OBSERVATIONS ON THROMBOSIS AND EMBOLISM OF THE PULMONARY ARTERY AS A CAUSE OF DEATH DURING THE PUERPERAL STATE.

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SINCE the attention of the profession has been specially directed to obstruction of the pulmonary artery as a cause of sudden or rapid death, the number of recorded cases has greatly increased, and we are now in possession of a large body of facts in connexion with this deeply interesting subject.

Numerous cases are recorded in which the fatal result can be traced to this cause in the course of various diseases, such as rheumatism, phthisis, typhus fever, and other complaints. But it is more especially to its connexion with the puerperal state that I desire to draw attention in the following communication; and it is such a terrible complication of labour, it carries off its victims with such suddenness, often when convalescence is progressing so favourably that all fear has been banished, that we are bound to study every case that comes under our care with the most earnest attention, in the hope that some light may be thrown on the nature and causes of the malady, so that, even if we can do nothing in the way of cure, we may at least gain experience which shall in future be useful in the way of prevention.

A good deal of attention has been paid to the subject of late years. The fourth volume of the "Obstetrical Transactions" contains a valuable paper by Dr. Barnes "On the Thrombosis and Embolia of Lying-in Women," in which the whole question is gone into in detail, the histories of fourteen cases of obstruction of the pulmonary artery being given in a tabular form. In the sixth volume there is a paper "On Puerperal Embolism" by Dr. Wade, in which a case that came under his observation is recorded, and in which a *résumé* is given of Virchow's views on the subject. Several separate monographs have also been published in which the question is discussed, especially an essay by Dr. Humphry, of Cambridge, "On Coagulation of the Blood in the Venous System during Life" (Cambridge, 1859); and a very complete and able treatise by my friend Dr. Benjamin Ball, of Paris, "Des Embolies Pulmonaires" (Paris, 1862), in which several new cases are recorded.

Dr. Ball, like Dr. Wade, is an advocate of Virchow's views. He believes that in the great majority of cases the obstruction is due to the transference of a clot from some portion of the peripheral venous system to the right side of the heart, and thence to the pulmonary artery, where it is detained; and either of itself gives rise, if of sufficient size, to the asphyxial phenomena of embolism, or acts as a nucleus round which a subsequent deposition of fibrin takes place. Dr. Ball does not deny that thrombosis may sometimes arise spontaneously, and that the same causes which occasion coagulation in the veins of the extremities may produce it in the pulmonary artery itself. He does not, however, consider it possible that the blood can coagulate in the larger divisions of the pulmonary arteries during life, except, perhaps, in the few minutes immediately preceding death. He admits that sometimes the smaller ramifications may become obstructed by spontaneous coagulation, the coagulum subsequently extending to the main

trunks. But he evidently considers such cases to be very rare, and believes that they can be distinguished from the more common ones due to embolism by the form and structure of the coagulum itself.

Dr. Humphry is inclined to consider that spontaneous thrombosis of the pulmonary artery is by no means rare; but there can be no doubt that the view which refers most cases to embolism is the one now generally received.

I cannot help thinking, however, that this opinion is not borne out by the recorded facts. I believe that a careful examination of the now numerous instances of sudden death after delivery will show that in a large proportion there was no history whatever of peripheral phlebitis or venous obstruction from which an embolus could be derived; and, further, that there is a clear line of demarcation between the cases due to embolus and spontaneous thrombosis respectively, with regard especially to the period after delivery at which the fatal result ensued.

With the view of elucidating this question, I have tabulated all the cases I have been able to lay my hands on. These amount to twenty-five in all, fourteen of which have been previously collected by Dr. Barnes.*

I cannot hope to do more than make a very small contribution to the general stock of information on so complex and difficult a question, which will probably require years of patient investigation, and a much larger body of facts than we now possess, before we can arrive at any very definite and certain conclusions with regard to it. Still I trust that even the few observations I have to make may prove of interest, as the subject is one of such vital importance to all engaged in the practice of midwifery.

I must first, however, beg leave to record two cases that have come under my own observation, in neither of which does there seem to me to be any evidence of the result being due to the transference of a clot.

CASE 1. *Natural delivery; puerperal mania; peritonitis; death from pulmonary obstruction on the thirteenth day.*—Sarah D——, aged forty-five, married, was confined in the Nightingale ward at King's College Hospital of her first child on the 31st of January, 1865. The labour was rather tedious, but in all other respects perfectly natural. No unfavourable symptoms were observed until the fifth day after delivery, when she became eccentric in manner, and on the seventh she was decidedly maniacal. She did fairly well until the thirteenth day, the pulse being always rapid; but there was no tenderness over the abdomen, nor any œdema of the lower extremities. On the morning of that day she was suddenly attacked with well-marked symptoms of pulmonary obstruction, rapid and gasping respiration, coldness of the face and extremities, and intense syncope. She rallied somewhat on the administration of stimulants; but soon again fell into a semi-unconscious state, and died the same evening.

Shortly *after* she was attacked with chest-symptoms the left leg was found to be swollen, and tender to touch. This was evidently of very recent occurrence, the matron being certain that there was neither pain nor swelling on the previous day.

A post-mortem examination was made twenty-four hours after death. It was found that there had been recent and intense peritonitis. The femoral and other large veins in both lower extremities were filled with dark-red, soft, non-adherent clots, those in the left leg being, if anything, rather larger than in the right, but the difference was not well marked. The vena cava and iliac veins were empty. The left ventricle of the heart contained fluid blood, and in the aortic arch there was a very small pale clot. The pulmonary artery contained an extremely large firm clot, which extended into the right ventricle on the one hand, and into the minute ramifications of both pulmonary arteries on the other. The coagulum adhered firmly to the curtains and tendinous cords of the tricuspid valve, but not to the arterial wall. It was quite solid, and nearly colourless in the larger trunks. It was perfectly uniform in texture through its entire length, and no indication of any impacted embolus could be found, although carefully searched for.†

The history in this case seems to me clearly to show that the pulmonary coagulum was formed before those in the veins of the lower extremities; for not only were the symptoms of pulmonary obstruction observed before the tenderness and œdema of the leg, but the anatomical peculiarities of the clots point to the same conclusion. Those in the legs were soft, dark, and unadherent; while that in the pulmonary artery was dense, firm, partially adherent, and entirely decolorised, as if the fibrin had been deposited for a considerable time. In this respect the ordinary post-mortem signs met with in undoubted examples of embolism were exactly reversed. In typical cases of the kind, several of which will be found carefully described in Dr. Ball's work, the pulmonary coagula are described as being soft and recent, containing here and there portions of older and firmer clots, generally colourless, exactly corresponding to similar clots in some of the peripheral veins, from which they have been broken off and carried through the right side of the heart, until they were arrested in the pulmonary artery, and served as nuclei round which the more recent coagula were deposited.

The clinical history also bears out this view, for in almost every case that can fairly be ascribed to embolism, there have been well-marked symptoms of phlegmasia dolens for a considerable period *before* the fatal attack, seldom less than ten or fourteen days; while in this instance the œdema of the leg showed itself for the first time after the chest symptoms had occurred.

I consider it, therefore, to be a fair inference that the pulmonary obstruction was due to the coagulation of the blood *in situ*, and that the clots in the femoral veins were formed in all probability at a somewhat later period, both having their origin in the same condition of the blood.

* For Synopsis of Cases see Path. Trans., vol. xviii.

† The pulmonary arteries from this case were exhibited at the Pathological Society by Dr. Morris Tonge, medical registrar to King's College Hospital, from whose report the account of the post-mortem appearances is taken.—Path. Trans, vol. xvi., p. 87.

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(*Continued from p. 67.*)

CASE 2. *Placenta prævia, complicated with bronchitis and emphysema; pulmonary thrombosis; death on the fourteenth day.*—On the 8th of October, 1866, a woman twenty-nine years of age, and the mother of five children, was admitted into the Nightingale ward in King's College Hospital. She had been long afflicted with emphysema, and was suffering from an acute exacerbation of her usual chest symptoms. She had lost blood in considerable quantities at intervals for the last month, and at the time of her admission had been in labour for several hours, and was flooding profusely. On examination, the os was found fully dilated, and three-fourths of its diameter was occupied by the placenta. She was losing much blood, and was in so exhausted and debilitated a state that Mr. Dabbs, the resident accoucheur, thought it advisable to terminate the labour at once, and delivered her of a dead child by turning. The uterus contracted firmly, and there was no further hæmorrhage.

For some days she did pretty well, although she was in a very feeble condition, and the bronchitis diminished under appropriate treatment.

On the evening of the fifth day after her delivery the nurse left her feeling comfortable, but on returning to her bedside after a short absence found her in a state of collapse, and breathing with great difficulty. I was sent for, and found her suffering from all the symptoms of pulmonary obstruction. She was gasping for breath, and was almost unconscious, with a pale face and cold extremities. Diffusible stimulants were administered freely, but she never rallied, and died in the course of the night.

On post-mortem examination, the lungs were found highly congested and emphysematous, especially the right lung, in which there were numerous very large bullæ, some as big as a walnut. Both pulmonary arteries, up to the smallest ramifications, contained dark-red, soft, unadherent clots. Both cavities of the heart were empty. No clots were found in the uterine, ovarian, or femoral veins. The uterus itself presented nothing unusual.

This was a very complicated case, and certainly was not due to embolism. The obstruction of the pulmonary arteries was

probably caused by the state of the lungs, in which the circulation must have been much obstructed. Indeed it presented a typical example of the very condition which Virchow himself admits to be an occasional cause of spontaneous thrombosis, and which he believes to be the only one which ever gives rise to it.

In comparing the cases I have collected of death due to pulmonary obstruction, some interesting facts may be observed. In twelve out of the twenty-five cases there were either well-marked symptoms of phlegmasia dolens or crural phlebitis, or the veins of the lower extremities contained coagula. In these instances death occurred on the following days after delivery—viz., the 19th, 42nd, 28th, 13th, 21st, 28th, 29th, 8th, 19th, and 21st. In three of these cases, in which death occurred respectively on the 13th, 8th, and 19th days, there was no evidence before death either of phlebitis or phlegmasia dolens, but coagula were found in some of the veins of the lower extremities on post-mortem examination. Amongst these I have included the first of the two cases above narrated, although I do not consider that it can possibly be a true case of embolism. In two instances the date of death is not mentioned; but of the remaining seven, in all of which there was antecedent phlebitis or phlegmasia dolens, in none did death occur before the nineteenth day after delivery, in most not till a much later period.

This contrasts remarkably with the fifteen cases in which no clots were found in the peripheral veins. In those in which the date of death is mentioned, it took place on the 9th, 14th, 16th, 18th, 14th, 12th, 12th, 8th, 2nd, 11th, 14th, 29th, and 8th days. In all, therefore, with a single exception, the fatal result occurred sooner than in the earliest of those cases which I believe may fairly be ascribed to embolism.

This curious difference is, it seems to me, susceptible of explanation. The first step towards the production of an embolus is admittedly the formation of a coagulum in some of the peripheral veins. But no sooner is the fibrin deposited than it begins to undergo certain changes, which have been carefully studied by Virchow and other pathologists, the primary object of which is evidently to produce absorption of the coagulum, so as to restore the circulation in the occluded vessel. It is unnecessary to describe here what these changes are. They consist chiefly in the retrograde metamorphosis of the fibrin, which is generally either an amylaceous or fatty degeneration. The result is that the coagulum becomes softened; and then some accidental cause gives rise to the detachment of a portion, which, being carried to the right side of the heart and thence to the pulmonary artery, at once produces the phenomena of embolism. It can be readily understood, therefore, why the fatal result should occur after a considerable lapse of time, and when convalescence seems to have been fairly established. For, first, we have the local clotting, due very probably to a similar blood dyscrasia as that which produces spontaneous thrombosis in the pulmonary artery; and it is not till the clot so formed has had time to change and soften that portions of it become detached and form the embolus which proves fatal. When spontaneous thrombosis occurs, on the other hand, it must arise from the state of the blood rendering it peculiarly apt to coagulate; and this is more likely to be met with at a much nearer period to delivery. The pulmonary obstruction may then, indeed, be considered as taking the place of, and occurring about the same time as, the peripheral coagulation in undoubted cases of embolism.

It is interesting to observe how the condition of the blood in the puerperal state increases the tendency to thrombosis, and in this we have a sufficient explanation of the frequency of its occurrence after delivery. Indeed there is probably no other condition of the body in which so many circumstances concur to favour coagulation. For not only is there an actual excess of fibrin as the result of pregnancy, but a vast quantity of material destined for excretion is circulating in the blood for some time after delivery, the product of the involution which is going on to reduce the uterus to its usual size. And, in addition to this morbid constitution of the blood, an examination of the cases will show that when spontaneous thrombosis has occurred, the patient has, in a large majority of instances, been in a very feeble and exhausted state. Thus, out of the fourteen cases in which no clots were found in the veins after death, in no less than eight was there either post-partum hæmorrhage, or the patient was expressly described as being extremely weak and anæmic. Now, taken by itself, the state of the blood thus produced would, independently of all other circumstances, greatly increase the tendency of the fibrin to become deposited. Dr. Richardson's opinion is very clear on this point. "There is," he observes, "a condition which has been long known to favour coagulation and fibrinous deposition. I mean loss of blood, and syncope or exhaustion during impoverished states of the body. The explanation here is, that these states are attended, as a general rule, by an excess of fibrin in the blood, as well as by an excess of water. The fibrin solvent is thus widely distributed, the density of the blood is reduced, the fibrin superabounds, and stasis only is required to give all the circumstances favourable to deposition."* When, therefore, we have the alteration so produced, added to the already vitiated state of the blood due to puerpery, we cannot but regard the occurrence of thrombosis as a very probable circumstance.

It would be a question of great importance to decide if there is a sufficient difference in the character of the clots found in the pulmonary arteries to enable us to decide by inspection whether they are due to spontaneous thrombosis or embolism. Dr. Ball seems inclined to answer in the affirmative. He believes, if I understand him aright, that in a clot depending on embolism the embolus may be observed of a similar texture to the clots in the peripheral veins from which it was originally derived, surrounded by more recent fibrin, which can be readily distinguished from it; while, on the other hand, clots of spontaneous origin are identical in appearance with thrombosis of the peripheral veins, being dense, firm, white in colour, homogeneous in structure, and having a smooth, rounded head pointing in the direction of the heart. This form and direction he explains on the hypothesis that spontaneously formed clots always originate in the minute ramifications of the pulmonary arteries, gradually creeping backwards towards the larger branches. For this assumption, however, I do not see sufficient grounds. Dr. Ball considers it difficult to believe that the blood can coagulate in the primary divisions of the pulmonary arteries, because the propulsive movements of the heart would disturb it, and effectually prevent the separation of the fibrin. Dr. Humphry, however, has shown that the anatomical arrangement of the artery is such as to favour stasis and coagulation of the blood in the main trunks at the root of the lungs. He observes that "In this situation the artery breaks up at once into a number of branches, which radiate from it, at different angles, to the several parts of the lungs. Consequently a large extent of surface is presented to the blood, and there are numerous angular projections into the current; both which conditions are calculated to induce the coagulation of the fibrin."† And if, as I have pointed out, it be true that spontaneous thrombosis generally occurs in exhausted and enfeebled patients, subject to syncope, and in whom there is a very weak action of the heart, it seems to be by no means unlikely that the deposition may primarily take place in the larger branches, where it is found after death. However, I think that we are scarcely yet in a position to speak dogmatically on this point. When more attention has been paid to the characters of the clots in various cases, and when the results of a larger number of post-mortem examinations have been recorded, it is by no means improbable that much light may be thrown on the origin of the obstruction.

A question of great interest arises as to whether recovery does not in some cases take place after the pulmonary artery has been occupied by a coagulum. This is a point of much importance, which has as yet scarcely received any attention. We are every now and then meeting with cases after delivery in which there are formidable symptoms of syncope, attended by embarrassed respiration and all the phenomena usually ascribed to embolism, in which, nevertheless, a more or less perfect recovery eventually takes place. Such cases have been usually ascribed by authors who have written on the subject to what they call "idiopathic syncope," a term invented to account for phenomena otherwise inexplicable. The symptoms, however, are so precisely those of pulmonary obstruction that it seems far from unlikely they may really be due to that cause. Mr. Paget has published a case of pulmonary thrombosis in a male patient, from which he draws the inference that "in certain circumstances a great part of the pulmonary circulation may be arrested in the course of a week (or a few days more or less), without immediate danger to life, or any striking indication of what has happened."‡ Virchow also found clots in the pulmonary artery in several cases in which there had been no symptoms during life to give rise to a suspicion of their existence.

The history of many of the fatal cases renders it quite certain that the deposition of the fibrin had existed for a consi-

* The Causes of the Coagulation of the Blood. By B. W. Richardson, M.D. p. 422. London, 1858.

† Op. cit., p. 29.

‡ Med.-Chir. Trans., vol. xxviii., p. 358.

derable time without causing much distress, until some unusual exertion induced a call for blood which could not be supplied through the obstructed vessels, and hence the sudden syncope which carried off the patient. Is there anything improbable in the supposition that some of the cases of so-called "idiopathic syncope" may really have been of the same kind, with this exception, that the patient rallied and survived, and that the obstruction in the artery has been eventually removed?

(*To be concluded.*)

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(*Concluded from p. 95.*)

CLOTS in the peripheral veins are certainly frequently absorbed, and the circulation in the occluded vessels becomes as perfect as ever. So strong is the tendency to this that Humphry observes with regard to it: "It appears that the blood is almost sure to revert to its natural channel in process of time, unless the vein be completely destroyed."* If this, then, be so frequent an occurrence in the venous system generally, surely it is more than probable that it may now and then occur in the pulmonary artery also. The following cases, which have come under my own observation, seem to me to be explicable on no other hypothesis.

CASE 3. *Post-partum hæmorrhage; symptoms of syncope on the eighth day; recovery.*—On the 27th of April, 1864, I attended a young lady, twenty-three years of age, in her first confinement. She was a healthy person, and had a perfectly natural labour. It was followed, however, by hæmorrhage, but not to any excessive amount; and this was soon checked by pressure on the uterus, the administration of ergot, and cold applications. On the sixth day the lochia became very fetid, but were not diminished in quantity. In all other respects she seemed very well. She was, indeed, weak from loss of blood; but her pulse was under 100, the skin was cool and moist, there was no tenderness over the abdomen, and there was an abundant secretion of milk. I ordered her injections of tepid water and Condy's fluid, to remove the fetor of the discharges. On the next day she had one or two fits of hysterical crying, and felt low and depressed. The lochia were still intensely fetid, but she was no worse in any other way. On the following morning (the eighth from her delivery) she awoke feeling better, and ate a hearty breakfast. About half an hour afterwards the nurse, going to her bedside, found her in a state of collapse, gasping for breath, and unable to speak. She immediately gave her some brandy, but with little effect. I was sent for at once, but in the mean time, her condition being so alarming, they also sent for the nearest medical man, Mr. Willington of Sumner-place, who administered brandy, ammonia, chloric ether, &c., freely. I did not reach her until an hour and a half after her first attack, when I found her somewhat rallied. She was then ghastly pale, with an anxious, pinched look about the face. The pulse was 110, soft, and compressible. The respirations were only slightly increased in frequency, and no abnormal sounds were audible about the heart and great vessels. She was ordered a mixture containing sesquicarbonate of ammonia every hour, and a dessertspoonful of brandy every second hour. The most absolute rest was enjoined, and the nurse was directed not even to allow her to raise her head off the pillow. She felt "faintish" every now and then for several days, but eventually made a perfect recovery, and has since had another child, after a natural and easy labour.

The second case is perhaps still more to the point.

CASE 4. *Severe post-partum hæmorrhage; intense syncope a week after delivery; frequent recurrence of the attacks; recovery.*

—This case occurred in a patient of Dr. Arthur Farre's, with whom I attended. A young lady, of feeble and delicate health, was confined of her third child on the 19th of October, 1866. She had an easy labour which was followed by very profuse hæmorrhage. All the ordinary means—pressure, ice, the cold douche, ergot, &c.—failed to check the flow, which was eventually arrested by injecting the cavity of the uterus with a solution of perchloride of iron. She was much exhausted, her countenance was blanched, and she had sighing respiration. Perfect rest was enjoined, and for a week she seemed to be doing well, taking strong essence of beef, and six drachms of brandy every second hour.

During the whole of the seventh day after her confinement she felt unusually weak, complained of faintness, and said that her head felt dizzy whenever she moved it. About six o'clock the same evening she suddenly called out that she was dying, and fell into a state of syncope. She rallied on the administration of stimulants, and when I saw her, about an hour after the attack, she was still highly excited, and said she felt as if she was going to die; but the respiration was not then rapid; the pulse was feeble and small, about 130; the hands and feet were numb and cold. The most absolute rest was enjoined, and stimulants and restoratives were administered freely. For several days she remained in a very critical condition, the slightest exertion bringing back the tendency to faint. On one occasion I detected a faint blowing murmur at the base of the heart, but it was not permanent. The auscultatory phenomena were in other respects perfectly normal.

For nearly two months she continued in the same feeble state. As long as she remained in the recumbent position she felt pretty comfortable, but any attempt at sitting up in bed, or any unusual exertion, immediately brought on embarrassed respiration. It was also found necessary to continue the same amount of stimulants she had been taking from the first, as any diminution in the quantity at once brought on a tendency to syncope. She is, as I write, getting slowly and gradually better, but is unable to sit upright for more than a few minutes at a time.*

The next case I did not see during the attack, but the circumstances were related to me by the patient herself, a person of great intelligence, and I took every means in my power to satisfy myself as to the details of her illness. I have therefore no hesitation in recording it, and believe her account of the case to be substantially correct.

CASE 5. *Symptoms of pulmonary obstruction eleven days after labour; phlegmasia dolens; recovery.*—On Aug. 20th, 1866, I was consulted by a lady forty-four years of age, the mother of twelve children. She complained of general weakness and debility, and she had phlegmasia dolens of the left lower extremity, which was hard and swollen up to middle of thigh. She informed me that she had had an easy labour on the 6th of July. She made a good recovery, and on the eleventh night went to bed feeling very well. There was no swelling or discomfort of any kind about the lower extremities at this time. About half-past three A.M. she was sitting up in bed, when she was suddenly attacked with an indescribable sense of oppression in the chest, and fell back in a semi-unconscious state, gasping for breath. Her husband, greatly alarmed, went for the nearest medical man, who administered stimulants freely. She remained in this condition for about three hours, when she commenced to rally. The secretion of milk, previously abundant, was suspended. Two days *after* the attack, symptoms of phlegmasia dolens came on; the left leg swelled, and has since remained in the same condition as it was when I saw her. She has since been very feeble and out of health, but there has been no recurrence of syncope.

Now in all these three cases the symptoms and history are exactly those of pulmonary obstruction. Had the patients died, and no post-mortem examination been allowed, I think no one would have hesitated a moment as to the diagnosis. They also illustrate well the points in the history of the disease I have endeavoured to explain. In two out of the three there was post-partum hæmorrhage, and a tendency, therefore, to coagulation from the altered condition of the blood. In all the three the attack occurred before the twelfth day after delivery—just the time, as I have previously observed, at which spontaneous thrombosis most generally takes place. The last case was certainly complicated with phlegmasia dolens; but this did not show itself until two days after the chest-symptoms. On this point there can be no doubt, as the patient was perfectly sure that, at the time of her attack, no swelling of the leg existed. I believe, therefore, that, as in Case 1, this is an instance of pulmonary and peripheral thrombosis occurring simultaneously, from some condition of the blood tending to coagulation. I have no doubt that many practitioners have met with similar cases, which seemed at the time inexplicable; and it is in all probability simply because the attention of the profession has not been directed to the subject that more are not recorded.

Dr. Arthur Farre agreed with me as to the probable cause of the attack in Case 4, and informed me that he had seen more than one case in his practice which he now believed to have been caused by pulmonary obstruction, and in which the patients eventually made a good recovery.

If I have rightly interpreted these cases, they teach us the lesson that we should not entirely despair when we meet with a case presenting the symptoms of embolism. Unfortunately the question of treatment is one on which but little can be said. By far the most important indication is, doubtless, to enforce the most rigid rest, scarcely even permitting the patient to move for a long time after the occurrence of the suspicious symptoms, so as to enable sufficient blood to pass through the obstructed vessels to carry on the animal functions until a free channel for the circulation is in the course of time restored. The history of all the fatal cases clearly shows how dangerous is any action which calls for an increased supply of blood; for the fatal attack has almost invariably been the direct result of some unusual exertion. In addition to this, a free administration of stimulants, and a liberal supply of strong animal soups, will be indicated to support the strength as much as possible. It is to be feared that no medicinal agents are likely to be of any service, except in the way of stimulants and restoratives.

No less than twelve out of the twenty-five cases occurred in primiparæ; while of the remainder there are several in which nothing is said as to whether the patient had previously borne children or not. Whether this is a mere accidental circumstance, or whether there is actually a greater tendency to deposition of fibrin in first than in subsequent labours, I am unable to say. It is sometimes said, on the other hand, that phlegmasia dolens is more common in multiparæ. Probably a much larger mass of statistics is required before we can come to a conclusion on this point, but as far as our present cases go the number of primiparæ greatly predominates.

Finally, I think the facts before us justify the following conclusions:—

1. Obstruction of the pulmonary artery after delivery may depend either on embolism or spontaneous thrombosis.
2. The former usually occurs at a much later period after delivery than the latter; and spontaneous thrombosis probably corresponds with, and is due to some cause similar in its nature to, that which produces the obstruction of the peripheral veins in true cases of embolism.
3. Both thrombosis and embolism are much more common in patients who are anæmic and weak, either from hæmorrhage or other cause.
4. It is probable that obstruction of the pulmonary artery sometimes occurs without proving fatal.
5. The main element in the treatment of such cases is the most rigid rest, and a nourishing supporting regimen.
6. As far as present statistics go, thrombosis and embolism seem more common in primiparæ than in multiparæ.

Addendum.—The following case has come under my observation since the above was written, and, although not connected with the puerperal state, it is in itself so instructive and interesting that I venture to relate it. It would be impossible to bring forward a more striking example of the insidious way in which this affection sometimes comes on, or of the terrible suddenness with which it may carry off a patient whose general condition shows no ground for alarm.

Rheumatism of the knee of three days' duration; sudden death; obstruction of the pulmonary arteries.—On Friday, the 15th March, 1867, I was requested to prescribe for one of the nurses employed in the children's ward at King's College Hospital. She was an apparently healthy girl, nineteen years of age. She complained of pain in the right knee, which was, however, neither swollen nor tender on pressure. The pain had been felt on the previous day for the first time. The bowels were constipated, and the tongue was foul; but there was no general feverishness, the skin was cool and moist, and the pulse was under 80. She had never suffered previously from rheumatism. Altogether, she gave me the idea of having a very slight indisposition. I prescribed an alkaline mixture containing bicarbonate of potass, with a Dover's powder at bedtime if the pain rendered it necessary. She had already taken some aperient medicine, which had not as yet ope-

* This lady has since made a perfect recovery.

rated. The knee was wrapped in cotton wadding and oiled silk. On the next day I did not see her, but it appears that she remained in much the same condition. There was no pain in any other joint. She took her food well, and was cheerful and happy as usual. She merely stayed in bed to rest her knee. On the morning of Sunday, the 17th, she awoke at six A.M., and entered into conversation with one of the other nurses who slept in the same room. She said that she had passed a good night, and that she felt altogether better. Shortly after this she complained of feeling weak, and asked one of her companions to give her a bed-pan, as she wished to pass water, and felt disinclined to get out of bed. The nurse gave it to her, and retired to the other end of the room to dress herself, but soon returned to ——'s bedside, being attracted by her rapid and gasping breath. Her appearance was so alarming that she called out for assistance. Dr. Fenn, the house-physician, was immediately summoned, but she was dead before he could reach her.

An autopsy was made by Dr. Kelly, Pathological Registrar to the Hospital, twenty-six hours after death. There was no effusion in the pericardium, and so sign whatever of either pericarditis or endocarditis. The structure and valves of the heart were healthy. The left side of the heart and the aorta were empty. In the right ventricle there was a large, firm coagulum of decolorised fibrin, adherent to the valves and walls of the ventricle. A similar clot extended into the pulmonary arteries on both sides for a considerable distance, but did not reach the smaller ramifications. It was of the same firm structure as that in the ventricle, of a pale-yellow colour, and cylindrical in shape. It was quite solid, nothing like a central channel existing. It was not attached to the coats of the arteries, which were themselves healthy in appearance. Both the cardiac and arterial clots were perfectly uniform in structure, there being no trace of an impacted embolus. The vena cava and iliac veins contained dark black clots, evidently of post-mortem origin, and entirely different in structure and appearance from those in the pulmonary arteries. All the other organs in the body were healthy.

Here we have a blood dyscrasia, in so far, at least, resembling the condition after delivery that there was an increased amount of fibrin present. However great the alteration of the blood may have been, it is certain that there were no general symptoms calculated to give rise to the least anxiety. There were four nurses sleeping in the same room as this girl. They had all been chatting and laughing together the previous night, and none of them saw anything to make them think that their companion was even seriously ill. One of them, who had been wakeful during the night, had noticed how calmly and quietly she slept. It appears to me that there had been deposition of fibrin going on for some time before death, probably during the whole night. On waking, before making any exertion, she felt pretty well, although weak. The attempt to micturate, however, necessitated an exertion which acted as the immediate cause of the fatal syncope, as happens in the majority of fatal cases. Before this sufficient blood reached the lungs to carry on respiration without much inconvenience, but enough could not pass when respiration was hurried by movement.

I see no reason to doubt this being a true case of thrombosis, not of embolism. There were no peripheral clots from which an embolus could come, nor was there any appearance of an impacted portion in the clot itself. If so, it goes far to disprove Dr. Ball's theory, that spontaneous thrombosis can only form in the smaller divisions of the pulmonary arteries, gradually creeping up to the larger ones, since in this case the smaller ramifications were collapsed and empty.

Curzon-street, Mayfair, 1867.