	Rupture at fundus; firmly contracted.	Intoxicated; bladder distended.	DR. BUSH. *West. Jour. Med. and Phys. Sci.* Vol. iv.
Death on 4th day.	Soft parts about hypogastrium contused; scrotum and penis much distended; intestines distended with flatus; slight blush of inflammation; other viscera healthy.	Empty; ruptured at fundus and at neck, close to prostate.	In good health.	MR. GAMACK. *Medico-Chirurg. Rev.* Vol. xiii.
Death on 5th day.	Ecchymosed and livid spots in different parts of abdominal parietes; scrotum and penis black, involving only skin, 15 pints yellow fluid, not urinous, in cavity of abdomen.	Round hole with sphacelated edges in upper fundus.	Intoxicated.	M. BOYER. *Malad. Chirur.* Tom. ix., p. 61. 1831.
Death on 7th day.	Inflammation in hypogastric region; adhesions between the abdominal walls and bladder; the latter and adjacent viscera all agglutinated, forming an organized pouch, which circumscribed the urine, and prevented further effusion.	Rupture two inches in extent, in posterior wall.	Intoxicated.	M. DUPUYTREN. *Archives General.* June, 1834.
Lived 17 days.	Effusion of urine and pus in pelvis; inflammation in this region; no signs of general peritonitis.	Bladder contracted; two ruptures on anterior surface; bladder and intestines adherent.		M. DUPUYTREN. *Amer. Jour. Med. Sci.* Vol. xii.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 24.	50	Fell under a car.	Collapse.	Severe abdominal pain, face anxious, pulse very feeble, delirious.
M. 25.	35	Kick on lower part of belly.		
M. 26.	Ad.	Kick on lower part of belly.	Was shocked; rallied to fight but felt sick; attempted to urinate but could not; walked 200 yards.	Symptoms of peritonitis nsued.
F. 27.	26	Fall on edge of a tub.	Syncope; intense pain in abdomen; inability to urinate.	Catheter drew but little urine; symptoms of peritonitis set in; antiphlogistics used, but without relief.
M. 28.	35	Fall upon a bench.	Intense pain in belly; inability to urinate; catheter drew bloody urine.	Severe symptoms continued unrelieved.
M. 29.	22	Straining to evacuate bladder.	"Felt something crack in abdomen," followed by a chill; relief to his former symptoms.	Tenderness of abdomen; sense of distention; no circumscribed tumor in hypogastrium; catheter drew two quarts bloody urine; catheter constantly used. Treatment, active antiphlogistic.
M. 30.	26	Blow on abdomen.	Symptoms slight; abdomen not tense; slept soundly first night.	2d day, had hot skin, quick pulse, thirst, inability to pass water. Catheter drew a pint of clear urine; bled, purged, &c., but no relief. 3d day, excessive vomiting, tympanitis, constant desire to urinate; catheter never drew but an oz. of water at a time.
M. 31.	28	Horse fell upon him.	Shocked; inability to urinate; blood only flowed by catheter.	2d day, great pain in abdomen; pulse 120, great desire to urinate. Catheter drew only blood, at night passed water voluntarily, less pain. 3d day, suffering slight, passed water, great prostration, features pinched.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 3 hours	Extensive injuries to other parts.	Bladder ruptured in posterior part.		DR. KIRKBRIDE. *Amer. Jour. Med. Sci.* Vol. xvi.
Death on 7th day.	No external marks of injury; sanguineous fluid in abdomen; having an ammoniacal odor; adhesions of viscera.	Vertical rupture at superior and posterior part, 2 inches in length, involving all the tissues only at lower part; mucous membrane inflamed at neck.		*Annales d'Hygiene et de Medicine.* Legall. No. 29. Jan., 1836.
Death on 5th day.	No external marks of injury.	Rupture at superior and posterior part.	Intoxicated. Bladder distended.	*Lond. Med. Gaz.* April 9, 1836.
Death on 6th day.	Marks of severe inflammation in peritoneum.	Small aperture at fundus of bladder.		MR. SYME. *Ed. Med. and Surg. Jour.* Vol. ii. Oct., 1836.
Lived 36 hours.		Rupture into peritoneal cavity.	Intoxicated. Bladder distended.	J. F. SOUTH. *St. Thos. Hosp'l Reports.* Vol. i. 1836.
Recovered.			Retention from injury.	MR. KEAL. *Lond. Med. Gaz.* 1836–37.
Lived 15 days.	Intestines filled with flatus, peritoneum but slightly vascular, with several patches of lymph; 2 or 3 gallons of pale urinous fluid in abdomen.	Rent in superior and posterior part sufficient to admit the little finger.	Intoxicated. Retention from stricture.	MR. ELLIS. *London Lancet.* Vol. xvii. N. S.
Lived 3 days.	Quart of reddish fluid in cavity of abdomen, having a urinous odor.	Rupture in posterior and superior part of fundus, through which the catheter introduced into urethra, readily passed into cavity of abdomen.	Intoxicated. Bladder distended.	MR. ELLIS. *London Lancet.* Vol. xvii. N. S.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 32.	35	Antagonist fell across lower part of belly.	Felt excessive pain in hypogastrium; sick and weak; rallied and walked home alone; tried to urinate but could not.	Had a restless night, but slept some, made ineffectual efforts to urinate, took breakfast on 2d day and walked three miles for a surgeon, catheter drew six oz. urine; walked home again, passed one or two oz. urine. 3d day, rose and began his usual labor; at noon felt so sick that he walked again to town three miles for medical relief. 4th day, still kept about, but symptoms increased in severity, gradually sank.
M. 33.	27	Kick on lower part of belly.	Syncope; intense pain in belly; inability to urinate; thirst; pain extending from hypogastrium and increasing in severity; unable to remain in one posture but for a short time.	Drew quart of bloody urine with some difficulty, vomiting, pulse quick and hard, intense abdominal pain. Ord, venesection, leeches to abdomen, opium, &c.; symptoms continued with increasing severity until near his dissolution, when they abated; continued to draw small quantities of bloody urine.
M. 34.	2½	Cart wheel passed over lower part of belly.	Collapse; passed urine voluntarily; no blood; lower part of belly bruised and tender; perineum distended with fluid.	2d day, pain slight; passed water; features natural, cheerful, pulse 120; perineum fluctuating; symptoms mild until 4th day, when erysipelas appeared on lower part of abdomen.
F. 35.	36	Parturition.	Twelve hours after labor attacked with severe pain in lower part of abdomen, extending down thighs.	2d day, high fever, thirst, rapid pulse, abdomen tense and tender, inability to pass water, countenance anxious, restless; catheter drew nothing from bladder. Treatment, that for peritonitis.
M. 36.	Ad.	Fell, striking the abdomen against a stair.	The sense of fulness of bladder ceased and he walked to a friend's house to dinner.	
M. 37.	Ad.	Fell upon a door step.	Complained of great pain.	Severe symptoms continued.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 8 days.	Viscera of epigastric and umbilical regions healthy; small intestines distended with flatus, and adherent at some points by soft fibrin; no fluid; cavity of pelvis separated from that of abdomen by agglutination of lower intestines with bladder, and abundant effusion of lymph; quart of colorless urine in pelvis, containing shreds of lymph.	Oblique fissure in posterior part of bladder an inch and a half in length; interior showing no signs of inflammation.	Intoxicated.	DR. HARRISON. *Dub. Jour. Med. Sci.* Vol. xi.
Death on 3d day.	Intestines distended with flatus; vascular, slightly adherent; bloody urine in lumbar region, with flakes of lymph; marks of severe inflammation about pelvis; peritoneum coated with lymph.	Bladder not much contracted; transverse rent an inch and a half in length, on posterior part of fundus, through all its tissues, but most extensive in peritoneum; interior not at all inflamed.	Intoxicated.	DR. HARRISON. Ibid.
Lived 10 days.	No trace of inflammation in cavity of abdomen or pelvis; ossa pubis fractured and separated.	Vertical rent in anterior wall; interior acutely inflamed.		DR. HARRISON. Ibid.
Death on 4th day.	Slight marks of inflammation of peritoneum and intestines; uterus contracted, signs of inflammation around it; cellular tissue of abdomen and thighs infiltrated with urine and sloughy.	Fundus of bladder ruptured, and urine effused into cavity of abdomen.	Good health in labor, which was easy.	MR. BEDINGFIELD. *London Lancet.* June, 1837.
Death in 24 hours.			Bladder distended.	*Taylor's Med. Juris.* See Am. Ed., p. 287.
Death in 2 days.		Bladder ruptured two or three inches.		MR. SYME. *Taylor's Med. Juris.* See Am. Ed., p. 284.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 38.	35	Carriage fell on him.	Hurried respiration; pulse quick; vomiting; no urine flowed from catheter; blood on the end when withdrawn; pulse 140.	Symptoms continued to increase in severity; leeches were applied to abdomen and opium administered, but without relief.
M. 39.	38	Stricture.	Had retention 3 days while at sea; suddenly seized with severe pain in region of bladder; followed by great prostration.	Sloughs of cellular tissue separated from rectum, so that the hand could be passed up to sacrum. Urine passed in a stream from rectum, catheter left in bladder.
M. 40.	31	Kick on lower part of abdomen.	Walked one fourth of a mile in a stooping posture and in great pain; chills; desire, but inability to pass water; pulse rapid and feeble.	Drew off 12 oz. bloody urine. On 3d day passed water in a stream, and continued to do so until day before death; vomiting, tympanitis.
F. 1.	Ad.	Parturition.	Collapse near close of labor.	Stimulants administered; revived.
F. 42.	36	Parturition.	"Felt something give way" near close of labor, followed by sudden pain about umbilicus; pains of labor ceased; pulse small; tongue dry.	Extracted child with forceps; abdomen swelled and became painful, pulse quick; tympanitis, sinking.
M. 43.	27	Was fallen upon in a fight.	Slight pain in hypogastrium; not to prevent sleep.	Symptoms of peritonitis, inability to pass water, intense pain in abdomen, which became tense and tender; was treated with tonics and stimulants. On 4th day drew off 52 oz. of brownish fluid but no blood.
M. 44.	42	Cart wheel passed over abdomen.	No complaint of pain; noisy from drink; unable to pass water.	2d day, great tenderness over bladder, tympanitis, incessant vomiting, pulse 140; mind clear; bloody urine passed by catheter; cal. and opium freely exhibited.
M. 45.	32	Fall of a rock.	Severe pain in abdomen; desire but inability to urinate; pulseless.	Catheter removed only blood from bladder; scrotum distended with blood.
F.	53	Fall on edge of a tub.	Syncope; vomiting; tympanitis; countenance anxious.	Blood flowed from catheter.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Death on 4th day.	Fluid in abdomen not having a urinous odor; universal peritontis, most intense in region of the bladder.	Bladder contracted and ruptured on its posterior aspect.	Bladder distended.	MR. LAWRENCE. *Lond. Med. Gaz.* Vol. xxiii.
Recovered.			Bladder distended.	DR. WARD. *New-York Lancet.* Vol. i., 1842.
Death on 5th day.	No external marks of injury; fluid in abdomen not urinous; no sign of peritonitis.	Rent in superior and posterior part one and a half inches, valvular.	Intoxicated.	MR. HILEY. *London Lancet.* May 14, 1842.
Death in 2 hours.	Urine effused into cavity of abdomen.	Extensively lacerated.	In childbed, primipara.	MR. RAMSBOTHAM. *Pract. Obs. in Midwifery,* 2d. Ed., p. 146. 1842.
Death on 3d day.	Marks of inflammation in cavity of abdomen; uterus contracted, having a tubercle on its anterior surface, corresponding with rent in bladder.	Rupture in fundus, size of the finger.	In childbed, primipara.	MR. RAMSBOTHAM. Ibid.
Death on 4th day.	Three pints of bloody fluid in cavity of abdomen; viscera agglutinated by recently effused lymph.	Rupture at superior and posterior part, rent one and a quarter inches in length, taking an oblique course.		MR. SCOTT. *London Lancet.* Vol. 2. 1843–44.
Death on 3d day.	No external marks of injury; 4 pints uncoagulated blood in cavity of peritoneum.	Firmly contracted and torn at its supero-posterior portion.	Intoxicated. Bladder distended.	MR. OLDFIELD. *London Lancet.* Vol. 2. 1843–44.
Lived 12 hours.	Separation of symphisis pubis; thigh bone dislocated into ischiatic notch.	Rupture at fundus.	Intoxicated.	MR. SYME. *Lond. and Ed. Month. Jour. Med. Sci.* June, 1843.
Death on 5th day.	Signs of peritonitis.	Very large transverse rent in superior and posterior part.		R. W. SMITH. *Dub. Hosp. Reports.* 1844.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
F. 47.	38	Cart wheel passed over body.	Collapse; intense pain in hypogastrium.	Reaction incomplete.
F. 48.	9	Run over by a cart.	Severe pain, suffering intense.	Bloody urine drawn by catheter.
M. 49.	42	Cart wheel passed over pelvis.	Pain about hypogastrium; catheter drew bloody urine.	Severe pain over abdomen, respiration difficult, distention over bladder, passed no water, blood only flowed from catheter.
M. 50.	23	Injured by rail cars.	Collapse; no power or desire to urinate; tumor in right iliac region, and fracture of pelvic bones detected; tenderness; vomiting; catheter removed 6 oz. urine, with relief; rupture of anterior wall of bladder diagnosed.	Lateral operation performed on bladder, with subsidence of tumor and tenderness; improvement followed, and rapid convalescence.
M. 51.	30	Fall from hammock upon a stool	Severe pain above pubes; great desire but inability to urinate; catheter removed 2 oz. of bloody urine; pulse quick and small.	2d day, 6 oz. pure blood passed by catheter, vomiting, increase of pain and tenderness, urgent desire to void urine and passed half pint voluntarily; features anxious, thighs and thorax flexed, circumscribed hardness felt above pubes where there was most pain.
M. 52.	24	Fall from hammock across chain cable, injuring loins.	Severe symptoms followed immediately; circumscribed hard tumor, like gravid uterus, felt in hypogastrium; tender on pressure; pint of bloody urine drawn by catheter.	2d day, had extreme pain and tenderness over bladder; relieved by bleeding and purging; passed small quantities of urine voluntarily; return of severe symptoms on 5th day, tumor above pubes still felt, painful and tender; pain gradually extended over whole abdomen.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Death in 17 hours.	Fracture of pelvis, separation of symphisis pubis.	Rupture of superior and anterior portion involving peritoneum.	Intoxicated.	MR. COOPER. *Guy's Hosp. Reports.* Vol. 2. 1844.
Death on 2d day.	Spleen ruptured; pelvic bones fractured.	Bladder ruptured in three places.		MR. COOPER. Ibid.
Death on 2d day.	But few signs of peritonitis.	Contracted; large rent in posterior wall.	Intoxicated.	MR. COOPER. Ibid.
Recovered.			Bladder distended.	DR. WALKER. *Med. Comm. of Mass. Med Soc.*, Art. iv., case 6, of vol. vii. 1845,
Death on 6th day.	No external injury; tissues beneath superficial fasciae of abdomen of a dark color; softened; gangrenous; exuding on pressure bloody serum, having a urinous odor; cellular tissue around bladder in same condition; peritoneum entire; marks of intense inflammation; intestines adherent by recently effused fibrin.	Peritoneum pushed upwards from its reflection from anterior surface of rectum; posterior and superior surfaces of bladder forming a large cavity filled with urine and coagulated blood, at bottom of which was bladder, contracted, with a rent one and a half inches in length in anterior wall, edges red and hard.	Intoxicated.	MR. WELLS. *London Med. Gaz.* Vol. XXXVI. N. S. Aug., 1845.
Death on 9th day.	Hemorrhage in both kidneys; intestines adherent and united to abdominal walls by recently effused lymph; bloody serum, not urinous, distended cavities formed by these adhesions; other viscera healthy.	Much enlarged; postero-inferior surface gangrenous in appearance; perforation inch in length anteriorly on right side below reflection of peritoneum; mucous membrane intensely inflamed; urinary infiltration of cellular tissue of pelvic cavity.	Intoxicated.	MR. WELLS. op. cit.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 53.	35	Blow on lower part of belly.	Inability to urinate; passed some blood from urethra; pain on moving catheter; drew bloody urine.	2d day, passed water with tolerable freedom, pain in left groin and across abdomen. 3d day, pain and tenderness increased; pulse 116. 4th day, abdomen not as tender, sinking.
M. 54.	50	Ran against a post in the dark.	Great pain over abdomen; collapse; desire and ineffectual efforts to urinate; rapid, feeble pulse; walked 100 yards after the injury.	Drew bloody urine 18 hours after accident; afterwards urine always clear. Treatment, as for peritonitis; on 6th day, strained to pass water, felt something give way, symptoms of peritonitis ensued, but was successfully treated.
M. 55.	Ad.	Kick in hypogastrium.	Symptoms of peritonitis.	
M. 56.	36	Run over by cab.	Walked 3 miles; began to have severe pain in hypogastrium 3 hours after accident; vomiting; passed a little water; chills; pulse 120.	2d day; efforts to pass water, but little escaped; severe pain at umbilicus and perineum, thirst; catheter removed 10 oz. of high-colored urine; pressure of finger in rectum increased its flow. 3d day, much worse, sinking.
M. 57.	29	Fell upon corner of table.	Intense pain, but with assistance walked home; but little desire and inability to urinate; anxious countenance; pulse quick and small; respiration; labored.	2d day, drew 2 oz. by catheter; symptoms worse; decubitus dorsal; knees drawn up; never got but 2 or 3 oz. of urine at once, passed an oz. voluntarily. 3d day, worse; continued to sink.
M. 58.	Ad.	Fallen upon in a fight.	Intense pain in belly; ineffectual efforts to urinate; abdomen tender.	Drew 3 pints of reddish urine 10 hours after injury, healthy urine afterwards.
M. 59.	32	Cart wheel passed over left groin and thigh.	Pain in perineum and above pubes; desire, but inability to pass urine.	On 3d day, symptoms continued severe; countenance anxious, respiration rapid; pulse 113, feeble; bloody urine flowed from catheter; cellular tissue of thigh, scrotum and perineum swollen. 4th day, free incision made in perineum, without relief; urine continued to flow from wound, but patient finally became exhausted by the sloughing.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Death on 4th day.	Dark fluid in abdomen, not urinous; no trace of inflammation of peritoneum; pelvis sound.	Rupture three-fourths of an inch on inferior and left surface.	Intoxicated.	B. COOPER. *Lond. Med. Gaz.* Aug. 27, 1845.
Recovered.			Bladder distended.	MR. CHALDECOTT. *Prov. Jour. and Dub. Med. Press.* Vol. 3.
Lived 55 hours.	Urine extravasated into the cellular tissue of scrotum; peritoneum not lacerated, but extensively inflamed.	Rupture near the neck, half-inch in length.		MR. STEAVENSON. *Taylor's Med. Juris.* See Am. Ed., p. 245.
Death on 3d day.	No marks of disease in upper part of abdomen; much lymph effused on pelvic peritoneum; pint of dark urine in pelvis.	Bladder small and contracted; rent oblique, an inch and a half long at posterior and inferior part; mucous membrane healthy.	Intoxicated.	MR. HIRD. *London Lancet.* Oct. 26, 1846.
Death on 6th day.	Not the slightest trace of inflammation in cavity of abdomen; viscera all healthy.	Rent at superior and posterior part one and a half inches.	Intoxicated.	MR. BOWER. *London Lancet.* Dec., 1846.
Lived 3 days.	Intestines adherent by recently effused lymph.	Contracted; large rent in fundus, around which intestines formed a cul de sac by their adhesions, limiting the effusion of urine.		MR. HAMILTON. *Dub. Quar. Jour.* Vol. ii., No. 5.
Death on 8th day.	Effusion of blood beneath pelvic fascia; extensive fracture of pelvic bones.	Rupture through left side of neck, admitting three fingers; opening into large abscess extending up between bladder and sacrum.		DR. WATSON. *Mon. Jour. Med., Sci.* Dec., 1848.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 60.	27	Caught in a steam engine, receiving a severe blow on the back.	Collapse; desire and ineffectual efforts to urinate; bloody urine drawn by catheter; pulse quick and feeble.	Severe symptoms continued unrelieved.
M. 61.	17	Fell against a spar in attempting to leap a fence.	Intense pain; feeling as if bowels protruded; walked a few steps with support.	Abdomen became distended; features pinched; 4 oz. urine drawn off by catheter, which was left in bladder; on 4th day œdema of back and lower limbs, fluctuation below umbilicus; punctured and gave exit to urine with relief; nothing from catheter; on 7th, cellular substance sloughed, and a rent in posterior part of bladder could be felt through the opening. Patient rapidly convalesced.
M. 62.	22	Fell 12 feet striking on his feet.	No symptoms first day.	On 2d day walked to hospital; severe pain in abdomen, which was tense and tender; ineffectual efforts to vomit, and defecate; face anxious, pulse feeble and quick; symptoms of peritonitis increased; 2 oz. bloody urine drawn off on 2d day; passed water voluntarily at stool; active antiphlogistics.
M. 63.	Ad.	Blow on abdomen.		Two quarts of urine drawn off 17 hours after the accident.
M. 64.	18	Caught between railcars.	Collapse.	Pain in hypogastrium and tenderness in abdomen. 2d day, discharged urine 2 feet from meatus; antiphlogistics.
M. 65.	40	Stone fell upon lower part of belly	Collapsed; ineffectual efforts to urinate.	Abdomen tympanitic; some tenderness over bladder; reaction in two hours; pint of bloody urine drawn off; pressure made over bladder increased the flow; clot of blood in the catheter; instrument passed in the whole length, vomiting of green matter, breathing thoracic.
M. 66.	30	Caught between cars.	Pain slight; urine and fæces passed from injury.	

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Death on 2d day.	Small quantity of urine in cavity of abdomen; blood effused into pelvis; injuries of pelvic bones and articulations.	Transverse rupture at fundus, admitting three fingers.	Good health	DR. WATSON. Ibid.
Recovered.			Good health	MR. SYME. *Ed. Med. & Sur. Jour.* 1848.
Lived 6 days.	No external injury; fluid in abdomen; slight adhesions of intestines; peritoneum coated with thick layer of lymph; pint of turbid fluid in cavity of pelvis, having an ammoniacal odor,	Rent three-fourths of an inch in posterior and upper part.	Bladder distended. Intoxicated.	MR. STAPLETON.. *Dub. Quar. Jour,* No. 16. Feb. 1850.
Death on 1st day.	2 or 3 oz. of urine and lymph in cavity of peritoneum; some congestion of and fibrinous effusion on viscera; no other signs of peritonitis.	Firmly contracted; vertical rent an inch in length at posterior part.	Bladder distended.	MR. SOLLY· *Lond. Med. Gaz.* April 26, 1850.
Lived 2 days.	Serum in cavity of abdomen; no odor of urine; no sign of peritonitis.	Contracted to one-third its natural size; rupture at fundus, admitting the thumb; separation of symphysis pubis.	Bladder distended.	DR. LENTE. *New-York Jour. Med.* Vol. iv., N. S., 1850.
Death on 2d day.	No external marks of injury; fluid and pus in abdominal cavity.	Contracted and lacerated at its superior part.	Bladder distended.	DR. VREELAND *New-York Jour. Med.* N. S., Vol. iv.
Lived 42 days.	Large abscess in both iliac regions; fracture of pelvic bones.	Contracted; mucous membrane congested and covered with pus; rent at neck.	Bladder emptied one and a half hours before	DR. PEASLEE. *Am. Jour. Med. Sci.* N. S., Vol. xix.

Sex.	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 67.	35		Collapse from which he never rallied.	Large quantity of bloody urine drawn by catheter, which passed without difficulty.
F. 68.	Ad.	Husband knelt upon abdomen.	Was sensible of a severe internal injury.	Most intense suffering.
M. 69.	50	Man jumped upon abdomen while lying on back.	Great pain and tension over lower part of abdomen; inability to pass water; catheter removed pint of bloody urine.	Improved under treatment; three fluctuating tumors appeared, one on misial line, others in illiac regions. On 12th day, opened the left, which discharged foetid pus and urine.
M. 70.	12	Iron railing fell on lower part of abdomen.	Inability to pass water; swelling and redness of lower part of belly, scrotum, groins and thighs.	Tympanitis; tension of abdomen; small quantity of bloody urine passed by catheter; delirium, low fever.
M.	40			Bloody urine drawn off by catheter.
72.	38			
M. 73.	32	Wheel of carriage passed over lower part of abdomen.		Bloody urine drawn off; pain and tension of the belly came on; typhoid symptoms set in rapidly.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 2 days.	No marks of inflammation in peritoneal cavity; extensive fracture of pelvis; other viscera healthy.	Rupture at apex two inches in length and one and a half in breadth; contracted, and containing clots of discolored blood.		MR. HAWKINS. ☞ This and the nine following cases were reported by Mr. HEWITT to the *Lon. Path. Soc. Vide Lond. Med. Gaz* April, 26, 1850.
Lived 24 hours.		Two ruptures, one half an inch in length into peritoneal sac, the other two inches in length into cellular tissue of pelvis.		MR. HAWKINS.
Lived 23 days.	Cellular tissue in hypogastric and iliac regions sloughy; peritoneum in this part "stripped off" as high as umbilicus.	Rupture in fore part an inch in length by half an inch in breadth, leading into a circumscribed cavity in cellular tissue; firmly contracted; mucous membrane of a dark color, with spots of lymph.		MR. TATUM.
Lived 6 days.	Pelvis extensively fractured; small quantity of blood in cavity of peritoneum.	Two ruptures on fore part, size of a large bougie; urine infiltrated into cellular tissue of pelvis, scrotum and thighs, causing sloughs.		MR. CUTLER.
Death on 1st day.	Extensive injury of pelvis; effusion of blood into sub-peritoneal cellular tissue.	Laceration on left side of bladder, one inch in length by half an inch in width, leading into cellular tissues.		MR. HAWKINS.
Lived 5 days.	Pelvis severely fractured; cellular tissue of pelvis, hypogastrium, illiac regions, upper part of both thighs and right side of scrotum, sloughy and infiltrated with urine and pus.	The two anterior thirds of the neck of the bladder separated from prostatic portion of the urethra; marks of severe inflammation of bladder, its mucous membrane being of a dark color.		MR. KEATE.
Death on 4th day.	Extensive laceration of symphysis pubis; cellular tissue infiltrated with sanious fluid.	Rupture size of a goose-quill on right side, leading into a circumscribed cavity, formed in cellular tissue by effusion of lymph; mucous membrane inflamed, having patches of lymph.		MR. KEATE.

Se .	Age.	Cause.	Primary Symptoms.	Progress and Treatment.
M. 4.	32	Piece of timber fell upon his back.	Swelling of scrotum, perineum and lower part of abdomen; no urine from catheter.	Free incisions into urethra and inflamed parts through which urine escaped; cellular tissue sloughed; typhoid symptoms ensued.
M. 75.	46	Kick from horse in lower part of belly.	Rigors; intense pain in abdomen.	Urine mixed with blood passed by catheter.
M. 76.	34	Fall from a great height		
Boy. 77.	7	Was trod upon.	Was not considered seriously injured until 24 hours after.	Abdomen became tympanitic; tenderness extreme; countenance anxious; passed water and fæces after taking oil; vomiting grumous matter; pulse 106; symptoms increased in severity. Treatment, antiphlogistic.
M. 78	29	Blow from knee over lower part of abdomen.	Collapse; intense pain and tenderness of abdomen; great desire but inability to urinate; bloody urine passed by catheter; thirst.	2d day. drew off a pint of clear urine; blood followed on withdrawal of instrument; all symptoms as at first. 3d day, passed catheter 9 inches, removing 2 quarts clear urine; on the 4th passed water by bearing down forcibly and taking full inspiration; symptoms more unfavorable; vomiting of stercoraceous matter came on, desire to urinate constant and unrelieved, rolling of bowels detected through abdominal walls, urine high colored and offensive; gradually failed, sufferings unabated. Treatment, actively antiphlogistic.

Result.	Post Mortem appearances of Viscera.	Post Mortem appearances of Bladder.	Condition.	Authorities.
Lived 4 days.	Extensive fracture of pelvis; slight marks of inflammation on peritoneum, which was stripped off nearly as high as umbilicus, between bladder and pubes, a large cavity containing blood, urine and pus.	Rupture in fore-part behind symphysis pubis, size of end of little finger.		MR. HAWKINS.
Death on 3d day.	Extensive infiltration of blood and urine into cellular tissue; peritoneum stripped off from wall of abdomen as high as umbilicus.	Rupture in fore part, just below reflexion of peritoneum.		MR. HAWKINS.
Death on 1st day.	Separation of symphysis pubis; fracture of pelvis.	Ruptured immediately behind pubes.		MR. HAWKINS.
Lived 4 days.	Three gallons of fluid in abdomen; pus in pelvic cavity; other organs healthy.	No appearance of bladder.	Bladder distended.	DR. PENDLETON. *Charleston Med. Jour.* Vol. v.
Death on 7th day.	No external marks of injury; but little fluid in cavity of abdomen; no urinous odor; peritoneum healthy; bowels distended with flatus; lemon-colored pulpy substance in appearance softened membrane or cellular tissue in cavity of pelvis; an intussusception in the ileum just above the ileo-cœcal valve; marks of inflammation at this point.	No part of bladder found, except neck, to which adhered shreds of softened membrane, in which a blood vessel was observed; ureters terminating in the pulpy mass in pelvic cavity.	Intoxicated. Bladder distended.	DR. KNEELAND. *New-York Jour. Med.* March, 1851.

The following is an analytical summary of the seventy-eight cases of rupture of the urinary bladder reported in the foregoing table :—

Sex.—Males 67 ; females 11 ; making about 6 of the former to 1 of the latter.

Age.—Under 10, 3 ; 10 to 20, 3 ; 20 to 30, 19 ; 30 to 40, 26 ; 40 to 50, 7 ; 50 to 60, 4 ; above 60, none ; adults 16, age not given.

Condition.—Bladder distended, 30 ; of which 10 were intoxicated ; 5, from stricture ; intoxicated, condition not given, 14 ; parturition, 4 ; in good health, 4 ; doubtful, 2 ; no note of 24.

Causes.—Direct violence, 48 ; concussion, 15 ; internal causes, 9 ; of which 4 were parturition, 4 results of structure, 1 retroversio uteri ; no note of 6.

Primary Symptoms.—Severe, 59 ; of which 43 were ruptured into the peritoneal cavity ; 2, not involving peritoneum ; 10, into cellular tissue ; 3, not given. Slight, 9 ; of which 7, were into peritoneal cavity ; 2, into cellular tissue. No symptoms, 3 ; 2, into peritoneal cavity ; 1, indefinite. No note of 7. Inability to urinate, 28 ; of which 22 were into peritoneal cavity ; 1, not involving peritoneum ; 5, into cellular tissue. Power to void urine, 3 ; 2, into the peritoneal cavity ; 1, not involving peritoneum. Power of locomotion, 7 ; all through the peritoneum. Felt a sensation as of the bladder bursting, 7.

Progress of Cases.—Severe symptoms continued in 48 ; of which 39 ruptured into the peritoneal cavity ; 7, into cellular tissue ; 2, peritoneum not involved. Severe symptoms set in in 10 ; in 1, three hours after accident ; 6, two days ; 2, four days ; 1, three days—all ruptured into peritoneum except last. In 1, power to urinate continued, the rupture being into cavity of abdomen. In 14, it came on ; in 12 of these, on 2d day ; 9, being into peritoneum ; 2, not involving peritoneum ; 1, into cellular tissue ; in 1, on third day ; in 1, on fourth day. Locomotion continued in 2, both ruptured into peritoneum. Bloody urine drawn in 25 ; clear in 4. Symptoms were mild in 2, both ruptured into cellular tissue.

Result.—Died, 73. Within 5 days, 39 ; 26 being ruptures into the peritoneum ; 9, into the cellular tissue ; 3, not given. Between 5 and 10 days, 22 ; 17, into peritoneal cavity ; 3, into cellular tissue ; 2, not involving peritoneum. Between 10 and 15 days, 2 ; both into cellular tissue. Between 15 and 20 days, 3 ; 1, into the peritoneal cavity ; 2, into cellular tissue. Above 20 days, 2 ; both into cellular tissue ; of which 1 lived 42 days.

Recovered, 5; 3, into cellular tissue; 1, into peritoneal cavity; 1, partial.

Post-mortem appearances of Viscera.—External marks of injury in 2, both ruptured into peritoneal cavity. No external marks of injury in 8; 7, ruptured into cavity of peritoneum; 1, not involving peritoneum. Fracture and injury of pelvis in 15; 11, ruptured into cellular tissue; 3, into peritoneum; 1, not given. Marks of inflammation in abdomen, in 34; 27, being into peritoneal cavity; 5, into cellular tissue; 2, not involving peritoneum. No marks of inflammation in cavity of abdomen, 7; 4, being ruptured into cellular tissue; 3, into cavity of abdomen.

Post-mortem appearances of Bladder.—Rupture into cavity of peritoneum, 50; 39, the result of direct violence; 6, concussion, or indirect violence; 4, from parturition; 2, stricture; 1, retroversio uteri. Rupture in the anterior wall of the bladder, 9; 5, being direct violence; 3, concussion; 1, stricture. Rupture at neck, 6; 5, direct violence; 1, not given. No bladder found, 2; bladder firmly contracted in 17.