standing all this, he ultimately recovered with an ankylosed hip. The onset in this case was in the early part of the year; and the patient's room, large, lofty, and well ventilated, was in a house in one of our great squares. When this gentleman first came under my care, he was one of the healthiest-looking young men I ever saw, strongly built and most active; and he subsequently was one of the most dashing light cavalry officers in our central Indian campaign.

Some time after the occurrence of this case, the late Dr. Bence Jones happened to mention to me that he had been summoned into the country to a young gentleman, who was suffering from well-marked pyæmia, without, as far as could be ascertained, any previously existing suppurating surface. I then told Dr. Bence Jones of the above case of pyæmia after gonorrhœa, and begged of him to ascertain, if possible, if his patient was suffering from gonorrhœa. The patient died before Dr. Bence Jones saw him again, but, at the *post mortem* examination, the existence of gonorrhœa was clearly proved. A third case of a similar nature, and in a young gentleman, was also mentioned to me by Dr. Guéneau de Mussy.

Such, gentlemen, are the cases of pyæmia occurring in private practice, to which I wished to direct your attention. They are twenty-three in number, and twenty-one of them fell under my own notice; the remaining two, the last being well authenticated, have been alluded to simply on account of their extreme rarity.

And now, if we proceed to analyse the circumstances under which pyæmia occurred in these twenty-three cases, it will be found that an operation was performed in six instances only. In four of these, the first four, the operation was of the most trifling nature—a single-thread seton, a small wart on the heel, a small wart on the scrotum, a small sebaceous tumour of the scalp; and it was only in the remaining two that the operation was of a somewhat severe character—amputation of the breast. Moreover, the first four were all in different years, and not in the same locality; the last two were in the same year, and within a month of each other; but one was in town, and the other in the country. And here let me note, that the third case is also mentioned among those of recovery, this patient having had two attacks of pyæmia at several years' interval, and in different localities.

Of the remaining seventeen cases, in which no operation had been performed, there was a broken surface in eleven, and in six there was not even an abrasion. Of the eleven cases, in which there was a broken surface, it was but small in ten; ulceration of a small sero-cystic tumour of the breast in one, of abscesses in two, of tonsils in two, of bowel in typhoid fever in three, a needle broken in the leg, a small splinter of wood in the great toe. The eleventh case was the only severe one—compound dislocation of the elbow. The six cases in which there was no abrasion were—a slight injury to the foot followed by suppurating, inflammation of the lateral sinus and internal jugular vein in connexion with discharge from the ear after measles, abscess after parturition, and gonorrhœa in three. Of these seventeen cases, none occurred at the same period, or in the same locality.

As to locality, of the twenty-three cases, sixteen occurred in town and seven in the country. Of the sixteen in town, all, with one exception, that of the young girl who, after running a needle into her leg, was admitted with pyæmia into the hospital, were in the best parts of town, scattered about in good houses, and in good-sized, well-ventilated bedrooms, and well cared for; in fact, to all appearances, under most favourable conditions. The country cases, seven, were in different parts, and widely separated from each other; and their conditions, too, were in all respects apparently excellent.

As to age, the youngest patient was six, and the oldest close upon eighty. Of the remaining twenty-one, eleven were between fifteen and twenty-five and ten between thirty and fifty.

As to local treatment, it was out of the question in several of these cases, and in several cases, too, all possible care and supervision on the part of the surgeon would have been of no avail. Of the twenty-three cases, eleven were under such circumstances.

In conclusion, pyæmia, it has been said, is caused, for the most part, by hospital-air, by foul air consequent upon the aggregation of surgical cases in the wards of our large hospitals; but pyæmia occurs also in cases even when placed under the most favourable conditions—perfect isolation, large airy rooms in the country, with plenty of fresh air, and in every way well cared for. Pyæmia appears, too, at times to be connected with atmospheric conditions; several cases occurring without any apparent cause, at, or about, the same period in different places. The two cases of amputation of the breast, which were within a month of each other, followed exactly the same course; one, however, being in town, and one a few miles out of town. And at the same time that these cases were under my care, other cases of pyæmia, which occurred in private practice at the same period, subsequently came to my knowledge.

Moreover, cases occur in which patients are apparently prone to pyæmia; as in the case of a gentleman who recovered from an attack of pyæmia, and a few years afterwards died of another attack.

The truth is, the causes of pyæmia are still to be worked out; and this, gentlemen, is a problem the working out of which I would strongly urge upon the Clinical Society.

LECTURES

ON

HOSPITALISM: AND THE CAUSES OF DEATH AFTER OPERATIONS.

Delivered at University College Hospital, London.

By JOHN ERIC ERICHSEN, F.R.C.S.,

Holme Professor of Clinical Surgery in University College, and Senior Surgeon to University College Hospital.

LECTURE III.—ON THE MODE OF PRODUCTION OF SEPTIC DISEASES.

CONTENTS.—*Overcrowding.*—*Nature, not mere Number, of Cases.*—*Experience at University College Hospital.*—*Epidemic Influences.*—*Meteorological Conditions.*—*Tyndall's Lecture on Dust and Disease.*—*Organic Atmospheric Dust.*—*Purkes, Rattey, and Cunningham on Pollution of the Atmosphere by Organic Matters.*—*Air in Hospitals.*—*Ships and Towns.*—*Influence of Organic Matter in Air as developing Septic Diseases.*—*Hospital Gangrene.*—*Septicæmia.*—*Pyæmia.*—*Erysipelas.*

By "overcrowding", a condition of atmosphere is induced which may, according to the condition of the individuals so congregated together, produce diseases of various types. The overcrowding of uninjured individuals will produce some variety of typhus: the "gaol-fever" of a past generation was an instance of this kind.

The overcrowding of wounded people—whether the wound be accidental or surgical matters not—will develop septic disease in one of four forms; viz., hospital gangrene, septicæmia, pyæmia, or erysipelas.

That the septic poison which, when once generated, impregnates a wound, and thus gives rise to hospital gangrene, pyæmia, or erysipelas, is capable of transmission through the medium of the atmosphere, is undoubted. That it may be generated in the air by "overcrowding" is equally certain. The results of the most extended and recent observations in the development of this scourge of hospitals in actual warfare, which have of late years been numerous, have left no doubt whatever on the minds of military surgeons that "overcrowding" is the direct occasioning cause of the whole class of surgical septic diseases. But the word "overcrowding" is liable to misconception, and requires explanation. It is very important to be clear on this point; for by it is not meant the mere heaping together of sick and wounded in one ward or building to an extent beyond what it is intended to hold, or only limited by its size; but by "overcrowding", in the sense in which it is here used as the cause of the generation of the septic poison, is meant the accumulation within one ward, or under one roof, of a greater number of patients than is compatible with such a degree of purity of air as to render it incapable of the development or transmission of the septic poison.

It would, in fact, appear that the air of a ward is capable of oxidising, destroying, or absorbing a certain amount of morbid emanations from the contained patients; but if these emanations be developed too rapidly or too abundantly, the air becomes overcharged with septic matter, and then all the ill effects of "overcrowding" at once develop themselves. The contamination of the air of a ward may thus take place even though the actual number of patients lying in it be below what it is constructed to hold, as readily as by the introduction of one single patient beyond the number that the ward is calculated to accommodate with safety. Thus it would be more correct to say that the special evil effects of overcrowding, and the special form they will assume, are rather dependent on the nature than on the actual number of the cases that are contained in any given ward or building at one time. There is no evidence that an accumulation of unwounded patients to any extent can develop hospital gangrene or pyæmia, whatever other diseases may thus be generated. Pyæmia could not have been generated in the "Black Hole" at Calcutta; but a very trifling excess in the number of open or suppurating wounds beyond what any given ward is capable of holding with safety, constitutes "overcrowding" in a surgical sense, and will infallibly generate septic disease.

I can illustrate this observation from what has happened in this hos-

pital. Ward 1, my male accident-ward, contains a cubic space of 21,924 feet. It is intended to hold fourteen patients, giving a cubic space of 1,566 feet to each, or, if we deduct for space occupied by furniture, etc., about 1,500 cubic feet. But not only is the cubic space sufficient, the floor-space is also ample. There is a space of about six feet between each bed, and ten feet between the opposite rows; the ward being sixty-three feet long by twenty-four feet wide. It can be well ventilated by a row of windows on each side; a fireplace at one end and on one side; and a large door, with an open air-hole above communicating with the passages of the hospital, at one end. In this ward we have had many outbreaks of septic disease, pyæmia, and erysipelas, invariably the result of the accidental accumulation within it, not always of too large a number of patients, but of too many severe cases of operation and of injury with wounds in a state of suppuration. The average number of open wounds in this ward is about seven, or half the number of patients it contains; and, if these wounds be not severe, such a number can be contained in it with moderate safety. But if they rise above this in number, or if the majority be severe, then septic disease will certainly break out. The outbreak in Ward 1, in November 1872, which will be fully described hereafter, was thus produced, the ward containing at the time a remarkably severe set of cases; in fact, the conclusion at which we have arrived is this, that if Ward 1 contain nine or more cases with open wounds, at least three of which are severe, as amputations or similar cases, an outbreak of septicism in some form is imminent. Thus, then, it is the nature of the cases, and not their number merely, that constitutes the danger of the development of surgical septic disease by so-called overcrowding; and doubtless epidemic influences favour the development of those septic outbreaks that are directly produced by overcrowding.

In what these epidemic influences consist, I know not. So far as my experience and observation go, they are connected with very different meteorological conditions. In wet and dry weather, in heat and cold, during prevalence of easterly and westerly winds, they have equally manifested themselves. The existence of an epidemic condition, in addition to the influence of overcrowding, is evidenced by the admission from out of doors of erysipelas cases and allied diseases, or by their appearance amongst the out-patients in unusual numbers. But the influence of different meteorological conditions on the development of epidemic septic diseases has yet to be worked out. In reality, we know little or nothing that is positive about it.

The influence of season of year is, however, somewhat better ascertained. Thus the observations of Dr. Hewson of Philadelphia, that have already been referred to, point to the winter months as those in which pyæmia is most rife—an observation which has long been in accordance with my own experience at University College Hospital, where we have always suffered much from septic disease in the surgical wards during the winter and early spring months. This often appears to be owing, however, less to the direct influence of season of year than to its indirect effect in preventing ventilation; it being difficult, in wet or cold weather, to get the nurses or patients to submit to having the windows opened so as to allow an influx of fresh air in a constant current, and to prevent the ward from being ventilated wholly by air drawn from the hospital corridors. The air-supply that is thus admitted is, therefore, unfortunately already in a state of contamination, and liable to generate disease.

Now, what is this condition of contamination in hospital air that causes the development of septic disease in a ward the cubic and floor space of which are sufficient, and which is kept scrupulously clean? That is the next point for inquiry. In the well known, I may say celebrated, lecture of Professor Tyndall on *Dust and Disease*, that distinguished philosopher points out the important fact that the atmosphere under all circumstances contains floating particles of organic matter; that the motes which dance in the sunbeam are of this character. He states that the air of our London rooms is loaded with this organic dust, nor is the country air free from its pollution; and he goes on to observe that, however much it may disguise itself from ordinary observation, "a powerful beam of electric light causes the air in which the dust is suspended to appear as a semi-solid rather than as a gas. Nobody could in the first instance without repugnance place the mouth at the illuminated focus of the electric beam and inhale the dirt revealed there. Nor is the disgust abolished by the reflection that, although we do not see the nastiness, we are churning it in our lungs every hour and minute of our lives. There is no respite to this contact with dirt; and the wonder is, not that we should from time to time suffer from its presence, but that so small a portion of it would appear to be deadly to man."

Watts states that a minute quantity of organic matter—one grain in 200,000—is found in the purest mountain-air. This increases in the country at a lower level, and in large towns reaches the condition stated

by Tyndall in the above extract. Even in sea-air, according to Dr. Rattray (*Medico-Chirurgical Transactions*, vol. lvi), it is not absent. This organic matter is the result, in all cases, of vegetable and animal emanations, and it necessarily varies in its composition, according to the source from which it is derived. Rattray, in a most interesting paper in the volume referred to, gives an analysis of ship-air; and, after pointing out a variety of impurities of a gaseous character, states that the more solid impurities are of animal, vegetable, and mineral origin, from the skin, lungs, etc., of the crew; from the ship, as minute particles of wood, paint, cordage, whitewash, leather, etc.; from the bilge, containing occasionally microscopical, animal, and vegetable organisms; from the stores, particles of bread, cotton, wool, etc.; and others which I need not mention. He states that it is the volatile organic matter thrown off by the skin which gives ship-air its close and often nauseous smell. Parkes, in his admirable work on *Practical Hygiene*, gives the following account of hospital-air. At page 88 he says: "I have examined the air of various barracks and military hospitals, and have detected large quantities of epithelium from the skin, and perhaps the mouth." And at page 99 he says: "The most important class of disease produced by impurities in the atmosphere is certainly caused by the presence of organic matters floating in the air, since under this heading come all the specific diseases. The exact condition of the organic matter is unknown; whether it is in the form of impalpable particles, or moist or dried epithelium and pus-cells, is a point for future inquiry." And again at page 106: "The air of a sick ward, containing as it does an immense quantity of organic matter, is well known to be most injurious. . . . At a certain point of impurity erysipelas and hospital gangrene appear. The occurrence of either disease is, in fact, a condemnation of the sanitary condition of the ward." And again at page 100 he states that—"Erysipelas and hospital gangrene in surgical wards are often carried by dirty sponges, dressings, etc. Another mode of transference is by the passage into the atmosphere of disintegrating pus-cells and putrefying organic particles; and hence the great effect of free ventilation in military ophthalmia, in erysipelas, and hospital gangrene." And, lastly, "Dr. Douglas Cunningham of Calcutta finds that the atmospheric dust largely consists of spores of fungi, and that the majority of these are living and capable of growth and development; and that bacterial matter exists also in dry dust. So that when this is added to putrescible fluids, a rapid development of fungi and bacteria occurs." Here, then, we find, on the combined authority of the most able and recent observers, abundant evidence not only of the existence in the atmosphere of large quantities of suspended organic matter, but of animal *débris* and exfoliations, and of other organic particles, capable, under favourable circumstances, of generating septic diseases. We are, however, still in complete ignorance as to the precise nature of the septic poison that produces those various forms of disease which we recognise as being due to its influence. We know it, in fact, by its effects, but are ignorant of what it essentially consists. That there are different forms of septic poison, appears more than probable. We find that the different varieties of septic disease are not interchangeable, but are as distinct in themselves—in the symptoms they present, in the course they run, in the pathological conditions that are found—as any of the other zymotic diseases. In whatever way originating, and in whatever it may essentially consist, there can be little doubt that this septic series is communicable from patient to patient through the medium of the organic particles of various kinds with which the atmosphere of any crowded building, be it hospital, barrack, or man-of-war, is invariably charged; and when we reflect on the exceedingly minute, infinitesimal—in fact, inappreciable—quantity of any animal virus, as that of cow-pock, syphilis, or small-pox, that is needed to communicate its own disease when applied to a fitting soil, we can easily understand how the virus of the septic diseases that occur in surgical wards may be transmitted from wound to wound even on so slight a vehicle as organic atmospheric dust.

There are four of these septic diseases universally recognised by surgeons—hospital gangrene, septicæmia, pyæmia, and erysipelas. Let us very briefly study the mode of development of these.

With regard to hospital gangrene, I need say but little. It is universally recognised by the concurrent testimony of all military surgeons, that this disease originates in the first instance as a direct consequence of the overcrowding of the wounded in hospitals that are insufficiently ventilated. The experience of the Franco-German war added confirmation, if any were needed, to this view of the origin of this pestilence; which, however, when once generated, is capable of indefinite propagation by contact, through the medium of fingers, instruments, sponges, and surgical appliances. The occurrence of hospital gangrene in civil hospitals is now, fortunately, extremely rare; and its development in such institutions is of itself an evidence that the sanitary condition of the building is for the time at least in a bad state.

The repeated recurrence of hospital gangrene in a civil hospital would undoubtedly be discreditable to those who had the management of its sanitary arrangements. In University College Hospital, we have now had no outbreak of hospital gangrene for more than twenty years; and I trust never to see it here again, as having been developed within the walls of the hospital. It is altogether a preventable disease, and ought never to occur in an institution that is conducted on proper sanitary principles. The few cases that we have had of late years have been brought into the hospital from without; and, curiously enough, last summer two came to us—of a mild form, certainly—from a convalescent institution.

Septicæmia is not a very common occurrence, yet there is a certain proportion of deaths arising from it. In this hospital we have about one death in the year from this cause. Its influence on the general mortality after operations is therefore but trifling, but its existence is an indication of a septic influence, and I believe that a certain number of cases of low or irritative fever, following operations and injuries, partake of the septicæmic type; in fact, the gradation from traumatic fever into septicæmia is easy, and, I believe, not very unfrequent. Surgeons themselves suffer at times from small whiffs of this poison. Who that has been long connected with a hospital, has not at times, after the examination of a sloughing cancer or some other horribly putrescent case, felt feverish, depressed, prostrated for some hours, or a day or two, conscious of the absorption of a poisonous effluvium, which, after a period of febrile depression, eliminates itself from the system by an attack of offensive diarrhœa, the eruption of a pustule, or perhaps by some more distinctly localised inflammatory action, such as tonsillitis or a boil? The cause of septicæmia appears to me to be somewhat obscure. It does not appear to be distinctly connected with overcrowding, but rather with the development of putrescent discharges from unhealthy or malignant ulcers. The offensive discharge from ulcerated cancer uteri is supposed by some to tend very specially to its production, and it has been a cause of death in ovariectomy when practised in the same building in which a woman suffering from this disease was lying.

But the two most important of the septic diseases are undoubtedly Pyæmia and Erysipelas. These two diseases are commonly looked upon as being more or less allied, and they may be so, in so far as their etiology is concerned, in "over-crowding," and in epidemic influences that predispose to their occurrence is concerned, but in all other respects they differ widely.

Acute pyæmia is essentially a hospital disease. As has already been stated in the last lecture, it seldom occurs except in hospital practice, and perhaps the best proof that we have of the rarity of the occurrence of true pyæmia out of hospitals, exists in the rarity of the admission of a pyæmic patient into a hospital from without whilst labouring under the disease. Almost every case of pyæmia that I have seen in hospital practice has originated within the building itself. By a reference to Table B, it will be seen that the amount of pyæmia varies very greatly in different London hospitals, which is an additional proof of its being dependent for its origin on conditions that are more rife in some Hospitals than in others. So far as University College Hospital is concerned, there appears to be, at present, a tolerably uniform amount of it. In three years, from July 1870 to July 1873, we had twenty-three cases; nine in connection with amputations, fourteen with other operations and injuries. Of these twenty-three cases, four occurred in the latter half of 1870, eight in 1871, eight in 1872, and three in the first half of 1873. As to the mode of its development, there can be no doubt that it is the result of the exposure of wounds to an atmosphere overcharged with organic matter emanating from other patients with suppurating wounds. What I stated in the last lecture about the infection of the military hospitals with pyæmia during the Franco-German war, and the comparative freedom of the "hut-hospitals" from this disease, points clearly to its cause.

I look upon pyæmia, when of traumatic origin, as being primarily the local septic impregnation of a wound by organic atmospheric matters, in a condition capable of developing change of such a character in the wound that its fluids decompose; its surface usually becomes foul or sloughy, and the veins leading from it become plugged with soft clots, putrid or easily decomposable. The constitutional symptoms of this dread disease—the prostrating rigors, the profuse transudations from skin and lung, saturating the bedclothes and contaminating the air around with a faint sickly odour, the high temperature, the extreme mental depression—are all consequent on the entry into the circulation of the septic virus deposited from air on wound, absorbed into the veins, and thence transmitted through the system.

Pyæmia stands next to hospital gangrene amongst the septic diseases of local origin. It is less marked in its local phenomena; it is far more developed in its constitutional symptoms. But, though less marked locally, it is most distinctly characterised. Mr. Beck, who has

made the *post mortem* examinations of the twenty-one cases of pyæmia that have occurred at University College Hospital during the past three years, with a degree of minuteness and care that leaves nothing unnoted, states that in every case except one—a case of necrosis of the tibia, in which there was no open wound until a few hours before death—distinct local evidences were found. In fourteen cases, the local origin of the embolism was evidenced by breaking down and putrid clots in the veins leading from the part; and in six there were foul sloughy wounds.

It is a remarkable fact that acute pyæmia never appears to occur in single isolated cases, invariably in groups of two or three; not necessarily absolutely cotemporaneous, but only separated by short intervals of time.

Is pyæmia contagious? The French surgeons generally believe that it is highly so. I have never seen an unequivocal instance of its spread in this way. This, however, may be accounted for by the fact that, whenever a case of pyæmia has declared itself in hospital, immediate steps have been taken to guard against contagion by isolating the patient and disinfecting the ward. We act, in fact, as if its contagion were proved, although we may not in reality be in possession of this proof. There certainly appears, however, to be an epidemic influence that favours its development. It is often coincident, though not invariably so, with outbreaks of erysipelas, both in the hospital and out of doors.

I have already said that it is necessary for the surgeon to consider the nature, rather than the number, of the cases contained within it. This is well exemplified by an outbreak of pyæmia that took place in Ward 1 in January 1871. In the early part of the month, this ward contained a rather large number of severe wounds, including a sloughing cancer in the groin, an amputation of the leg, a compound fracture of the fibula with extensive laceration of the soft parts, a compound fracture of the femur, and one of the tibia. Pyæmia occurred in the case of amputation of the leg on January 19th; in the compound fracture of the fibula on February 3rd; in the compound fracture of the femur on the 13th: they all died. At no time, however, was the ward overcrowded as to number of patients, two out of the fourteen beds being empty the whole time; so that each patient had a cubic space of no less than 1,800 feet of air; but it contained for two months an average of seven or eight open wounds, of which five were always severe, such as amputations or compound fractures. During this period, there was only one case of erysipelas, and the hospital generally was free from that disease. Another instance of a similar kind occurred in December 1872. At this period, Ward 1 became again crowded with severe wounds, there being an average of nine open wounds, seven or eight of which were severe, including three amputations and an extensive necrosis of the tibia. One of the amputation cases had pyæmia, and recovered; another had pyæmia, and died. On this occasion, erysipelas broke out in three cases; in both these outbreaks, the weather was cold.

In erysipelas, we find various influences tending to develop the disease—contagion, overcrowding, and epidemic influence, all produce their effect. About the contagion of erysipelas, there can be no question. I could adduce many instances of it, but one especially occurs to me; though it happened many years ago, it has made a deep and lasting impression upon my mind. On January 17th, 1851, a case of phlegmonous erysipelas of the leg was accidentally brought into No. 1 ward. As soon as the nature of the disease was discovered, the patient was removed to the erysipelas ward at the top of the building, having only remained in No. 1 for about two hours. At this time, No. 1 ward was perfectly healthy; but, a few days afterwards, a patient lying in the next bed to that into which the erysipelous patient had been taken, and who had been operated upon for necrosis of the ilium, was seized with erysipelas. On the 22nd, I performed five operations on patients who were in this ward. Of these cases, three were attacked by erysipelas on the 24th, namely, a case of necrosis of the tibia, of partial amputation of the foot, and of encysted tumour of the scalp. All these patients died. On the 24th, a patient was operated on for strangulated femoral hernia. He was seized with symptoms of low peritonitis, doubtless of erysipelous character, on the 31st, and also died. No case of pyæmia showed itself, but all the patients in the ward who were not attacked by erysipelas had diarrhœa and severe gastro-intestinal irritation.

There was a series of lamentable catastrophes, doubtless, directly induced by the accidental intrusion of an erysipelous patient into an operation-ward, and then propagated by contagion.

That erysipelas may be developed in other ways, there can be little question. I believe that by no means an uncommon cause is infection from dissecting students. I have several times seen cases, both in hospital and private practice, distinctly referable to contamination from this cause; and I think that no student, during the time that he is

engaged in dissections, should be allowed to serve as a dresser in an hospital.

There is a remarkable resemblance, if not an actual similarity, between puerperal peritonitis and the erysipelatous inflammations of the peritoneum following operations on the organs contained in that cavity. The influence of contamination in the way that I mention is well illustrated by what occurred some years ago at the Vienna Hospital. Prior to 1846, the proportion of deaths amongst lying-in women in this hospital was one in ten. In order to check this frightful mortality, Dr. Semelweis required the students who attended these women to avoid making necropsies, and obliged them to wash their hands in a solution of chlorine before and after making vaginal examinations. The result was, that the mortality in 1848 fell to one in seventy-four. (Braidwood *On Pyæmia*, page 220.)

That erysipelas is often of epidemic origin, there can be no question; but the influence of any epidemic is immensely increased by an unhealthy condition of a ward from overcrowding. Of this I will give you an instance.

At the middle of November, 1872, ward I was filled by a very severe set of cases. There was one patient who had had both legs amputated below the knees; another whose leg had been amputated through the knee; another who had a compound fracture into the ankle-joint; one with extensive necrosis of the tibia, and another with extensive laceration of the fore-arm. And this condition of severe cases was kept up by two other primary amputations—one of the foot, the other of the thigh—these cases being admitted in December, but whilst the preceding ones were under treatment. There was no erysipelas in the ward until November 15th. On that day, the case of compound fracture into the ankle was attacked. He recovered, and the erysipelas had left him by the 21st. On this day, the patient with necrosis of the tibia had the sequestrum removed. He was a feeble old man. He was attacked by erysipelas on December 1st, was removed to the erysipelas ward, and died there on the 7th. On December 4th, the patient with scalp-wound was attacked, and was at once removed to the erysipelas ward. During this period, viz., on December 7th and on the 22nd, two of the other patients—the one with amputation through the knee-joint, and another—were seized with pyæmia. The patient who had been amputated through the knee, a healthy gardener, was the only one out of the twenty-three patients with acute traumatic pyæmia who recovered. During the same period, two of my patients in ward 5, both suffering from chronic wounds—one a fistula *in ano*, the other a sinus in the thigh—were attacked by erysipelas. To them, it is possible that the infection was conveyed by the house-surgeon or dressers; but, as other cases of erysipelas occurred in the hospital at the same time, and one was admitted from out of doors, it is possible that an epidemic influence existed.

In the next and concluding lecture, we will consider the means of prevention of septic disease, and of lessening the mortality in hospitals.

ERRATUM.—In Lecture II, page 97, column 2, line 38, after "general hospital practice," insert "in the adult."

CASE OF *POST PARTUM* HÆMORRHAGE TREATED BY THE INJECTION OF PERCHLORIDE OF IRON.

At the present time, when the intrauterine injection of the perchloride of iron in *post partum* hæmorrhage is on its trial, it is well that each individual case of its failure or success should be recorded.

In November 1873, I was called to the lying-in ward of this hospital to see a woman suffering from *post partum* hæmorrhage after the birth of her first child. The woman was very pale, but perfectly calm and collected. The uterus was found to be above the umbilicus, in a very soft and flaccid state. By the use of manual pressure, accompanied with cold application to the abdomen, the womb contracted, expelling a large quantity of blood and clots. This contraction continued for about five minutes, when it ceased, and the uterus was in the state in which I found it. The hand was now introduced, and, with the means I had previously used, contraction was the result, but to be followed in a much shorter period by relaxation. The woman's position was now serious; her pulse was quick, weak, and intermittent; her respiration was a series of sighs; she was very much agitated, and had great desire to be left alone. The injection of the perchloride of iron was now determined on. Two ounces of the strong solution were used in half a pint of iced water. The hæmorrhage immediately stopped; the uterus became corrugated on its internal surface, but remained uncontracted. Stimulants with a sedative were now administered. From this time, she progressed favourably, and was discharged at the usual period.

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LETTSONIAN LECTURES ON SYPHILIS AS A CAUSE OF DISEASE OF THE NERVOUS SYSTEM.

Delivered before the Medical Society of London.

By W. H. BROADBENT, M.D., F.R.C.P.,

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LECTURE II.—*Continued.*

CASE II. *Paraplegia, probably from a Syphilitic Nodule in the Middle Dorsal Region of the Spinal Cord.*—Ann F., aged 41, a widow, was under my care in St. Mary's Hospital from July 24th to December 2nd, 1872.

She had been married eleven years, and had had two early miscarriages, but no living children. There was no history of syphilitic symptoms, but one iris was found bound down by adhesions. Her husband had died early in 1871 from an illness, which I venture to pronounce syphilitic affection of the brain. In June, 1870, while in apparent health, he had an attack of convulsions, which was attributed to sun-stroke, though he was at work under cover. After this attack, he was never himself; he had frequent fits, and his mind became affected; at times also he lost the use of his limbs. He died in an asylum nine months after the first attack.

The patient had for three months been losing the use of her legs. First, the right failed; then this seemed to recover somewhat, and the left became affected. The weakness increased till she could scarcely move about; the bowels were confined, and the urine was not passed readily. On testing the power of the limbs as she lay in bed, the right leg was fairly strong, but the flexors at the back of the left thigh were almost powerless; the extensors of the knee still retained a good degree of strength. I may note in passing that, in partial paraplegia, the flexors are usually affected earlier and more severely than the extensors of the knee. The ankle was fixed and immovable, the foot arched, and the great toe turned in. There was no loss of sensation anywhere. When the patient tried to walk, the difficulty was greater than the degree of paralysis led me to expect; she could scarcely walk alone, and was very awkward and clumsy; the left foot shot out uncontrollably. She could stand as steadily with the eyes closed as when they were open.

Iodide of potassium was given in doses of four grains, and the continuous galvanic current was ordered. The case appeared to be slight, and I hoped for much from rest in bed and treatment. She had, however, come under observation at a moment when the disease was in active progress, and a few days later the legs were almost absolutely powerless, and sensation was lost, this aggravation of the symptoms having come on rather rapidly. She had fallen helplessly in trying to get out of bed, when unaware of her increased weakness.

I found her, on August 7th, quite unable to move either leg; the limbs, however, were not flaccid and soft, but, when handled and tested, they were firm and rather stiff from involuntary resistance of the muscles, and it was ascertained on inquiry that, before she had so completely lost power in them, they became rigid when the feet touched the ground. Reflex action took place when the soles were tickled, but it was not vigorous. There was violent involuntary starting of the lower extremities, both during asleep and while awake. The difficulty in sitting up was peculiar. As soon as she made the attempt, aiding herself with her hands, the legs contracted and resisted, and it was only after a severe effort that she succeeded, the lower extremities jerking all the time.

Sensation, which was severely tested, was almost totally lost on the right side as high as the lower edge of the ribs; on the left, up to the level of the mamma; but there was an imperfect kind of consciousness of the contact with the soles of the feet when they were tickled. The bowels were still confined; there was less complaint of difficulty in passing urine, because of the loss of sensation; but the urine was retained, and the catheter was required.

The dose of iodide of potassium was increased to twelve grains—at first, three times a day, then every four hours. The galvanism was discontinued. In the course of a few days, sensation began to return—first, in the left side, in which the anæsthesia had extended highest, and the recovery was general in the extremity and abdomen, and not progressive; while, on the right side, the return was at first progressive from above downwards. It was further noted that, while the difference in the degree of sensation on the two sides existed, reflex action was more vigorous in the limb in which sensation was most impaired.