autopsy showed some softening of the brain, old adhesions of the lungs and some thickening of the cardiac valves from former disease. The other lesions, probably due to the benzine, were fluid blood, great lividity, congestions and some hæmorrhages. In this case, then, which is supposed to be the first fatal case in France, there is evidence of old disease of the brain, lungs and heart, and the benzine was inhaled in a fresh state, in a room where there was no ventilation.

Poincaré, a French authority, says there have been many cases of unconsciousness among workers in naphtha, but only one death. He gives no particulars of this one case, but it was before 1879. Lewin, a famous German writer on poisons, says that workers on rubber fabrics stand benzine without detriment to their health.

Felix, in the *Oeffentliches Gesundheitspflege*, for 1872, page 231, gives some experiments on healthy men. Into a paper cone, loosely filled with cotton wool, of which the point was cut off, pure benzine was poured, and held before the noses of several healthy men, as in giving chloroform. In the first eight minutes, the pulse rose and later fell. Five to fifteen grammes of benzine, inspired for from seven to twelve minutes produced dizziness, nausea, desire to vomit, cough, burning in the chest and sleepiness. Twenty to forty grammes inspired for eight to twenty minutes produced sleep and full anæsthesia as by chloroform. The stupor lasted two to eight minutes, and after coming to, they complained of nausea, sleepiness, and headache. The very slow pulse returned to normal in ten to twenty minutes. Some persons bore the inspiration of fifty to fifty-five grammes without lasting disturbance.

Hirt, "Diseases of Occupation," 1875, Band 2, page 183, says he examined a great many workers in rubber, benzine and naphtha, and was astonished to find them exceptionally healthy. After a stay of several hours in benzine air, there was no trouble with pulse or respiration.

Poincaré, "Hygiène Industrielle," 1886, page 207, attributes the headache, pain, exhilaration followed by depression, to the bi-sulphide of carbon rather than to benzine. But bi-sulphide of carbon is very volatile, with a boiling point of 45° C., and cannot be present in the churn residue, which does not begin to boil until about 70° C.

In *L'Union Médicale*, Paris, 1861, page 92, is an article by M. Perrin. After some experiments on animals with benzine, he concludes that intoxication by benzine is very different from that by chloroform. In chloroform and ether the ultimate and deadly period of intoxication does not exceed three or four minutes, while with benzine it may last five times as long without the death of the animal following. Benzine seems incapable of producing that complete and remarkable inanition and insensibility of the whole body which is a characteristic of the anæsthetic proper. The persistence of sensibility, which is only weakened, the heavy convulsions and the functional exaggeration of the circulation and the respiration, indicate that the nerve-centres are affected in a particular way, and that the physiological effects resemble closely those which result from animals breathing the essential oils, a toxic dose of which causes drunkenness, convulsions and death without the animal passing through the state of true anæsthesia.

It would be possible to multiply experiments and

quotations; but, in our opinion, we are justified in concluding that Kirby's death was not due to naphtha, because—

(1) He was accustomed to it.

(2) He had worked in the churn for several days without bad effect, when the naphtha was much more abundant, more volatile, more dangerous, than when he was found dead.

(3) The churn room was well ventilated, and there was no possibility of accumulation of fumes.

(4) Experiments on animals, even with free, low-boiling naphtha, and continuously applied, show a mode of action and death entirely unlike the Kirby case.

(5) We are unable to find in medical literature any similar case to Kirby's, where it was known that death was due to naphtha.

(6) Cases of sudden death, particularly soon after dinner, in persons who were not known to have any cardiac or other serious disease, are sufficiently common to justify us in concluding that Kirby's death was due to some natural cause, and that it was not caused by naphtha.

ABDOMINAL AND PELVIC EMERGENCIES CAUSING SUDDEN DEATHS.¹

BY J. C. IRISH, M.D., LOWELL, MASS., AND A. K. STONE, M.D., BOSTON.

THE chief duty of the medical examiner, and what he especially owes to the State, is to make inquiries into each case to which he is called, why the State has lost its subject. When he can say that the State has lost its subject through nobody's fault, his investigation as medical examiner has ceased. The State is not interested to know of what one subject or another has died, only that there has been no foul play. It simply limits its inquiries by its desire to know whether it has lost its subject by the fault of another.

Now, in the number of cases in which a medical examiner is called during the year, there will be but a very small percentage of them in which the State has lost its subject by the fault of another; probably not one-tenth of them. Therefore in the remaining nine-tenths, when the medical examiner has established the fact that death was due to natural causes, one portion of his duty is fulfilled. In addition, however, he is not only to find that these subjects died from natural causes, but also to certify of what particular disease they died.

Hence, in connection with our office we are confronted oftentimes by simple, sudden deaths, with no preceding history of any illness in the few hours previous to death. For instance, the patient has gone to bed apparently well, and is found dead the next morning, and we are asked to decide what was the cause of death, or its most probable cause. This is one of the questions that we must answer to the best of our ability, and answer oftentimes with the aid of very little evidence.

So far as our absolute knowledge goes, we do not know the cause of death in many instances, and we have not data enough to make a reliable or probable conjecture as to its cause. Yet, there is no suspicion that the deceased came to his death by anything than by natural causes, so there is no reason for asking for

¹ Read before the Massachusetts Medico-Legal Society, February 3, 1892.

an autopsy. Fortunately, however, we often have the preceding history perhaps of one or two days' illness, which was not thought to be dangerous, to give us very considerable aid in forming our conclusions, and in those cases we are able to sign the certificate of burial intelligently, and probably correctly.

Still, as I have said before, there are very many of them in which the cause of death, is a matter of mere conjecture, which is entirely unsupported by any testimony. It therefore behooves us to investigate with all possible care the various causes of sudden death, and whatever investigation can throw any light on these various causes is of great assistance, and of great value in aiding us to arrive at correct conclusions in particular cases.

In the subject which has been assigned to me to-day, there are very many interesting inquiries to be made. The experience of any one man as to what causes sudden death due to any accident occurring in the pelvic abdominal cavity must be very slight. The ordinary practitioner, or medical examiner, who has seen two or three such cases, has had really a very large experience. Therefore in drawing any conclusions upon this subject relative to the frequency of those accidents, or, upon the occurrence of any given case, it is simply necessary to investigate as thoroughly and exhaustively as possible the combined experience of all our writers. I therefore avail myself of the recorded experience of others that has come readily within my reach.

It is not my purpose in this paper to touch upon the subject of hæmorrhages into the pancreas, which has already been treated so ably and exhaustively by the President of this Society, Dr. F. W. Draper. Neither do I intend to consider abortion, for complicated as it is with questions of law and morality, it deserves a place entirely by itself in the transactions of this Society. I shall, however, call your attention to-day to those non-traumatic conditions in the abdominal cavity and pelvis which may cause death in such a manner as to demand our attention.

I shall run over briefly the cases which have come to my notice in glancing over the literature of the subject, and then add a few cases which have fallen under my own personal observation.

First of all I shall take up the cases which have occurred in the course of typhoid fever, where death has occurred in the so-called walking or ambulatory cases.

Dr. Fitz² in his recent investigations upon the subject of perforations has collected 4,680 cases with 5.58 per cent. of perforations, thereby agreeing with Holscher³ whose report of 2,000 cases observed by him showed perforation in 6 per cent. of the cases. Murchison⁴ gives a percentage of nearly double this, while Schultz⁵ and Liebermeister⁶ in the hospitals of Hamburg and Bale report a percentage of only 1.2 per cent. and 1.3 per cent. respectively.

All these taken together would make a trifle less than 5 per cent. in a total of 14,087 cases. What the exact data, from which Dr. Fitz obtained his 4,680 cases, is, we have no means of knowing, but it would seem from a number of other statistics that we have seen, that he made no attempt to tabulate all that has

been written on the subject, and that if all were collected, that the percentage would be on the whole less by one or two per cent. than the 6.58 per cent. which he is inclined to consider the true percentage of perforations. But whatever the real percentage may be, every one has the idea firmly fixed in his mind that a large number of these cases occur in the lighter cases of typhoid. Murchison⁷ states that this is due to the fact that this assertion was originally made by Louis and Chomel (1834), who found the disease latent, previous to the perforation, in 10 out of 12 cases examined by them. This statement was copied into all text-books, and it was only later after long investigation that perforations were found to be more common in severe cases of typhoid. Fitz's paper supports Murchison, for of the nearly 200 cases of perforation collected by him, only 14 cases occurred in walking typhoid.

Many of our instructors have taught what has been so strongly asserted, supported as it is by autopsies, and probably backed by unreported cases which have occurred in the course of their own consulting practice, that there is a prevailing sentiment through the medical profession that perforation is specially common in ambulatory typhoid. In spite of this general belief cases of sudden death often occur in persons who have had a mild form of the disease, and whose death has doubtless resulted from the carelessness of the physicians, who neglected to remember that perforation must always be borne in mind in the treatment of typhoid fever.

A case that will serve to illustrate this is one narrated by Louis,⁸ where a man with a mild case of typhoid was allowed to walk about the hospital garden each day. He was improving until the twenty-third day when perforation with the usual symptoms of collapse and peritonitis set in, and the patient died within thirty-six hours.

Two similar cases are reported to have occurred at Guy's.⁹

Many people have not known just what has been the matter with them, and have gone to the hospital only to die in a short time from perforation. Murchison¹⁰ relates a case of this kind where the patient walked three miles to the hospital in order to find out what was the matter with himself, and died within thirty-six hours of his entrance from collapse. And Louis is said to have seen a similar case. Such cases are always a great shock to the friends, but they do not specially interest us, for the cause of death in such cases is usually apparent. The same is true in those cases which occur late in the stage of convalescence. The history of the previous illness, together with the sudden onset of severe symptoms referable to the abdomen, leave little doubt as to the true cause of death.

The case of Tweedie¹¹ is in point. Here the patient had had an ordinary case of typhoid, and was up and about, apparently convalescent, and had been allowed to leave the house. The stools were well formed, and perfectly natural. Suddenly, symptoms of perforation occurred, and the patient quickly died.

Another similar case is recorded by Murchison. Here the patient, a laborer, had been convalescent for

² Boston Medical and Surgical Journal, October 1, 1891.

³ Münch. Med. Woch., 1891, xxxviii, 64.

⁴ Murchison: *Treatise on Continued Fevers*.

⁵ Schultz *Obi. fur. Allg. Path. u. Path. Anat.*, 1891, ii, 289.

⁶ Ziemssen's *Handb. d. sp. Path. u. Thera.*, 1874, ii, 1, 161.

⁷ Murchison: *Continued Fevers*, 2d Ed., 1872.

⁸ Murchison: *Continued Fevers*, 2d Ed., 1872.

⁹ *Transactions of the Medical Society of London*, 1862, ii, 120.

¹⁰ Murchison, 1872, p. 75.

¹¹ Recorded by Murchison.

two weeks, and had returned to his work. One day while working he was suddenly attacked, and died in a few hours. The intestine showed typhoid ulcers nearly cicatrized, one of which had perforated and caused the fatal peritonitis.

In spite of their rarity, cases do occur when the typhoid gives no signs, or such obscure signs that they are overlooked, and treatment meant to meet certain more manifest symptoms is inaugurated, which may work most disastrously upon the typhoid lesions.

Bennett¹² reports a case of this kind where a man who was supposed to have cardiac disease with dropsy was purged. He was allowed a liberal diet, as he had an extremely good appetite. After a fortnight the bowels became loose for a couple of days, then there was complaint of general distress with some abdominal tenderness, which was taken for peritonitis from inflammation of the kidneys. Sudden death took place the next day from perforation of the ileum.

Sevestre¹³ reports a case where there had been absolutely no symptoms till the sudden advent of perforation symptoms, and the patient died four days later.

A very interesting case is reported from the Hants County Insane Asylum,¹⁴ and one where the charge of neglect might give considerable trouble to the authorities. The patient, a woman, was confined in the asylum for mild mania and delusions, and having some dementia. She was up and about the wards, and was not considered sick until two days before her death. Till then made absolutely no complaint to the nurses.

July 17th she refused her breakfast, and complained of abdominal pain. By night she showed signs of peritonitis, and died the next day at noon. At the autopsy the ileum and large intestine were found to have numerous and undoubted typhoid ulcers, and one of the former had perforated.

Any one who has had experience with the difficulties of diagnosis in light cases of typhoid will readily see how much, on account of her mental condition, the difficulties would have been increased had she made complaint, as she did not.

A case reported by Kleinwachter¹⁵ shows how a really secondary matter can absorb the whole attention. A patient entered the hospital with an abortion well under way, and signs of peritonitis already present. A four months' fetus was delivered without any difficulty, but in spite of all treatment the patient died the next day. The general course of the case lead the physicians to think of induced abortion, and they were much surprised to find at the autopsy numerous typhoid ulcers, and a perforation from which the peritonitis had started. The abortion had started as secondary to the disease, or been induced at the time of the perforation.

November 21, 1891, I was called by a member of the Board of Health to investigate the cause of death in the case of Mrs. K., who had died suddenly, the preceding night. She was taken sick about five weeks before. The first physician who attended Mrs. K., pronounced the disease typhoid fever. A second medical attendant doubted this diagnosis. The fever was of very mild type. Her physician had not seen her for the ten days before her death and refused to sign the certificate for burial. Mrs. K. had for several days been about the house and in the street.

In the night of November 20th, she was seized with extreme pain in the abdomen and great prostration, and died three hours later. Although no autopsy was made, there can be no doubt that this patient's death was caused by intestinal perforation.

Murchison¹⁶ gives some cases where sudden symptoms have followed exposure to foul air of vaults, etc., and as some of them have resulted in sudden death with symptoms which might have been attributed to poison, they are of value here.

In August, 1829, twenty out of twenty-two boys who were attending the same boarding-school were seized within three hours with fever, vomiting, purging and excessive prostration. One boy, three years old, had been attacked two days before, and had died comatose in twenty-three hours. Another, five years old, had died in twenty-five hours after being attacked. It was found on investigation that a choked-up drain had been opened two days before the first case of illness, and the contents spread on the boy's play-ground. At the autopsy the Peyer's patches and solitary glands were enlarged like "condylomatous elevations," and in one case the mucous membrane was slightly ulcerated. The mesenteric glands were enlarged and congested.

A little girl of nine had been playing over the grating of a choked-up cesspool, from whence such foul smells came that sometimes the horses had to be removed from the stable. She was shortly after attacked with febrile symptoms, vomiting, purging, and intense headache followed by acute delirium. She died forty-seven hours after the commencement of the attack. After death the characteristic lesions of early stage of enteric fever (typhoid) were found in the intestines.

Ulcerations in the stomach and upper intestine may give but little trouble, so much so that patients have no idea that anything serious is the matter, and think that they are only run down.

A case bearing on this point has been presented by Harman.¹⁷ A boy of ten years was playing in Central Park, New York, when he stumbled and rolled down the hill on which he was. Half an hour later he was brought to the hospital. He was slightly dazed, his temperature was 101.4°, and his pulse 110, the abdomen was slightly tympanitic and tender on pressure. Four hours later he began to get pale, the pulse quickly became imperceptible, the tympany and tenderness increased, the respiration became weak and shallow, and vomiting set in, and the patient died within three hours after the onset of the collapse.

The autopsy disclosed an ulcer of the duodenum ten inches from the pyloric opening, which had perforated, and the peritoneal cavity was full of intestinal contents.

There had been no hæmorrhage. No other ulcers were to be found. Investigation of his parents showed that the boy had made no complaint, and had no symptoms referable to the gastro-intestinal tract.

A class of cases will next present themselves for attention where there is usually sudden pain in the pelvis followed by severe collapse, blanching and general appearance of internal hæmorrhage. These cases have been recognized as a source of danger for a long time, but their frequency has been understood only since the advent of abdominal and antiseptic surgery.

Since 1872 there has been a great mass of literature on the subject of ectopic gestation, yet but little of it

¹² Trans. Path. Soc. Lon., 1866 [Fitz].

¹³ Bull. Soc. Anat., 1871.

¹⁴ Lancet, October, 1889.

¹⁵ Wiener Med. Presse, 1880, xxi, 337.

¹⁶ Murchison, p. 472.

¹⁷ Medical News, August 1, 1891.

is of value to us at the present time except that anything that will throw light upon the diagnosis of obscure pelvic symptoms of course aids us in establishing our opinion as to the cause of death. But the question of abdominal operation *vs.* electricity, etc., which have occupied so much space have no interest for us except as clinicians. Therefore we are obliged for the purposes of this paper to throw out the great mass of brilliant operations which have been accumulating in the last few years. The number of cases of ectopic gestation which are now seen and recognized make it probable that in the past there must have likewise been a great many. But the fact that there are so few lithopædia to be found in museums,¹⁸ etc., make it probable that only a comparatively few cases pass to full term, and that from the small number of autopsies to be found that only a small per cent. die of either hæmorrhage or shock. In by far the greatest number of fatal cases death seems to come from exhaustion, or from peritonitis, and follows some time after the first attack. Even in those cases that Barnes calls "cataclysmic," the patient usually survives long enough to allow of medical consultation.

A case reported by Dr. Trush gives a very fair idea of the usual course of an extra-uterine pregnancy. Dr. Trush's¹⁹ patient was attending to her ordinary household duties when she was suddenly seized with excruciating pain in the lower part of the abdomen, and almost immediately everything turned dark. When the syncope disappeared she vomited freely, and an intense sickening pain in the abdomen continued. This was the attack, and gradually, after a long tedious convalescence the patient recovered, an invalid.

In spite of the fact that death so sudden that it does not allow of diagnosis is extremely rare, yet enough cases do occur to make it necessary that the examiner should have the subject of extra-uterine pregnancy in his mind in cases where the history in any way points to the pelvic organs.

Dr. Draper²⁰ has reported a case where an unmarried girl of eighteen was brought to the City Hospital in a state bordering on collapse. She was greatly blanched, and complained of severe pain starting in the pelvis and extending down the thighs and to the back. The hypogastric region was extremely sensitive to palpation. In spite of all stimulation the patient died five hours after her admission to the hospital.

The clinical data were insufficient to establish a diagnosis, and as irritant poison and criminal procedure were thought of, the case became one for medico-legal examination. The abdominal cavity was found filled with three quarts of clotted blood. The left tube was distended at its outer end to the size and shape of a small olive, and in this distended portion was a rent, from whence the ovum had escaped, and the fatal hæmorrhage had occurred. The gestation was probably in its second month.

A very similar case is recorded by Jordan,²¹ of Budapesth. A mill-girl soon after beginning her day's work fell to the floor complaining of severe pain in her abdomen. She quickly became unconscious, and remained so until she died. At the hospital she was unconscious, very much blanched and lay slightly turned to the right side. The right leg was perfectly quiet

as if paralyzed. The left leg was drawn up flexed on the body. The patient moaned most of the time, and any attempts to examine the abdomen caused increased moaning, when the left leg was moved.

Physical examination showed the organs of the body normal excepting the presence of oedema in the lungs was noted. In the pelvis a tumor was felt upon the right side. The breasts were slightly enlarged, and later it was learned from friends that there had been no menstruation for two months. After some delay diagnosis of extra-uterine pregnancy was made with rupture on the right side. As preparations were being made for operation the patient suddenly died. A medico-legal examination followed. The left tube was found ruptured, and a solid clot weighing about 1,000 grammes was found on the right side of the pelvis.

(The writer draws the conclusion from this case that the patient lay instinctively upon the unaffected side just as a person with acute pleurisy. The blood consequently gravitated to the right side making the tumor appear upon that side. Therefore Jordan thinks that the position of lying should always be taken into consideration in establishing a diagnosis as to which tube is affected.)

The following case of Zweifel,²² of Leipzig, though operated upon, illustrates very well the suddenness of the attack, and the difficulties in the way of making a diagnosis. The patient was taken with very sudden and severe symptoms of abdominal pain while she was in the garden. She fell to the ground, and from there was removed to the hospital. She had recently had her third child, and there had been no signs of pregnancy present. Clostrum was found in her breast, and a pelvic tumor was felt on vaginal examination. Laparotomy was performed, and a ruptured tube was found, but the patient only lived a short time after the operation.

In June, 1890, I was called to Meredith, N. H., to operate upon a patient who was suffering from hæmorrhage into the abdominal cavity. I reached the patient about two o'clock in the morning five hours after the summons, when I found a woman apparently almost entirely exsanguinated with sighing respiration, and an almost imperceptible pulse. The history of the case is as follows:

This woman had been apparently well. Had missed one menstrual period, and a day or two before had commenced to menstruate. She was left in the morning alone in the house. When her husband returned at 5 o'clock in the afternoon, he found her lying upon the floor entirely unconscious. On examination an ill-defined solid mass was found in the abdominal cavity. There could be no doubt that this was a case of ruptured ectopic pregnancy. The patient had so much the appearance of being in articulo mortis that I regarded any surgical interference as absolutely hopeless. The patient, however, went on to a complete recovery, except that there has since remained in the pelvis a distinct solid mass. Although this patient did not die, and the diagnosis was not verified, either by operation or post-mortem examination, still there can be no question as to its correctness. When she fell to the floor, had she died instead of making a narrow escape, and had been found in this condition, the medical examiner who would have been called in, would probably never have suspected the real cause of death, and in no other

¹⁸ Tabs, quoted by Cushing, Boston Medical and Surgical Journal, 1891, No. 2.

¹⁹ Trans. Obs. Soc. N. Y., 1886, p. 1283.

²⁰ Boston Med. and Surg. Journal, January 8, 1891.

²¹ Allg. Cent. Zeit., November 14, 1891.

²² Zweifel: Archiv. f. Gyn., 1891.

way could this have been determined than by a post-mortem examination.

A case reported by Förster²⁸ is very suggestive, as similar cases could easily occur among a class of patients where foul play might be suspected. The woman was twenty-nine years old, and had one child a year before. Menstruation was regular until one month before, when the duration was six instead of three days, but was very scanty throughout. The patient stated that she did not believe herself pregnant. With the approaching menstrual period she had had greatly increased sexual desire, which her husband had been gratifying to excess. During this procedure the patient felt a sharp pain in her right side, which she supposed to be due to indigestion, and various household remedies were used. Three hours later the physician was called. The patient was then in complete collapse, with pulse hardly to be felt, blanched, and with cold, clammy perspiration. The lower part of the abdomen was sensitive. The husband denied cohabitation for some months past, and refused an operation asked for on the diagnosis of extra-uterine pregnancy. The patient died in a few hours. After death two litres of blood were found in the abdominal cavity. The right tube was distended, and a rent was present large enough to allow of the escape of the head of the foetus. A right corpus luteum was present.

SUDDEN DEATH FROM AFFECTIONS OF THE NERVOUS SYSTEM.¹

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AN inquiry into the causes arising within the nervous system which may give rise to sudden death is by no means easy. Registration reports and vital statistics seldom separate such cases from the total number of deaths attributable to any given cause, and a study of clinical records with autopsies would require an enormous expenditure of time before a sufficient amount of evidence could be accumulated. I can offer, therefore, only a few *a priori* considerations as to the possible occurrence of sudden death in affections of the nervous system, basing my statements rather upon the probable events in any given disease than upon statistics. In such a study I exclude traumatic affections of the nervous system, and poisons which cause death by their action upon the nervous system, whether they be taken into the system from without, as in the case of opium, or be generated within as in the case of the poison of uræmia.

Before beginning the inquiry, however, a word of definition seems necessary. I shall limit the consideration to cases of death occurring within an hour from the onset of symptoms; only in such cases will I speak of sudden death, using the term speedy death for cases where death occurs within twenty-four hours.

I shall consider sudden death as occurring from affections of the peripheral nerves, the spinal cord, the brain, and in the neuroses.

I. PERIPHERAL NERVES.

Sudden death is not uncommon where there is in-

¹ Read before the Massachusetts Medical-Legal Society, February 3, 1892.

²⁸ Förster: Jour. Amer. Association, 1890, p. 1204.

flammation of the vagus. It is due undoubtedly to paralysis of the heart. Such a vagus neuritis is not uncommon after the acute infectious diseases, especially diphtheria, and to it are now generally attributed the sudden deaths which are so common after these affections. In multiple neuritis arising from other causes such a sudden cardiac paralysis rarely, if ever, occurs. When death ensues as a result of vagus neuritis, as is not uncommon, it is of gradual onset, and is attended by various respiratory and circulatory symptoms. It would seem, therefore, that some other factor beside the vagus neuritis, is requisite; and this factor is probably the degeneration of the cardiac muscle, which is also not infrequent in such cases. Only in the last instance can these cases be attributed to affections of the nervous system, for the acute infectious disease has a large share in their causation. They may therefore be excluded from this inquiry, the more in that they seldom have any medico-legal interest.

II. SPINAL CORD.

Lesions of the spinal cord rarely, if ever, give rise to sudden death. Lesions of the medulla will be considered with lesions of the brain. It is, of course, obvious that lesions high up in the cord, close to the medulla, may act very like lesions of the medulla itself, but such lesions need no separate consideration.

Spinal meningeal hæmorrhage.—Ollivier long ago contended that meningeal hæmorrhage, unlike cerebral hæmorrhage, could not produce death by a "stroke." Leyden² later contested this statement, and Gowers³ thinks it very common for death to ensue in a few hours. Death, however, seems to be speedy rather than sudden; it usually takes place, at the soonest, after a period of three to six hours, with symptoms of spinal pain, paraplegia, etc. In a part, at least, of the fatal cases, especially those where death has come on the quickest, the hæmorrhage was high up, involving the medulla, or there was co-existing cerebral hæmorrhage, or the patient died of shock.

Spinal hæmorrhage. Hæmato-myelia.—This affection is extremely rare, and it seems to cause death rather less speedily than meningeal hæmorrhage, unless the lesion be high up. The shortest time in which Leyden⁴ found that death occurred was thirteen hours.

Acute hæmorrhagic myelitis.—Death in this affection is distinctly of slower onset than in hæmorrhage. Strümpell⁵ thinks it not impossible that, in some cases where children die in a short time with fever, convulsions, etc., there may be an acute polio-myelitis; but that is purely an hypothesis. Unless the myelitis involve the upper part of the cord death seldom occurs until a week or more has elapsed.

III. BRAIN.

Meningitis.—Even in the fulminating forms of cerebro-spinal meningitis, and the rapid cases of tubercular meningitis and meningitis from ear disease, we rarely meet with cases of sudden death. Stillé⁶ finds the shortest duration of any case of cerebro-spinal meningitis (Gordon's) to be five hours. Meningitis of tubercular origin or from middle ear disease may come on suddenly, with paralysis, etc., as if from a "stroke," and the patient may rapidly become comatose, and die; but in such cases the period of coma is more or less

² Leyden: Klinik der Rückenmarkskrankheiten, i, 382.

³ Gowers: Diseases of the Nervous System, i, 207.

⁴ Leyden: Op. cit. ii, 80.

⁵ Strümpell: Text-book of Medicine, p. 632.

⁶ Stillé: System of Medicine (Pepper), i, 819.