OBSERVATIONS ON A CASE OF SUDDEN DEATH
AFTER DELIVERY, FROM EMBOLISM OF THE
PULMONARY ARTERY.By W. S. PLAYFAIR, M.D., M.R.C.P.,
Assistant Obstetric Physician to King's College Hospital.

IT is with some hesitation that I have employed the word "embolism" in describing the following most interesting case, since its use has been roundly denounced by so high an authority as Dr. Richardson, in his recently published lecture "On the Deposition of Fibrine from the Blood within the Circulation."

When one who has devoted so much attention to this subject expresses his hope that "in England, at least, where practical common sense, as apart from jargon, is so boasted of, we shall give up the use of a term which means nothing but obscurity," it requires considerable boldness to express a contrary opinion. It must be confessed, too, that Dr. Richardson has some good grounds for his objection, and that much confusion has arisen from the indiscriminate application of the term to two very distinct and easily distinguished classes of cases.

What these are, he thus describes:—"In the ready twang of the word 'embolism' are now confounded two distinct series of facts—the fact of a floating of a mass (*of fibrine*) from one part of the circulatory system to another part, and the fact of the separation and fixation of a mass at the very point where it is found after death."

It is scarcely the case, however, that the confusion of these two pathological states is so universal as Dr. Richardson would seem to imply. Dr. Barnes, Dr. Humphry, and others, have clearly pointed out the difference between them; and, in a series of papers published in the *Lancet* in 1867 (July 20 and 27, and August 10) "on Thrombosis and Embolism of the Pulmonary Artery as a Cause of Death during the Puerperal State", I have myself laid considerable stress on the importance of distinguishing them. Nor does it seem to me that Dr. Richardson in any way puts the matter in a clearer light by abolishing the term embolism altogether, since he proposes no substitute for it, and describes both the classes of facts above alluded to, under the somewhat cumbrous designation of "Separation of Fibrine from the blood within the Circulation." It appears to me that the real and important difference between the two classes of cases is as entirely lost sight of, as it is when the word "embolism" is indiscriminately applied to them both. Without defending the term from the stigma of barbarity, which Dr. Richardson attaches to it, it seems to me to be as practically useful as any that can be suggested, and now to be too firmly fixed in medical nomenclature to be changed. It is of primary importance, however, that the exact meaning of the word should be borne in mind when it is used.

By *embolism* we mean those cases in which a portion of fibrine is detached from a clot in a blood-vessel, and is carried through the circulation until it becomes impacted in another, and possibly very distant, part of the circulatory system, where it may become the nucleus round which fresh fibrine is subsequently deposited. When the fibrine is deposited *in situ*, in the place where it is found after death, the term *thrombosis* is the one which should be used; and it is to be observed that every case of *embolism* must necessarily be preceded by *thrombosis*, for, unless a thrombus or clot exist in some part of the circulatory system, there is no deposited fibrine from which an embolus can be detached.

Although the words can be used in reference to any part of the vascular system, I would wish to be understood as referring more particularly to those cases in which fibrine is found obstructing the right side of the heart and pulmonary arteries; cases which, in reference to the puerperal state, are of extreme importance to the accoucheur, and deserve the most careful study.

There can be no doubt that embolism in this situation has been more generally considered the cause of sudden death after delivery than thrombosis. This is the view that has been maintained by Virchow, and by Wade and others who have written on the subject in this country. In fact, the possibility of the coagulum forming *in situ* has been almost entirely overlooked. In the paper above alluded to, I ventured to maintain a contrary opinion. I then said: "I believe that a careful examination of the now numerous instances of sudden death after delivery will show that in a large proportion of them there was no history whatever of peripheral phlebitis or venous obstruction from which an embolus could be derived." I am pleased, therefore, to find that Dr. Richardson, who has devoted much attention to the point, considers true embolism to be comparatively rare; and points out, very graphically, how the heart

and pulmonary arteries are, from their anatomical arrangements, a likely situation for the separation of fibrine.

It seems to me that the term *embolism* should never be applied to cases of fibrinous obstruction in the heart and pulmonary arteries, unless two conditions are met with on *post mortem* examination. One is the existence of a clot in some part of the peripheral venous system, from which an embolus can be derived; the other is the existence in the pulmonary clots of separate travelled portions of fibrine, corresponding in structure to the peripheral thrombus, round which more recent fibrine is generally deposited. If no clots exist in any of the veins, the case clearly cannot be one of embolism.

Many cases have been carefully examined in which the existence of true pulmonary embolism is beyond all doubt.* The following, in which the travelled embolus was not only found, but the exact site from which it was detached also determined, is so remarkable that it seems to me to be well worthy of record.

Jane W., 21 years of age, was admitted into King's College Hospital, under the care of Mr. Henry Smith, early in the month of December 1868, suffering very severely from intense pain on defecation, which was, ascertained to depend on a fissure in the rectum. She was then in the sixth month of her third pregnancy. Two years ago she had suffered in the same way, and her symptoms were then so severe that Mr. Smith had operated on her, although she was then also far advanced in pregnancy. No unfavourable results followed, and she had gone to the full time, the rectal symptoms having been greatly alleviated. Encouraged by his former success, Mr. Smith determined to operate again, and this was accordingly done on the 5th of December.

On December 7th, she began to complain of pain in the back, accompanied by a slight discharge of blood, when she was at once removed into a separate ward. Opiates were administered, and the usual treatment for averting premature delivery resorted to. For several days it was hoped that labour might be prevented; for, although slight uterine contractions recurred every now and then at long intervals, the os remained unopened, and there was no discharge. The appetite was good, the pulse quiet and regular, the pain on defecation much diminished, and the patient was in every other respect apparently in perfect health.

Things went on exactly in the same way until December 13th, on the morning of which day she had one or two very slight pains, but was otherwise cheerful and well. Late on the evening of that day, however, her pulse and temperature gradually rose without any evident cause, and at 10 P.M. her pulse was found to be 160, her temperature 103, and her respirations 40. She complained of no pain, and there was nothing to show what could be the cause of this sudden change. Shortly afterwards she vomited a large piece of undigested meat, showing no sign of mastication, which, she stated, she had swallowed accidentally when disturbed during her dinner on the same day.

At 1.30 A.M., uterine contraction had increased in strength; the pulse being now 104, the temperature 100. At 5.45 A.M., the entire contents of the uterus were expelled, the membranes being unruptured.

The condition of the patient was noticed by Mr. Pedler, the resident accoucheur, to be at this time as follows: "She was suffering from extreme dyspnoea, the countenance was excessively pale, her lips white, the face generally expressing *extreme* anxiety. The uterus was well contracted. No pulse could be felt at the wrist, nor at the posterior tibial artery. The sounds of her heart were almost *nil*." In fact, she had all the symptoms of obstruction at the right side of the heart, most characteristically developed. Stimulants were administered freely. The patient called incessantly for air, and said she was being suffocated. She died at 7.45 A.M., and during the last few seconds of her life the face was convulsed.

A *post mortem* examination was made eight hours after death by Dr. Kelly, the pathological registrar to the hospital, from whose notes the following account is abridged. On opening the thorax, the lungs were found collapsed; there were no adhesions or fluid in the pleura; the lungs themselves were quite healthy, unusually light, and containing very little blood. The bronchial mucous membrane was a little congested, and there was no frothy mucus nor pus in the tubes. The heart weighed nine ounces, and was quite healthy in structure. The right side of the heart was extremely distended, and also the large veins of the neck and the two caveæ; the left ventricle was small, and the pulmonary veins were nearly empty. The right side of the heart was filled with a soft black coagulum, on the upper surface of which was a little discoloured fibrine; it had all the appearance of a recent *post mortem* clot. At the bifurcation of the pulmonary artery, plugs of firm

* See especially Dr. Benj. Ball's valuable work, *Des Embolies Pulmonaires* Paris: 1862.

fibrine were found obstructing the passage of the blood, more especially on the left side, where they extended for about an inch and a half into the primary divisions of the pulmonary artery. Beyond these the arteries were nearly empty, containing only a little fluid blood. These clots were of a yellowish or buff colour, very firm, but not moulded to the vessel in which they lay, and were very different from the soft gelatinous clot in the right ventricle. They were of a leathery consistence, and were not surrounded by any black coagulum. On section, they were all uniform in colour, and partially laminated, with the exception of one, which lay across the pulmonary artery, and was nearest to the heart. In the centre of this, was found a piece of fibrine, of the shape of an almond, and three-quarters of an inch long, surrounded by, but separate from, the remainder of the fibrine, which was of less firm consistence. At its base was an irregular surface, which fitted closely to a corresponding rough surface in a clot in the iliac vein. The valves of the heart and large vessels were quite healthy in structure, and none of the clots were adherent. At the junction of the internal and external iliac veins on the right side was a clot of fibrine about two and a half inches long, adherent at its distal end to the internal iliac vein, while its other extremity was free and lay in the common iliac vein, but not filling up the whole of its canal. About its centre was the roughened portion previously described, from which the nucleus in the pulmonary clot seems to have been detached. The uterus was perfectly healthy and well contracted, and its veins contained no coagula.

The symptoms which caused the death of the patient were so characteristic of obstruction of the right side of the heart and pulmonary arteries, that no other diagnosis was possible. They are precisely those which have been described in numerous cases of the kind which have been recorded. The very careful *post mortem* examination conducted by Dr. Kelly clearly showed that this was a true case of embolism. For, first, was found the firm coagulum obstructing the right iliac vein, showing a ragged portion at the juncture of the right with the common iliac vein, which looked exactly as if a piece of fibrine had been detached from it, and markedly different in appearance from the smooth surface of the coagulum at every other part. Then in the pulmonary arteries were found various masses of fibrine obstructing their calibre, and in the centre of one of these a separate nucleus of fibrine, differing in texture from that surrounding it, and presenting at one extremity a jagged portion, *which accurately fitted the corresponding point in the iliac clot.*

It is very clear, therefore, what had occurred. At some period during the eight days which elapsed between the operation and death, a coagulum had formed in the iliac vein. The portion found in the centre of the pulmonary coagulum had become detached, and was carried through the venous circulation until it was arrested in the pulmonary artery. This, probably, corresponded with the sudden rise in the pulse and temperature on the evening preceding delivery. During the night, the fresh fibrine which surrounded it was deposited, and the pulmonary arteries became more and more obstructed until death ensued. The original coagula in the iliac veins seem to have caused no symptoms, or at least none that were observed.

This explanation of the phenomena is necessarily theoretical, but it is, I believe, the only one which will fully account for the symptoms, and it is strictly in accordance with what has been observed in other cases which have been recorded. There is one difference, however, between this and every other other case of undoubted pulmonary embolism after delivery, which I have yet met with, which is worthy of remark. I have shown by an analysis of twenty-five cases after delivery that, in twelve which were probably due to embolism, the death occurred a considerable time after delivery—generally after the nineteenth day; while, in the remaining fifteen, where the coagulum apparently formed *in situ*, the fatal result occurred at a much earlier period. I explain this curious difference on the supposition that embolism must be preceded by the formation of a blood-clot in some of the peripheral veins, in consequence of a similar blood-dyscrasia to that which produces primary coagulation in cases of pulmonary thrombosis, and occurring about the same time after delivery, and it is not till then the clot so formed has had time to change and soften that a portion of it becomes detached and carried through the circulation to the heart.

In the case above narrated, however, the embolus seems to have been detached *before* delivery. The difference is probably due to the fact that the iliac clot was formed during some portion of the eight days which elapsed between the operation and the death of the patient; and its original deposition may have been produced by some blood-changes resulting from the operation itself. In the absence of any definite data as to the exact time at which it was formed, there is nothing to prevent us from believing that a sufficient period had elapsed to allow of those retrograde metamorphoses of the fibrine which favour the separa-

tion of a portion. As this is the only case in which death so nearly coincided with delivery, and as it was preceded by an operation, it seems a very fair inference that the operation was in some way the determining cause of the coagulation in the iliac vein, from which the embolus was derived. There can be no doubt that the alteration in the blood due to pregnancy favoured the occurrence; but, beyond this, it is questionable whether the delivery itself had anything to do with it; and I see no reason to alter the conclusion at which I formerly arrived, "That embolism usually occurs at a much later period after delivery than thrombosis; and that 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."

NOTES OF A CASE OF SEPARATION OF THE UTERUS FROM THE BODY BY LACERATION DURING LABOUR.

By THOMAS PAGET, F.R.C.S., and EDWARD R. C. DENTON, M.R.C.S., Leicester.

THE distressing imputations which Mr. Popplewell has recently incurred by attendance upon a case of entire separation of the uterus from its vaginal attachments, prompts us to offer the following report of a similar sad occurrence which has come under our own notice. The more frequent such records become, the less liable will our professional brethren be to suffer from misconstruction on the part of the ignorant.

February 11th, 1869. S. F., aged 24, the mother of two children, was confined of her third full-grown child this morning early. The labour was described by the midwife and others present as not unusually severe, and it was over in three hours. The placenta was removed with but little traction twenty minutes after the birth. To this, however, on examination, a large fibrous mass was found to be attached, and closer investigation showed that this mass comprised the whole uterus, Fallopian tubes and ovaries; with, of course, their usual peritoneal covering. The vaginal membrane hung loose and was jagged by laceration. Surgical aid was sought; but the poor woman collapsed and died in full retention of her senses about three quarters of an hour after delivery, and before Mr. Denton's assistant could arrive. The quantity of blood lost does not appear to have been large or above the average of labour.

Post mortem section showed the pelvis occupied by coagula; and the hand passed from the abdomen to the os externum, through which the fingers readily made their way out.

If it appear at first as probable that in these cases the dreadful result has for its cause an undue force used by the obstetrician, let us take a view of the uterus at the point of mature gravidity, floating in the abdomen, moored, so to speak, to the pelvis only by the round ligaments and the unsubstantial vagina. Then let us see it in labour as the power for forcing the fetus through the pelvis, the only power, indeed, except the abdominal muscles, attenuated as they are at the full period. Whether their aid be much or little, or whatever may be the force left for the uterus to exert, its capability and habit of violent effort is great, and may be estimated by the pinching and extrusion of the hand of the operator in cases of turning and hour-glass contraction, and cannot be lightly considered by those who have had their hand paralysed for the time by it.

For the exertion of the detrusive power of the uterus, there is no *point d'appui*, no purchase, except the forenamed slender moorings—the round ligaments and sheet-like attachments of the vagina. Who shall wonder that they occasionally give way? Nor, looking further at the mechanism of parturition, and the opportunities of doing mischief open to the practitioner, do we find more than the bare possibility of this damage arising from such a source. It is certain that no force can be applied to lacerate the uterus from its pelvic attachments until it is inverted and wholly outside the vulva; and surely not the most wretched meddler would be so mindless as to continue traction beyond this point—to remove a placenta when twice its substance was already in hand. The uterus, too, after dilaceration, would remain inverted, which condition has never yet been named in connection with the accident, and certainly did not obtain in the present case. If any one, then, be ready to believe that in turning or hour-glass contraction of uterus sufficient force can be used by the operator simultaneously with the paralyzing contraction of the womb itself to tear away the womb itself, we cannot think that he has ever had his hand cramped into a powerless state as above.

It may be mentioned that the verdict at the inquest expressed that there was not sufficient to show that undue force had been exerted by the midwife, who had previously attended more than 500 labours.